CONNECTING THE DISCIPLINARY DOTS: FACULTY ATTITUDES
TOWARD THE PROFESSIONALIZATION
OF WEB DEVELOPMENT

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Professionalization offers rewards such as prestige, financial benefits and autonomy. Fields such as nursing and social work have undergone the professionalization process. This exploratory study examined faculty attitudes regarding the professionalization of web development as defined by the Hall model of professionalism. The purpose of the study was to understand how faculty view web development as a profession. Based on the Hall's Professionalism Scale (1968) and modified survey by Snizek (1972), the Web Development Professionalism Inventory (WDPI) was used to explore faculty attitudes toward professionalization.

This study surveyed faculty about their views on the structural and attitudinal components of web development, their demographics, education, teaching experience and professional experience. Principal component analysis identified five factors of professionalization consistent with Hall (1968) and Snizek (1972). This study defined web faculty based on their experience teaching web courses. Web faculty have web-related professional experiences but lack formal education. Both web faculty and non-web faculty supported the web development as a required knowledge area Computing

Curricula, and the need for a code of ethics. Although membership in web professional organizations was low, participants selected the W3 as the professional organization representative of the web development field. This study shows both web faculty and non-web faculty support web development as a profession.

Although web development meets some of the criteria of a profession, the field has not reached professionalism status. This study lays the groundwork for the web development field to begin discussions on the need for professionalization. Although web development may be a marginal profession, this status will be able to change over time as the profession develops.

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by

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CHAPTER I: INTRODUCTION

The number of computers, tablets, smart phones, and web sites are growing every year. Hackers are continuing to create, modify, and repackage malicious programs delivered through email and web sites. Emails continue to include traditional attacks such as phishing, spam, and malware (Relations, 2011). Computer users can unintentionally download viruses, malware programs, spyware and unwanted programs from web based applications that allow an attacker to perform any number of tasks, including identity theft and rendering computers inoperable.

In recent years, with the proliferation of social media, more advanced techniques are being used to redirect users to malicious web sites, access personal data and impersonate users. With social networks like Facebook growing to 500 million users, the threats to users' personal safety and relationships, professional reputation, identity, and proprietary data are also expanding (McDowell & Morda, 2011).

Web application security continues to be one of the major security concerns for the government and companies as the numbers of web-based applications continue to rise (B. Sullivan & Liu, 2011). Web applications, consists of one or more web sites and often interact with data, email, and other network applications.

According to a study by the Ponemon Institute, 74 percent of the 637 experienced information technology and information technology security practitioners surveyed believe web application security is critical to other security issues faced by their companies (Westervelt, 2011). The majority of subjects reported that their company had been hacked through their own unsecured web applications and that the web hosting service provider was responsible for securing the web applications. Despite the risks, the study showed that many of these companies do very little if any testing of their web applications and the majority of companies were not well prepared to fix web application vulnerabilities quickly. The most common way companies protected web applications was with firewalls. B. Sullivan and Liu (2011) explained while firewalls are necessary for network defense, they are not useful for web application security.

The government, companies, and society need to be confident web applications are able to maintain privacy and data security. Many of the ten most common web security problems are caused by misconfiguration and poor programming practices ("OWASP Top Ten Project," 2013; B. Sullivan & Liu, 2011). In 2004, the OWASP included injection flaws as part of their top ten critical web application security flaws listing. Injection flaws allow hackers to insert commands into a web page that has a form, which can allow the hacker to break into the web server, database or other software that a company may be running. Authors such as B. Sullivan and Liu (2011) show how to reduce this risk using web programming techniques such as validating the form data to make sure the data does not contain commands that could be harmful. However, this risk has grown to the number one risk on the OWASP top ten listing in 2013. No web site is more at the front of the news media today than www.healthcare.gov. David Kennedy, CEO of a security firm named TrustedSEC, testified in a hearing before the Science, Space, and Technology committee in November 2013, about the security issues with the web site. ("House Science, Space, and Technology Committee Hearing," 2014). Kennedy reported that hackers continued to use injection to attempt to gain access to the California Obama Care web site and hijack other users accounts.

There is no definitive reason known for the ongoing security risks from web applications. Kennedy ("House Science, Space, and Technology Committee Hearing," 2014) indicated that the web site "fails to meet even basic security practices for protecting sensitive information of individuals and does not provide adequate levels of protection for the web site itself." Kennedy called for the government to take a more active role to learn about security issues in cyberspace and the causes of these security incidences. While in the past, emphasis has been on the attacks and attackers (Bosworth & Jacobson, 2009), the logical approach is to look at who is developing and securing these web applications.

Web Developers

A web developer is a person that design and creates web applications but may have a different job title such as web administrator, web designer, and web site developer, and webmaster (NorthWest Center for Emerging Technologies National Workforce Center for Emerging Technologies, 1999; U.S. Bureau of Labor Statistics, 2012). Web developers design, write the web site code, integrate graphics and multimedia, monitor web site performance and capacity, and may create content for one or many web sites. No research studies show that organizations, society or web developers have a common title or role. In 1999, NCWET identified eight different job titles for the web development and administration career cluster and by 2003, the list expanded to 26 job titles (National Workforce Center for Emerging Technologies, 2003). Lubell (1980, p. 22), places the selection of the name of the profession as the first step towards professionalization and indicated that the professional organization may not even be able to choose the name of the profession or maintain legal protection of the title until the profession is regulated or licensed. In this study, I will define a web developer broadly, as a person who creates and maintains web applications.

To meet the workplace demands for web developers, companies today are looking for technology workers, with skills which may be self-taught or acquired through a formal education (Statistics, 2014; U.S. Bureau of Labor Statistics, 2012). The job requirements define the educational recommendations for a specific job. Although currently there are academic degree programs and certifications in web development, anyone can call himself or herself web developer. Therefore, companies should not assume that the web developer has any breadth or depth of knowledge or skills, including how to protect the web server and web applications from attacks. Janicki (2008) reported employees hired in web development positions were expected to have only a working knowledge of the hypertext markup language (HTML) used to build web pages, and a fundamental knowledge of other web development technologies. Today, with web development software and web site content management systems, one can quickly build interactive web sites. Although these users may create web sites, they may not have training in web application development and security. Currently, web development has no defined entry level into practice, minimum educational requirements, and certification or licensure requirements. There are no large-scale studies on the education and experience of the web developers or their ability to secure web applications.

Web Development Education

Web developers build web applications with a wide range of tools and technologies. Maintaining currency, breadth, and depth of those skills may be a challenge because of the ongoing introduction of new tools and technologies at a rapid pace. Surveying web development courses and programs is challenging because web courses are offered through several different departments (Logan, 2005). No research studies have shown any consistent education requirements or curriculum across web development programs. The closest to this would be an informal survey by Logan of 134 research and land grant university web sites to identify those with a well-developed web technology curriculum. Logan showed there are many universities providing multiple courses in web development. Logan did not use a scientific approach to classifying courses as a web curriculum, but did provide a listing of the institutions surveyed and identified the institutions with a strong curriculum based on his experience. Logan reported higher education institutions are teaching web development courses through the computer science, management information systems, and information technology departments. Logan acknowledged other departments such as graphic arts, writing, and communication studies might offer web development courses.

Web Development as a Field or an Emerging Profession?

Through the process of professionalization, other fields have been able to impose educational and credentialing standards along with licensure because of concerns raised about the level of entry into the practice (Wynd, 2003). Under many of the professionalization models reviewed, web development would require a unique body of knowledge in order to achieve profession status (Coyle, 2004). A formal educational degree is required in the majority of professionalization models reviewed to define a field as a profession (Millerson, 1964). Therefore, it is important to understand the dynamics of how institutions choose to offer web development programs. Although Kennedy (2010) evaluated web design as a profession, the status of web development as a profession has not been evaluated in research. The next sections will discuss the benefits of a profession and the process of professionalization.

The Process of Professionalization

While historically law, religion, and medicine were traditionally accepted as professions, new emerging professions have evolved as society changed. The benefits of professionalization are not always clear because professions are dynamic and evolving as societal conditions change. Lubell (1980) contended that professionals benefited from higher income, prestige, and autonomy.

Creating a standard definition for a profession and how professionalization occurs has been challenging for researchers. Although theorists cannot agree on how they should define a profession or the process of professionalization (Evetts, 2003; Forsyth & Danisiewicz, 1985; Pavlin & Kogovsek, 2007), researchers have defined several common characteristics of a profession (Lubell, 1980; Millerson, 1964). Common characteristics across professionalization theories include standards of practice, advancement of knowledge in practice and education through scholarly research, monopolistic behavior such as control over entry into the practice and exit from practice through licensure and oversight of the process and accreditation of educational institutions, consistent expectations of professionals through codes of conduct, and professional organizations which provide opportunities for members to communicate and collaborate (W. Goode, 1960; Greenwood, 1957; Hall, 1968).

A unique body of knowledge, which can include content borrowed from other fields and is often driven by scholarly research and formal higher education programs, is a characteristic in most of professionalization models. Recent studies support this conclusion. Anderson and Krathwohl (2001) suggested that the subject matter is traditionally the work of scholars in the field who have reached consensus about that subject. Robertson and Jenson (1995) explained that the profession should maintain a consensus-based body of knowledge as well as acceptable methods of research. Identification of the core body of knowledge could be obtained through research of the current labor market and the current work product.

The comparison between professionalization models is complicated. For example, while some models include the presence of a professional organization as a trait, other models focus on how the professional organization applies control of the profession and its membership. Other researchers use a more fluid and dynamic approach, where the achievement of the characteristics lies upon a continuum between field and profession (Theodore. Caplow, 1954; E. Freidson, 1970; Larson, 1977; Wilensky, 1964a, 1964b). These disciplines are sometimes referred to as emerging or semi-professions (W. Goode, 1960; Toren, 1975). While the dynamic models may help society recognize when a field is moving toward full professionalization, they do not always include all of the traditional static characteristics of a profession.

Wilensky (1964a), identified sequential steps that a field goes through while becoming a profession. Wilensky developed and tested a survey to determine which steps in the professionalization process were completed. Subsequently, Hall (1968) developed and tested a survey instrument, focusing on the attitudinal characteristics defined by Wilensky. However, Hall chose not to focus on the sequence of the progression towards professionalization. Hall's instrument was further refined and tested by Snizek (1972) and applied by researchers towards other fields of study such as agriculture teachers, (Blezek, 1986; Lawver & Lee, 1990) and nursing (G. M. Hampton, McQuitty, & Hampton, 2000; Wynd, 2003).

Professionalization models provide a framework for distinguishing a field from a profession and help researchers evaluate the status of a field or profession. Theorists have evaluated fields, such medicine and engineering, in order to determine if they are a profession (Davis, 2009; Flexner, 1915; Rochester, 2001). Some fields, such as social work and nursing, have reached professional status over time (Covert, 1917; Flexner, 1915; Hallam, 2002; Toren, 1971). Other fields, such as victim services (Underwood & Wallace, 1999), remain classified as emergent or semi-professions.

Several authors have questioned if computing is a field or a profession (Ahmed & Hoven, 2010; Denning, 2001; Wyld, 1977). Although Denning concluded that computer science has a well-defined body of knowledge, the professionalization process is incomplete because computer science lacks in some of the well-established criteria, such as individual licensure. Computer science did not have a single organization that controlled admission to the profession or set standards of practice and lacks a foundation for professional practice (Ahmed & Hoven, 2010; Finerman, 1975).

Other fields within computer science have emerged but the extent of the influence of these fields on web development is unknown. These curriculum and fields have been reviewed in research including information systems (Baskerville & Myers, 2002; Couger, 1973; Khazanchi & Munkvold, 2000), information technology (Abernethy, Gabbert, Treu, Piegari, & Reichgelt, 2005), and forensic computing (Stahl, 2006). The extent of the influence of the computer science and other fields on the professionalization of web development is unknown.

Conceptual Framework

Hall's Attitudinal Characteristics of a Profession

Hall (1968) identified attitudinal and structural characteristics present in a profession and developed the Professionalism Scale to measure the five-attitudinal components. Professionalization helps society to understand the complex relationships between professional organizations, professional ethics and standards of practice, licensure and regulations related to practice, formal and informal education that helps us identify and potentially resolve gaps between academia and industry. Applying similar criteria used by (Hall) could help researchers evaluate the profession status of the web development.

As shown in Figure 1, the structural components defined by Hall (1968) consist of: (a) full-time employment status, (b) training which can include formal education programs and help define the core body of knowledge, (c) a professional association which controls entry into and out of the field, and provide the standards of practice, and (d) a code of ethics. The attitudinal components include: (a) use of the professional organization as a referent, (b) a belief in public service, (c) belief in self-regulation, (d) sense of calling to the field, and (d) autonomy. Although autonomy is both an attitudinal and structural component this study will look at the attitudinal factors of autonomy.

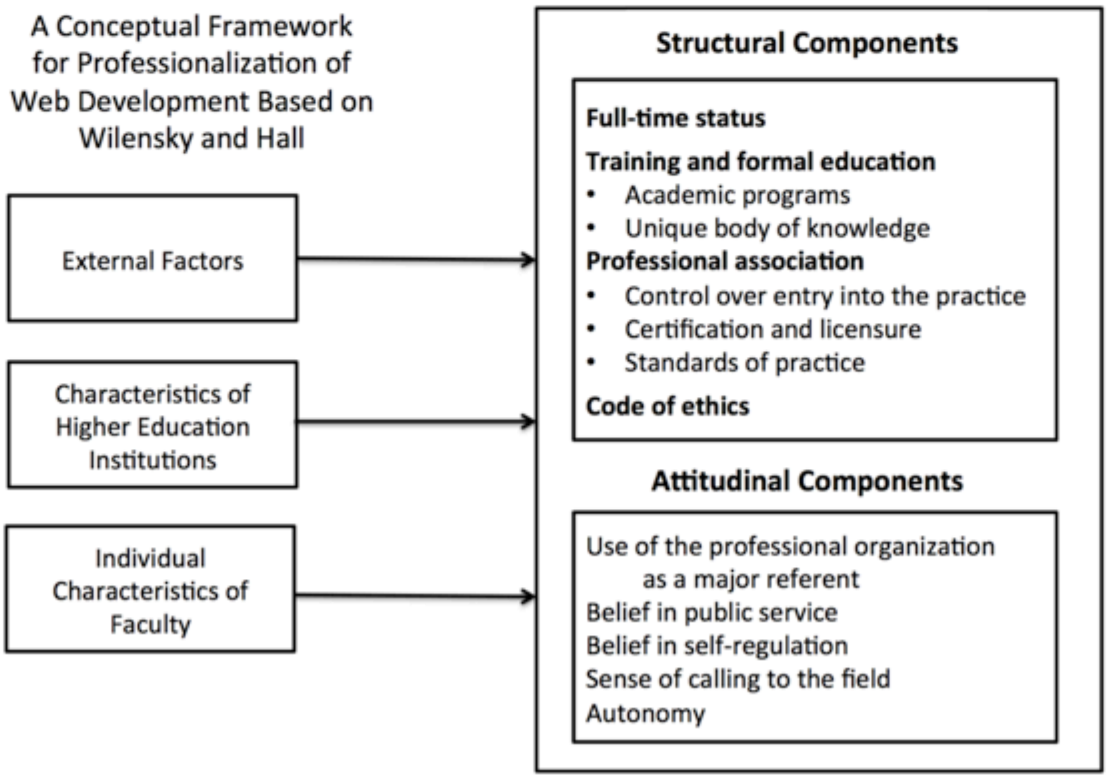

Figure 1. A conceptual framework for the development of the web profession

Multiple factors may influence how fields evolve to meet the requirements of a profession. As illustrated in Figure 1, in this conceptual framework, factors are grouped into external factors, characteristics of higher education institutions, and individual characteristics of faculty teaching the curriculum. These factors may influence the degree to which a field achieves the individual characteristics of a profession.

External Factors

External factors may impact the process of professionalization and de-professionalization. Lack of autonomy could be impacted by external factors and contribute to a change in the professional status. Warren, Weitz, and Kulis (1998) found participation in managed care programs may impact satisfaction if they are not able to control their income, schedule, and autonomy over clinical practice.

Eliot Freidson (1988) defined a “profession as a kind of occupation [field] whose members control recruitment, training and the work they do” (p. 425). Although Hall (1968) focused on the professional organization that represented the field, pressure on the field may come from other fields and their professional organizations. Professional organizations can influence curriculum in academic programs. Computing professional associations may impact the web development curriculum, because many web development programs are offered through the computer science departments (Logan, 2005). Some of computing professional organizations include web development in their curricula recommendations ("2013-2014 Criteria for Accrediting Computing Programs," 2013; Force, 2013). The extent that these computing professional organizations influence the field of web development is unknown.

Characteristics of Higher Education Institutions

Massive Online Open Courses. Higher education institutions are trying to implement new methods such as massive online open courses (MOOC) to help recruit students to include fields such as web development. Will institutions allow new fields to offer programs or will they be moved into alternative formats such as MOOC? Although it is unknown what the long term impact will be for new fields such as web development, companies like MIT OpenCourseWare, Allison, Iversity, ed2go, and Udacity are beginning to offer free courses online in areas such as web development. ("Online Course Directory," 2013).

Program Offerings in Higher Education. The Integrated Postsecondary Education Data System (IPED) datasets from the National Center for Education Statistics (NCES) was used in this study to identify information about the number and type of undergraduate and graduate programs and the number of degrees awarded in 2010. The IPED datasets were used to compile information about the number and type of web and web related programs and degrees awarded. Although there are baccalaureate programs in web development and web administration, the IPED dataset showed that there are far more associate degree programs. When computer science was a developing field, Denning (1985) espoused that degree programs will not be implemented in higher education institutions without faculty support. There is no information on web development faculty opinions regarding the establishment of degree programs in web development. There still remain many colleges and universities that are not teaching web development as a degree program.

Large Online Programs in Higher Education. The IPED datasets was used to extract data on web and web related programs. To avoid confusion, the extracted data is referred to in my study as Web Program Dataset (WPD). The WPD showed that four for-profit schools extend beyond their state boundaries and are impacting the supply of graduates in web development (2010). In 2010, there were 857 web development programs and 6297 graduates. DeVry, ITT Technical Institutes, The Art Institutes, and the University of Phoenix have a combined total of 221 (25%) of the programs and 3041 (48%) of the graduates in web development. In my study, these four institutions are referred to as the Quad. Because so many graduates are from these four institutions, it is reasonable to question if the education at these institutions impacts the field. Do these institutions include information on professional organization, standards and ethics within their curriculum? Does their program communicate to students that web development, a profession or a field? Is their curriculum based on a consensus of what is used in practice as well as research? Does their curriculum support demonstrate a unique body of knowledge in web development? The influence of these large online programs on the professionalization of web development has not been studied. Therefore, in order to limit the impact of these large online institutions on the study, the Quad institutions will not be included.

Characteristics of Faculty

Individual characteristics of faculty may impact the process of professionalization. Morssink (2001) stated that the guardians of the profession are the faculty and policy making leaders of national professional associations. Faculty, historically, have driven academic program development and curriculum and developed the content taught within academic courses. Web development programs are not mandated by the states or by the web development professional organization and are not required by employers or clients, according to the U.S. Bureau of Labor Statistics (2012). This suggests that the driving force for beginning a program in web development is the faculty. The literature did not show any studies that described the faculty who teach web development or what their attitudes are toward professionalization of the field.

IPED datasets includes information about faculty demographics and education, their job roles, and hire status. While the IPED datasets show demographic about faculty that teach computer science, the data is not aggregated for faculty that teach web development. Because web development courses are offered through different departments, the NCES data on computer science faculty may not apply to web development faculty (Logan, 2005). There have not been any studies that looked at web development faculty to identify if there were differences in demographics, employment status, academic background, teaching and web development work experience, role, professional memberships, or their attitudes toward professionalization of the field. The research shows across different professions that the attitude toward professionalization among practitioners can be measured (Hall, 1968; Snizek, 1972). Therefore, in my study, I will collect information about the faculty and their attitudes towards the professionalization of web development.

One of the critical components of becoming a profession is that the professionals within the discipline need to support the concepts upon which a profession is built. Therefore understanding the attitudes toward professionalization among practitioners is important to the advancement of the professionalization of a discipline.

Together, external factors, characteristics of higher education institutions, and characteristics of faculty may influence the ability for the web development to reach the status of a traditional profession.

Problem Statement

Web development is a field that may be in the process of emerging as a profession. It is not known where web development lies on the dynamic continuum. The process of professionalization of web development cannot move forward without faculty support. There are no studies that have examined the attitudes of the professionalization of web development among faculty who teach in web development related programs.

This study will explore the attitudes of faculty who teach in web development related associate and bachelor's degree programs regarding the professionalization of web development, as defined by the Hall (1968) model of professionalization. The purpose of this study, therefore, is to help understand the perceptions of faculty toward web professions in order to identify potential factors, which have an influence on the professionalization of web development.

Research Questions

This study will examine the attitudes of faculty who teach in web development related associate and bachelor's degree programs regarding the professionalization of web development as defined by the Hall model of professionalism.

Therefore, this study will seek to answer the following questions.

1) What does the profession of web development mean to faculty?
2) How is their view of the profession of web development consistent with the professionalization model as defined by the Hall's model of professionalization?

This study will look at some of the possibilities that can help explain how faculty perceive web development as a profession to help understand where web development lies on the professionalization continuum and if web development is indeed emerging as a profession.

Methodology

This study will use survey methods to learn about the attitudes of faculty about web development as a profession. The subjects will be faculty who teach in educational institutions that offer web development associate or bachelor degree programs in web development. The survey instrument developed for this study called the Web Development Professionalism Inventory (WDPI) will be used to collect information about the attitudes of faculty toward professionalization of web development and is based on the Hall (1968), model of professionalization. The WDPI will collect information about their attitudes toward the professionalization, their opinions about some of the current structural characteristics of web development, and their education, work experiences, and demographics.

Delimitations and Limitations

The purpose of the study is to understand how faculty view web development as a profession. This study will use a quantitative design methodology. Patten (2009) recommends qualitative research methodologies when little information is known about a topic. A qualitative design was not chosen because locating potential participants for interviews would be impractical and cost-prohibitive since there are few web development degree bachelor programs in Michigan, which would limit the study further.

A limitation to this study is that the population is unknown and, therefore, there is no ability to generalize the results to the larger population. However, this study can help lay the foundation for future studies that might be able to better identify and describe the population.

The Quad schools and schools with only certification programs are removed from the selection pool. Faculty at these institutions may have a large impact on the professionalization process.

One of the limitations of this study is that the underlying theoretical framework used is derived from the Hall (1968). Using a survey that has been validated and applied across so many disciplines and over time provides additional support to the reliability of the data obtained from the survey. While the validity of the tool has been supported in a variety of studies, the underlying research on what a profession is, and how it develops is entangled with how society works. Over time, we have seen changes in how people work and many new fields have developed as the information age has grown. While Burns and Grove (2008) might look at this as a problem where the underlying theory and concepts are not clearly defined, this is more likely a problem with the linkage of professionalization to society and the concept of work.

Lastly, as the conceptual framework illustrated, external factors may also impact the study. However, because there is very little known about the professionalization of web development, this study will serve as a first exploratory study.

Chapter 1 Summary

The professionalization process is a complex set of concepts and models that have evolved over time. Professionalization models include identification of common characteristics of a profession such as a core body of knowledge, degree programs offered in higher education, professional organizations, standards of practice, and codes of ethics and autonomy. The conceptual framework for this study will be used to help identify concepts that might impact the attainment of the characteristics of a profession.

The literature review will describe the process of professionalization, and details on the current state of web development programs at higher education institutions. The literature review will provide a detailed evaluation of the structural characteristics of web profession. The Hall (1968) survey will be modified and included in a survey that will also assess the faculty opinions about some of the structural and attitudinal characteristics of the field. The literature review will provide information on the development, testing, and application of the Hall's survey to other fields.

CHAPTER II: REVIEW OF THE LITERATURE

In order to understand how web development might become a profession, it is important to understand the professionalization process. The literature shows that researchers over time have applied different definitions of a profession and different criteria for evaluating professionalization. The first task in this study was to review the literature for professionalization models and identify a model that best fit for web development. This chapter will explain why this study will be based on the Hall (1968) professionalization model as well as why it is important to study the attitudes of faculty regarding the professionalization of web development.

Process of Professionalization

Professionalization is the process by which an occupation evolves from a field into a profession. To understand the professionalization process, it is important to understand why a field and its members would desire to transition into a profession. Members of a profession may benefit from prestige, autonomy, and financial status. Evidence of this is seen as early as 1917 when the Committee of the State Teachers of South Carolina, in an attempt to improve retention of teachers, recommended both organization and professionalization, which would "decrease the disagreeable of personal relations and increasing the comfort of the life itself" (South Carolina, 1917, pp. 7-8).

Members of a profession benefit from prestige because society views professionals as experts who have a high level of competence within their field of study, and therefore, in their professional role society treats them with great deference (W. J. Goode, 1957; Larson, 1977; Wilensky, 1964b) and include prestige as a characteristic of a profession. However the literature has not established that prestige is a benefit strictly for professions and not for fields. But prestige is difficult to measure. Ingersoll and Merrill (2011) reported rankings of prestige, from 1978 through 1989 based on census data, for selected fields. While physicians, professors, lawyers, and judges were at the top of the list, neither computer engineering nor computer science was included. Hauser and Warren (1996) denounced these scales because they "lack criterion validity" as they are not "as highly correlated with other variables as are other measures of occupational social standing, specifically, measures of the socioeconomic status of occupations, as indicated by the average educational attainment and income" (p.13). Therefore, in my study, we will not be looking at prestige scales in relation to the field of web development.

Although there is not necessarily a direct causal relationship between salary and rewards and the classification of a field as a profession, some professions may have benefited from a strong professional organization and their monopolistic behavior and autonomy, resulting in higher income and prestige (Davis, 2009; Lubell, 1980). Financial gain to the independent practitioners might be a benefit, depending on the professional success of the practitioner and the economic conditions of the marketplace, including the supply and demand for professional services (Theodore. Caplow, 1954, p. 170).

Professional autonomy is a distinguishing characteristic of a profession and is based on the roles of the clients and professionals being clearly defined and controlled within the professions, through regulations from society, and within the professional code of ethics and standards (W. Goode, 1960; Greenwood, 1957; Larson, 1977; Wilensky, 1964b) Some emerging professions, which Hall (1968) refers to as marginal professions, may possess some of the characteristics of a profession, such as autonomy, and therefore may receive similar benefits. Autonomy in practice, or what Eliot Freidson (1988) calls "occupational control" in the workplace, is connected with power and the ultimate test for a profession. The problem of autonomy is more complex as many practitioners do not work independently but rather within a larger organization (Forsyth & Danisiewicz, 1985; Millerson, 1964; Wilensky, 1964a). Because autonomy is also listed as a characteristic of professions, my study will look at how subjects perceive autonomy for web development (Hall, 1968; Wilensky, 1964a).

While many professionals receive benefits of prestige, financial status, and autonomy through membership with a profession, members of a field may also receive these benefits. Based on these models, to achieve these benefits, web development would need to have a high level of competence, clearly defined roles regulated through society, a professional code of ethics and standards, and a strong professional organization.

What is a Profession?

Davis (2009), explained that the word profession carries several meanings and considered "occupation" (referred to in this study as a "field") as a potential synonym for profession because both professions and fields possess knowledge, skills, and judgment applicable in workplace settings (p. 212). Stahl (2006) views a profession as a group within society that regulates the relationship between the professionals and the recipients of their services because of the nature of the power that the professional has over their clients. While this may appear to be consistent with web development, it is unknown if faculty teaching web development concur with this definition.

Many researchers have tried to define, classify, and compare professionalization models without unanimous support for any single theory (Davis, 2009; Lubell, 1978; Millerson, 1964; Popple, 1985). Flexner (1915) was one of the earliest modern sociologists to study how to define a profession. He characterized medicine, law, engineering, literature, painting, and music as “unmistakable professions” (p. 15). While lawyers, physicians, and civil servants appear as historical examples of professions, new disciplines may not be classified a profession depending on which professionalization model is applied (Carr-Saunders & Wilson, 1933).

Lubell (1978) classified professionalization models into static models, where achievements of traits or well-defined characteristics are used to define the profession, and dynamic models, where the field evolves over time and may possess these traits or characteristics to some extent on a virtual continuum. Appendix A lists some of the many professions that have either completed the process, are in the process of becoming a profession, or investigating the options for becoming a profession. There is no standard professionalization model that was used across these fields. As indicated in the table, these studies and concept papers sometimes investigate the professional models and apply the criteria to the profession and some have developed new survey tools.

Professionalization occurs within society and therefore will change with society over time (Hughes, 1966). Even Flexner (1915) stated that “the nature of a profession has undergone a readily traceable development, and the number of professions has not remained stationary” (p. 153). Not only can fields evolve into professions, but professions can devolve (Haug, 1988; Warren et al., 1998) described the de-professionalization of medicine. Warren et al. (1998) surveyed over a thousand physicians and found widespread dissatisfaction with respect to the practice and their clinical autonomy, the lack of control over reimbursement for their services, and the perceived loss of dominance in their role with patients stemming from the perception that patients lack confidence in their role. This supports the models that allow for professions to exist on a dynamic continuum.

Static Approach to the Professionalization

Flexner (1915), as an early scholar of professions, focused on the characteristic traits that define a profession. In "static" models such as Flexner's, the traits were either present or not present and collectively used to support the claim that a field has developed into a profession. Trait models typically list fixed criteria or characteristics to define a field as a profession and have been most commonly used in literature to define professionalization. These traits are also commonly referred to across literature as characteristics, attributes, or elements of a profession. Greenwood (1957) identified a specific set of traits widely accepted and recognized and also considers fields and professions at opposite ends of the poles. The static models offered by Flexner and Greenwood did not mandate all professions to possess all of these characteristics. However, Houle, Cyphert, and Boggs (1987) added that a requirement that "the professional possesses a specialized body of knowledge and skills that are acquired during a prolonged period of education and training" (p. 87).

Lubell (1978) created a single list of eighteen attributes which define professions by aggregating the attributes from major professional models. Professionalization models, classified as trait models, do not all share the same list of traits.(Millerson, 1964)

Millerson (1964); Shafer, Park, and Liao (2002) aggregated 23 elements of professionalization defined by 21 theorists, which he considered essential. He found that no model included all of the elements, no authors completely agreed with any of the other authors, and no one element was defined as essential by all of the authors. There is a general but not unanimous consensus for many of these characteristics to be included in the definition of a profession, such as a core body of knowledge, degree-based education, a theoretical basis that guides practice, a research based methodology to create and implement new theory, a recognized professional organization, a code of ethics and commitment to service others, and practice autonomy.

While the focus has been on identification of common traits, other literature has proposed that these traits are not independent of one another. When W. Goode (1960) reviewed various definitions of professionalization, he concluded that there were no major contradictions between trait models. Rather, Goode concluded that prestige, power, and income status were traits derived from the acquisition of two other characteristics: a core body of knowledge and a collective service orientation.

Applying Static Models to Specific Fields. Although a theorist may declare a field as an "occupation", semi-profession or profession, not all theorists agree with the findings or analysis. The ability to self-select a model could be to the advantage of a field that is missing one of the common traits. Social work was not always considered a profession (Flexner, 1915). Greenwood (1966) used static traits from Flexner and transformed and applied them to the analysis of the professionalization status of social work. Using these five attributes, Greenwood concluded that social work was a profession (p. 54).

Web development clearly does not possess some of the traits required by the static models. There are no significant studies that support that web development has a unique body of knowledge. The U.S. Bureau of Labor Statistics (2012) web site states that there are no barriers to entry into practice. Web development has several professional organizations, but only one, the Internet Webmasters Association, has a code of ethics ("IWA Code of Ethics," 2013). Membership in the professional organizations, or certification, is not required to practice in the field. Without these traits, web development would not meet the criteria of a profession as defined by these static professionalization models. But these static models are not helpful with identifying where web development is in relation to the criteria. In other words, is the field close to meeting the criteria? Static models are polarized, and either a field meets the criteria or does not. Static approaches, therefore, are not useful in studying potentially emerging professions such as web development.

Dynamic Approach to Professionalization

Dynamic models of professionalization propose that traits or characteristics vary in degree between fields and professions. Dynamic models may be used to evaluate to what extent a field possesses attributes on a continuum (W. J. Goode, 1957; Greenwood, 1957). Many fields are in the process of transitioning to professional status and that the transition between field and profession is fluid, allowing for professions to exist at various levels of professionalization. Defining characteristics upon a continuum makes it possible to have professions with varying degrees of these characteristics and allows for many fields being referred to as emerging, marginal, or semi-professions (Toren, 1975).

Rather than study if the field meets the criteria, Houle et al. (1987) proposes that the research question be: “To what extent does the occupation possess this characteristic and how is it working toward its further refinement?” (1987, p. 27). This study is looking at the perceptions of faculty on the process of professionalization of web development and the results may provide insight into what the faculty identify as characteristics of the profession and where web development lies on the dynamic continuum. The dynamic process models clarify how the field becomes a profession and therefore would be a better fit for web development in this study.

Characteristics of a Profession in Dynamic Models. Not all of the dynamic models use the same traits to define a profession. W. J. Goode (1957) proposed fields achieve profession status when they “take on the traits of a community” (p. 195). W. Goode (1960) described ten characteristics derived from the two common fundamental characteristics of a profession, a prolonged training of the body of knowledge, which includes a collective service orientation, but not necessarily a formal education.

On the other hand, Greenwood (1957) explained that the understanding of professional theory cannot be transferred to students through on-the-job training, and therefore, is best distributed through formal academic settings. E. Freidson (1986) concurred that university education is needed to formalize the unique theoretical knowledge within a profession. Freidson added that the society sanctions the profession to oversee the training process and controls the entrance into its profession.

Millerson (1964) focused on the role of professional organizations and education, which sets his model apart from other dynamic models. Millerson defined a profession as an upscale, non-manual field with a well-defined theory-based body of knowledge communicated through advanced training or formal education with practical application.

Sequential Professionalization Models

Theodore. Caplow (1954) proposed a process-driven model of professionalization and described a sequence of events that must occur in an explicit order as a field becomes a profession. These events included naming the profession and establishing a professional organization. T. Caplow (1964) defined four steps for transitioning from a field to a profession.

Wilensky (1964a) suggested sequential steps that for a field to transition into a profession, but did not require these steps to be completed in a specific sequential order. Furthermore, very few fields would achieve all the steps and therefore few would receive the benefit of authority experienced in the established professions. Although fields follow a typical sequence of steps, "marginal professions" may violate the order or try to advance the field quickly to expedite the process. Wilensky predicted these fields would not be accepted by society until they possess technical skills based on systematic knowledge acquired only through a lengthy specific training process and when the members of the field comply with professional norms (p. 138, p. 146).

Wilensky (1964a), studied 18 professions and when they achieved each step of the model. Wilensky used artifacts to identify and support the achievement of each step. The second step in the model is to establish a training school, which does not have to be within, or affiliated with a university but will include a standard program of study, academic degrees, and research programs to expand the knowledge base of the profession. The steps include the ability to engage in the activities on a full-time basis doing the professional activity, establishment of a training school with a standard program of study and research programs to expand the knowledge base of the profession, establishment of a local and national professional association, and creation of a formal code of ethics.

Alternative Professionalization Models

Larson (1977) proposed a different approach to professionalization and organized professions into academic, consulting, and organizational professions, because their power base is derived through intellectual achievements and technical expertise. With no definitive and standard curriculum or detailed models of education, the faculty perceptions on web development training become important for the practice.

Andrew (1998) was highly critical of the professionalization theories citing past definitions that defined professions based on stories to fit existing professions and other factors such as monopolistic relationships, and instead chose to focus on interrelated systems, territoriality and encroachment of professions as well as how expert systems form new professions. The criteria Abbot used included a code of ethics, licensure and exclusive professional association, jurisdiction, self-regulation and control, and abstract knowledge to differentiate a profession from a field. Kennedy (2010) relied on Abbot for standard criteria for a profession when analyzing web design as a profession.

Lubell (1980) described how conflict between competing occupations is common within accounting and is an "outgrowth of economic struggle" and "results from numerous non-economic factors such as differing ideologies and conflicting claims to professional status expressed by competing occupational groups (p. 21). However, there are no studies of the web development field such as self-regulation and control, as defined by Abbot (1988). Although there have been so many studies that have relied on Hall (1968) where the data can be used as a comparison for new professions.

Survey Instruments Measuring Professionalization

Although researchers have used different theoretical models to explain the process of professionalization, some common principles exist across these studies that can be used to evaluate the transition of professionalism for web related technology. This study will provide information about how faculty view the professionalization of web development as defined by the Hall's (1968) model of professionalization. Therefore, it is important to understand how the study was created, validated, and applied to other professions.

This study will use the Hall's (1968) model of professionalization to help understand where web development lies on the dynamic continuum. By 1968, Hall developed a model of professionalization based on Wilensky (1964a), where he incorporated both structural and attitudinal components.

Structural Components of Hall's Professionalism Model

The dimension within the structural component derived from Wilensky (1964a) and Hall (1968) included: (a) full time status, (b) training school reflecting a body of knowledge and later affiliated with established universities, (c) professional associations which can identify professional role and control membership, and (d) a code of ethics enforced by the professional organizations or laws (pp. 92-93). Consistent with static models, Hall indirectly included the body of knowledge as a requirement for a profession. The structural dimensions, such as formal education entrance requirements and professional organizations, are similar to the static approach and therefore are included in the conceptual framework model used in this study.

Hall (1968) concluded autonomy gave a professional the freedom to act using professional judgment acquired through specific knowledge and skills. While Wilensky (1964a) included autonomy as a structural dimension, Hall concluded autonomy was both a structural and attitudinal dimension.

Attitudinal Components of Hall's Professionalism Model

The attitudinal components within this scale included represented the "manner in which the practitioner views their work" (Hall, 1968, p. 93). The five attitudinal dimensions in Hall's model include a professional organization as peer reference group, belief in service to public, belief in self-regulation, sense of calling to field, and feeling of autonomy. Conceptually, these five dimensions make up the attitudinal component of professionalization of web development for this study.

According to Hall (1968) the attitudinal dimensions are:

1. The use of the professional organization as a major reference-this involves both the formal organization and informal colleague groupings as the major source of ideas and judgments for the professional in his work.
2. A belief in service to the public-this component includes the idea of indispensibility [sic] of the profession and the view that the work performed benefits both the public and the practitioner.
3. Belief in self-regulation-this involves the belief that the person best qualified to judge the work of a professional is a fellow professional, and the view that such a practice is desirable and practical. It is a belief in colleague control.

4. A sense of calling to the field-this reflects the dedication of the professional to his work and the feeling that he would probably want to do the work even if fewer extrinsic rewards were available.
5. Autonomy-this involves the feeling that the practitioner ought to be able to make his own decisions without external pressures from clients, those who are not members of his profession or from his employing organizations. (p. 93)

Development of the Hall Professionalism Scale

In order to measure the attitudes among practitioners toward professionalization, researchers have developed professionalism inventories. Hall (1963) initial research identified six bureaucratic dimensions and later connected these bureaucratic dimensions with the five attitude dimensions of professionalization. A Professionalism Scale was developed by Hall in 1966, to measure five attitude dimensions of professionalization across a broad range of professions. Hall (1968) tested his survey tool by studying established professions such as medicine and law, as well as fields that might be considered emerging professions across different levels of bureaucracy at 23 organizations and 11 field groups. Hall's initial eleven field groups included accounting, advertising, engineering, lawyer, librarian, nurse, personnel management, physician, social worker, stock broker and teacher and consisted of only 328 subjects.

In this study, the survey will contain a modified version of the Professionalism Scale. Therefore, the next sections will discuss the results from the Hall (1968) study, the Snizek (1972)study, how the Professionalism Scale was modified, and examples of studies that have used the modified Professionalism Scale.

Results from Hall Study. Hall (1968) reported the reliability coefficient from the split-half method with a Spearman Brown correction formula and found a reliability coefficient of .80 or higher for each scale. The results would show the degree to which each dimension of professionalism was met with higher scores indicating a more professionalized view for each attribute. To measure the level of agreement with the bureaucratic or structural components of a profession, Hall applied the same method followed by Wilensky (1964a) and included the traditional professions, physicians and lawyers, and other fields.

The dimensions were initially measured in the Hall (1968) study using a five item ordinal scale, consisting of fifty questions with ten questions per dimension (see Appendix B). Each dimension could have a range from 5 to 25. Hall chose this survey method not only because of its relevance for the kinds of attitudes being measured, but also because the question format is the same as that for the measurement of the degree of bureaucratization. Hall paired the dimensions with bureaucratic dimensions with the attitudinal dimensions and their rankings by using Kruskal-Wallis one-way analysis of variance, which allowed Hall to identify if the differences in the ranks were real differences or a chance occurrence.

Hall found that established professions had lower professional attitudes, while some of the less professionalized groups have very strong attitudes in this regard. Hall (1968) proposed that the strength of these attitudes appears to be based on the kind of socialization that has taken place both in the profession's training program and in the work itself.

Reliability and Validity of the Hall Professionalism Scale. Snizek (1972) and other researchers have shown a modified version of the Professionalism Scale to be both reliable and valid. Snizek (1972) applied the Professionalism Scale to measure attitudes toward professionalization among 566 engineers, physicists, and chemists and validated the Professionalism Scale. Rather than compare the factors extracted from the original Hall data and his data, Snizek chose to replicate the study as a way to improve the original survey tool. Other studies have modified the questions to reflect the specific discipline being investigated and using more current terms for their fields (Philip E. Carlan & Lewis, 2009; Gerald M. Hampton & Hampton, 2004; Miller & Fry, 1976; Shafer et al., 2002; Wimmer, 2009).

Results from the Snizek Study. The purpose of the Snizek (1972) study was to verify and improve the validity and reliability of the Professionalism Scale. Burns and Grove (2008) define validity as the "extent to which it actually reflects the abstract concept being examined" and reliability as 'how consistently the measurement technique measures a concept" (p. 43). This supported the validity by identifying items that should be deleted, which may not singularly reflect the dimension to which they are categorized within.

For concept testing, with multiple variables, factor analysis is the appropriate statistical methods to employ in order to identify if any covariation occurs between multiple variables (J. T. Walker & Maddan, 2013). To measure each of the five theoretical dimensions of professionalism Snizek used a rotated factor matrix, which measured the empirical fit of each item within each theoretical dimension. In other words, Snizek was using a factor analysis to determine if the individual items measured the dimension with which the item was classified. Snizek (1972) found that less than half of the items had acceptable factor loading values, meaning that they were not fit within the dimension. Either they were too low, indicating that they did not measure the dimension, or they were too high on one of the other dimensions, meaning they were not measuring the intended dimensions. There were some items that could be associated with more than one dimension. Because of the variations in factor loading values, twenty-five questions were removed from the survey.

Snizek (1972) then compared the results of his study and the Hall study. Hall's data revealed a drop from .86 to .84; Snizek's data from .80 to .78. Snizek recommended modifying the scale and removing half of the items. Snizek retested the modified Professionalism Scale and use rotated factor matrices to evaluate the empirical fit of the individual items across each of the five attitudinal dimensions. After removing half of the items, the reliability coefficients ranged from .78 to .84. Appendix C shows the reliability coefficients and scores for each dimension across several research studies. This information can help support the reliability of the survey.

Modified Professionalism Scale. Snizek (1972) concerned about the ambiguous wording of the questions, recommended using the word "self" rather than specific phrases such as "the professions" (p. 112). As Snizek suggested, there could be ambiguity within the questions, and therefore the wording may be changed to clarify the questions.

The questions were mapped to the five attitudinal dimensions by Snizek (1972) and Hall (1968). The mean is reported with a scale of one to five where one represents the lowest level of professionalism and five is the highest level of professionalism.

Criticism of the Hall and Snizek Professionalism Scales. Fox and Vonk (1973) were critical of the Snizek (1972) study on both procedure, because not all of the statistical methods were published, and substance. The Hall (1968) Professionalism Scale was modified using methods described by (Snizek, 1973) to enhance the reliability of the tool. Snizek described in depth the statistical methods used in the study to analyze the five dimensions by cutting the number of items from 50 to 25, resulting in Kuder-Richardson Formula 20 reliability coefficients from .783 to .843. The intention of the study was to enhance the validity of the original study not to compare the actual data from the rotated matrices with Hall's data. Snizek used orthogonal varimax rotations using normal Kaiser Varimax criteria, which is a common rotational method and was used in multiple studies that implemented the modified Professionalism Scale. The end result of the study was the improvement of the factoring of the individual items and subscales, though identification of the questions that measured the matched dimensions and removing items that were not a good fit. While the tool has had some criticisms, it would be useful to use the tool for investigating the attitudes of practitioners on professionalization. This still remains a useful tool for exploratory research for understanding the professional status of a field.

Studies that Implemented the Modified Professionalism Scale. Comparing the studies can be a challenge because their original purpose is different, the usage of the questions in the Professionalism Scale is different, and they report data results differently. Often researchers reported scores for the individual dimensions using the Chronbach's Alpha or standard deviation. Wimmer (2009) and other the studies compared data with the original Hall’s (1968) dataset. In some cases after factor loading and testing for a good, Wimmer and other researchers have removed additional questions from the study. Shafer et al. (2002) referred to the five dimensions as professional community affiliation, social obligation, belief in self-regulation, dedication to the profession, and demands for autonomy.

Wimmer (2009) compared data from Hall's subset of rank data from occupational physicians. Wimmer found higher fit using Chronbach's Alpha scores with three questions rather than five. However, professional organization as a reference and feeling of autonomy still remained below 0.7 and were therefore below the level of reliability. Wimmer had a small sample size (N=44), which might have been a factor in the results. Wimmer used principal component analysis as the extraction method and varimax rotation factor loading with Kaiser normalization from principal axis solutions. Wimmer finally concluded that none of the dimensions were constant in reliability compared to the original Hall's study except for the dimension on belief in self-regulation.

Shafer et al. (2002) only used 20 items from the Professionalism Scale to assess professional status of certified management accountants. Belief in social obligation, received the highest mean scores. The subjects also accepted the belief in self-regulation. The study used confirmatory factor analysis using the AMOS structural equations modeling program so that they could test the dimensionality of the Professional Scale. The goodness of fit equaled or exceeded 0.90 so they interpreted that as a good fit indicating that the model was a better fit to the data than alternative models tested.

Chan (2005) studied building professionals including architects, structural engineers, and surveyors across geographical regions including Australia, Hong Kong (China), Singapore, and the United Kingdom. Chan removed items after completing tests for construct validity where the standard deviation was .67 and alpha at .66. Chan reported the reliability with new ranges from .57 to 0.74 and overall at .71. The only dimensions lower than the .70 acceptable score was professional organization as a major referent (.57) and belief in public service (.63). The overall score was 3.32, which was above the mean value 3.0. All dimensions were above the mean score with the lowest dimension listed as the sense of calling to the field.

Philip E. Carlan and McMullan (2009) surveyed 21 municipal police departments to understand gender differences in the view of professionalism. The study revealed autonomy was lowest of all the dimensions at 3.14 and that the other dimensions were between average and high for all subjects. The researchers used difference-of-means (t-tests) to identify significant differences between groups and when they compared the differences in the dimensions between women and men they found that gender did not differ on any gender to any significant degree (t 1⁄4 0.43, $p > .05$). They found that men and women felt community service was the most important dimension.

Regolil and Poole (1980) compared professionalism across rural and urban police departments. They used the same 25 questions and same ordinal scale and scoring with the same questions reverse coded. Rather than report the mean of the means, they reported the mean total score for the dimension. Regolil and Poole also included identifying how these dimensions impact role conflict.

Like Regolil and Poole (1980), Wynd (2003) studied the professionalism of registered nurses in Ohio. The researchers reported that nurses with experience were at the same level of professionalism as physicians and nurses who are members of professional organizations have increased views of their professionalism.

Morrow and Goetz Jr (1988) studied professionalism as well as job involvement, organizational commitment, and work ethics. The professionalism was studied using 24 of the questions from the modified Professionalism Scale. Again, the Chronbach's alpha values reported for the dimensions belief in service and belief in self-regulation were above 0.70, indicating internal consistency reliability. The subscales were lower than the original Hall (1968) and studies. One item was eliminated from the autonomy subscales. Morrow and Goetz also applied Snizek (1972) factor loadings for the individual questions using varimax rotation to identify issues with individual questions and Eigenvalues that were over one were retained.

The Professionalization Status of Web Development

In this section, the literature review shows that web development has some of the hallmarks of a profession based on the structural component of the Hall model. The dimensions of the structural component includes the availability of full-time employment status, training, and formal education as a professional organization and a code of ethics, derived from the Wilensky (1964a) model of professionalization. This section will discuss how web development as a profession meets, does not meet, or partially meets these characteristics.

Full-time Employment Status

Murugesan (2008) classified web applications as static, dynamic, Web 2.0, mobile, and semantic, making the development and deployment of web applications different from a traditional software application because these application are built-for multiple users and delivered over the internet. The users of web applications are not a group of employees that use common hardware and software to run applications for business or home use. Rather these users are accessing the web applications for both business and personal use from different browser software programs, platforms, and devices. In other words, today personal use has expanded from using e-mail, web browsing, and basic word processing programs to social networking, communication, online collaboration, and multimedia applications. One of the challenges web engineers face is the continuing evolution of web applications. To meet these needs, web applications have evolved to become complex systems. For these reasons, Murugesan states that web developers today should have specialized skills to integrate complex and diverse programs and systems, and maintain high levels of performance and security. Web developers need strong skills in web application architecture, design, and development.

Web development is referred to as web engineering across multiple research studies and authors because of the application of the traditional software engineering model to web development (Ahmad, Zhang, & Azam, 2005; Dahanayake, Collier, Glenzer, Goette, & Welke, 2010; Mendes, Mosley, & Counsell, 2006; Murugesan, 2008). Although there are commonalities between software and web engineering, many professionals believe that there are significant differences (Murugesan, 2008). For the purpose of this study, web development is inclusive of web engineering.

Full-time careers in web development have continued to grow. The U.S Bureau of Labor and Statistics (BLS) aggregates job data in the Occupational Outlook Handbook for web developers with information security analysts and computer network architects. The U.S. Bureau of Labor Statistics (2012) projects a 21.7% employment growth rate from 2010 and 2020 for web developers, which is faster than the average (14%) for all the other fields. This strong growth rate will result in 65,700 new jobs over this time period. This number does not include computer science workers who are tasked with building web applications. As we have seen with other information technology fields, these jobs may be full-time, part-time, consultant, or freelance work (Ahmed & Hoven, 2010). Ahmed & Hoven reported freelancers are hired because some employers think that web developers can "develop websites faster and cheaper" (p. 417). As Ahmed & Hoven pointed out, this may become problematic if freelancers are using free or open source code if they do not understand and test the code for security, reliability and performance. The unemployment rate for web developers is only 4.2%. In 2011, the median salary for web developers was $77,990. According to the U.S.News & World Report (2012), web developer is number 9 on the top 100 jobs and number 4 on the top technology jobs for 2013. They reported that the workplace is favorable with above average ratings for upward mobility, high flexibility, and below level stress level. There are certainly opportunities for full-time employment in this field.

Because there is a steady increase in the growth rate for web development jobs, web development does appear to meet the requirements of providing a full-time status employment despite any impact that might occur from freelance web developers or other fields taking on web site projects.

Training and Formal Education

Most static and dynamic theories provide for either training, formal education, or a body of knowledge (Coyle, 2004). A formal educational degree is required in the majority of professionalization models reviewed to define a field as a profession (Millerson, 1964). This study will ask faculty about their perception of the role of education for the web development. So it is also important in light of this discussion to include information on what educational courses and programs are available for a web developer.

Training and Secondary Education Programs. According to the National Workforce Center for Emerging Technologies (1999), the web developer role begins in high school and ends with the four-year degree. However, the U.S. Bureau of Labor Statistics (2012) states that the educational requirements will vary with the job requirements. However, developers will need to know HTML, JavaScript, or SQL and some web multimedia programming.

The CIW Certified is a for-profit organization that provides certification for web foundations, web design, web development, and web security ("CIW Academic Funding and Awarding Bodies," 2013). Some funding for CIW Certified education and certification is authorized for secondary and postsecondary vocational education programs through the Carl D. Perkins Vocational and Technical Education Act of 1998 and the Perkins Act (Powell, 2003). CIW Certified lists eighteen states, including Michigan that to some extent have supported CIW as their official curriculum for web development at the high school level and cites that many state college systems through articulation agreements accept these secondary courses for college credit. Virginia will allow students obtaining a grade of C or better in the CIW Certified Web Design courses, who pass CIW Certified exams, to receive college credit at any community college or university in the state. But these programs can put additional requirements on the schools. Utah requires a passing score on the CIW Certified foundations exam or associate design specialist certification as one of the requirements before a secondary instructor can teach web development (Henderson, Beach, & Finkelstein, 2011).

The state, by certifying program and course curricula at the high school level as equivalent to a college course, thereby indirectly potentially is influencing the college level curricula. This action indirectly may influence the academic programs at higher education institutions as well as the core body of knowledge for the web development profession. There are no studies documenting the influence of the CIW programs on the professional role, on the security of web sites, or on enrollment in college level web development programs. That examination is beyond the scope of this study, but faculty will shed some light on what should be the minimum level of education for a web developer. This study will also identify if faculty are certified in web development through the CIW and other professional organizations.

Post-Secondary Academic Programs. Logan (2005) reviewed 134 research and land grant university web sites to identify those with well-developed web technology curricula. Logan used keywords such as "web development", "web technology", and "asp.net" on the school web site and looked at web pages for information studies, technology, and computer science departments and other areas such as affiliated professional schools. Logan identified seven real world models that could be classified as a web curriculum. Logan's recommendation for a web technology curriculum was based on personal experience. Although Logan did not use a scientific approach to classifying courses as web curriculum, she did provide a listing of the institutions and identified the institutions.

Logan (2005) reported 134 institutions showing 54 institutions (40.3%) offered one course, 47 institutions (35.1%) offered one to four courses, and 33 institutions (24.6) offered at least five courses, which could be considered a minor curriculum. Of the 80 institutions with one or more web courses, the author identified seven that could be representative of a real world model for a web development program.

The results from the initial literature search showed that colleges are at various stages in integrating web development into their curricula. While some colleges have a single course on web development, others have certificate programs or academic degrees. Multiple authors have reported on the creation of certificate and academic programs in web development. In this study, the award levels for less than one year and between one and two years are examples of certificate programs. Hufford (2001) described the creation of a web network and web site management course in the Internet technology minor. Courte (2004) described the development of an applied web programming curriculum and Bunch (2009) described how to develop a bachelor degree program in web development that is consistent with the Computing Curricula 2005 standards. Another strategy is to combine web and multimedia technologies into a single program (Sorkin, Tupper, Beiderman, Harmeyer, & Mento, 2003). Yet, there have been no formal published studies that have aggregated curricula at a national level other than Logan (2005).

Interdisciplinary Courses and Programs. Schools are offering formal academic courses in web development outside of the web development degree program. Logan (2005) is continuing to investigate the implementation of web courses but targeting the application in communication degree programs (personal communication, October 16, 2013).

Lifer, Parsons, and Miller (2009) reported that the IS 2002.2 Model Curriculum included a course called e-commerce. The model for information systems curricula was developed collaboratively between the Association of Computer Machinery, Association for Information Systems (AIS), and Association of Information Technology Professionals

(AITP). This is important because, as W. Goode (1960) proposed, other fields may encroach upon another field. Autonomy of the practitioner may be a characteristic of the profession (Hall, 1968); the benefits of the profession are derived from the body of knowledge and "service or collectivity" (p. 913). Therefore, the identification of potential fields that might encroach upon web development through migration of the body of knowledge should be considered. Therefore, my study will ask participants what they think about web development as a profession, including what department should oversee the web development content and programs.

Let's look at some of the undergraduate business programs that are accredited by the Association to Advance Collegiate Schools of Business (AACSB) and the Accreditation Council for Business Schools and Programs (ACBSP). Lifer et al. (2009) reported on a survey of schools that offered information systems programs found that overall 24% of AACSB schools and 34% of ACBSP schools did offer a course in web development or e-commerce. Specifically, AACSB schools offered Web Development (14%), Web Development II (6%), and E -Commerce (10%), while ACBSP schools offered Web Development (30%) and E-Commerce (10%).

Web Development Programs. In this study, it was important to identify institutions that offer web development programs in order to locate the potential subjects. Data on the number of web and web-related academic degree programs was retrieved from the WPD. Appendix D provides details regarding levels of academic programs available and which ranged from certificate awards less than one academic year through the doctorate. The following sections provide details on the status of the web and web-related programs, based on this dataset.

Web Development Program Classification. Hall's (1968) criteria for a profession include having formal training and university affiliated programs. This section shows that academic programs are available in web and web-related programs and the academic award levels. This information is important because it will be used in the selection of the subjects for this study. The subjects of this study will be faculty who have taught or are teaching in web development because this data shows that the most common program offered is in web development.

The NCES IPEDS (2010)classifies unique programs through the Classification of Instructional Programs (CIP) coding system. In the NCES IPEDS 2010 dataset, I identified six web and web-related programs, where the words “web”, “internet”, or e-commerce” were listed in the program CIP title or description. Only two programs had the word “web” in the program title: (a) Web/Multimedia Management and Webmaster, and (b) Web Page, Digital/Multimedia and Information Resources Design. NCES IPEDS classifies the web developer under the CIP code 11.0801, Web Page, Digital/Multimedia and Information Resources Design.

As explained, web development content is being offered across departments. Therefore, this study needed to establish that web development is the primary field for developing web applications. Four additional related web-related programs were identified based on the words “web”, “internet”, or “e-commerce” listed in the program CIP title or description and include e-commerce, graphic design, technical communications, and desktop publishing degrees. Expanding the search to include these same words across the job roles in the dataset did not return a significant number of programs or graduates. Underreporting of the numbers of graduates in this dataset may occur if the institution does not classify the major as web development using the appropriate CIP codes. Table 1 is a list of the web-related and web academic programs, and contains the web-related CIP codes.

Table 1

Web and Web-Related Academic Degree Programs and Their Corresponding CIP Codes

CIP Code	Short Title	Official Title
9.0908	Tech Comm	Technical and Scientific Communication
10.0303	DTP	Prepress/Desktop Publishing and Digital Imaging Design
11.0801	Web Development	Web Page, Digital/Multimedia and Information Resources Design
11.1004	Web Administration	Web/Multimedia Management and Webmaster
50.0102	Digital Arts	Digital Arts
52.0208	E-Commerce	E-Commerce/Electronic Commerce

Web Development and Web-Related Programs. To understand how institutions were organizing web development and web-related programs, two questions were asked. The first question asked was which CIP code in the WPD had the most programs. Of the 1552 web and web-related programs, 857 (52%) classified, as web development (see Table 2). The data in the WPD includes the CIP codes for each program, along with the school code, name, number of graduates and level of program.

The second question was which level of the program was most common. The level of the web and web-related programs was most commonly offered at the associate degree level with 529 programs. There were 343 associate degree programs in web development, making the associate degree in web development the most common program. The second most common award level was the one to two-year certificate followed by the bachelor degree.

Consequently, because web development has the largest number of programs compared to the other web related programs this study will continue to refer to web development as the primary field for web development. The tables show the number of entries, or academic degree and certificate programs, classified by CIP Code and Award Level. Table 2 shows a total number of web-related and web academic programs for each of the we-related the CIP codes.

Table 2

Web and Web-Related Academic Programs by Award Level and CIP Codes

CIP Code Short Title	Award Level >1	1- 2	AD	2 -4	BS	PBS	MS	PMS	Doc	Total
Web Development	145	180	343	16	156	8	8	1	0	857
Web Administration	41	54	74	1	58	1	1	0	0	230
Tech Comm	0	0	1	0	5	1	6	0	1	14
DTP	48	47	61	4	9	1	1	0	0	171
Digital Arts	2	3	8	0	27	0	3	0	0	43
E-Commerce	23	21	42	2	116	9	21	2	1	237
Totals	259	305	529	23	371	20	40	3	2	1552

Note: The full title for the CIP code short title shown is listed in Table 1. The legend for the level of degree abbreviations is shown in Appendix D.

Web Development and Web-Related Programs Graduates. It is important not only to look at the number of programs in each CIP code, but also the number of graduates, to see which programs are more popular. Because institutions may have programs with low enrollment and low graduation rates, I used the WPD to identify the CIP code with the largest number of graduates. The largest number of the 8,853 degrees awarded across all web and web-related program and academic levels are in web development with 6297 (71%) graduates (see Table 3).

It is also important to understand which award level was the most popular. The largest number of graduates from web development was from associate degree programs at 3301 graduates (52%), and bachelor degree programs at 1134 graduates (18%). Only 367 (4%) of the 8,853 graduates received awards higher than a bachelor degree. In contrast, the two lower level certificate programs had a combined 1672 (26.5%) of the graduates. These data support the suggestion that certificate, associate, and bachelor degree programs are the more popular degrees to attain at this time.

Table 3

Graduates from Web and Web-Related Academic Programs by Award Level and CIP Code

CIP Code Short Title	Award Level								
	>1	1- 2	AD	2 -4	BS	PBS	MS	PMS	Doc	Total
Web Development	776	896	3301	25	1134	19	146	0	0	6297
Web Administration	90	142	371	3	49	0	4	0	0	659
Tech Comm	0	0	2	0	31	1	16	0	6	56
DTP	160	181	352	10	55	1	2	0	0	761
Digital Arts	67	11	120	0	186	0	30	0	0	414
E-Commerce	120	39	67	1	297	43	95	3	1	666
Totals	1213	1269	4213	39	1752	64	293	3	7	8853

The Quad Programs. The WPD revealed that many schools provide more than one web-related program and offer programs at multiple locations and across states. The four schools collectively referred to in this study as the Quad are DeVry, ITT Technical Institutes, The Art Institutes, and the University of Phoenix. These four schools are for-profit, provide courses online, and extend beyond their state boundaries. In order to understand the impact of the Quad on the programs and graduates, the data from these schools was separated in the WPD.

Collectively, the Quad has a combined total of 341 (22%) of web and web-related programs with 221 (65%) of the Quad programs in web development (see Table 4). Remember that there are 857 total web development programs across all institutions in the WPD. The Quad therefore, provides 25.7% of the entire programs available in web development.

This study will not select subjects from the Quad because they could represent a more homogenous view of web development as a profession because of their similar working environment.

Incidentally, the most common award level for web development was the associate degree with 120 programs followed by the bachelor degree with 91 programs. Only one institution in the Quad had a degree program higher than a bachelor degree. So even within the Quad, the associate degree in web development is the most commonly offered program, followed by the bachelor degree.

Table 4

Web and Web-Related Academic Programs by Award Level and CIP Code for the Quad Schools

CIP Code Short Title	Award Level									
	>1	1- 2	AD	2 -4	BS	PBS	MS	PMS	Doc	Total
Web Development	2	7	120	1	91	0	0	0	0	221
Web Administration	0	0	0	0	46	0	0	0	0	46
Tech Comm	0	0	0	0	0	0	0	0	0	0
DTP	0	1	0	0	0	0	0	0	0	1
Digital Arts	0	0	0	0	0	0	0	0	0	0
E-Commerce	0	0	0	0	72	0	1	0	0	73
Totals	2	8	120	1	209	0	1	0	0	341

Total Graduates from the Quad Programs. Having a large number of programs may not equate to having a large number of graduates. Therefore I extracted the number of graduates from the WPD from the Quad programs (see Table 5). At first glance, the data shows that web development was also the most popular program in the Quad. The Quad schools graduated 3257 (37%) students in all levels of web and web related programs. Of these 3257 graduates, 3041 (93%) were in web development. The associate degree was the most common degree awarded with 2150 (71%) graduates followed by the bachelor degree at 678 (22%). Similar to the data in the WDP dataset, the most common degrees awarded from Quad schools were the associate degree followed by the bachelor degree in web development.

It is worth noting the Quad schools had a higher percentage of graduates in associate degree and bachelor degree programs (93%) than non-Quad schools (49%). This might have an impact on the faculty views about web development education and the professionalization of web development. Therefore, in this study, faculty teaching at the Quad institutions will not be included.

Table 5

Graduates from Web and Web-Related Academic Programs by CIP Code and Award Level within the Quad Schools

	Award Level									
CIP Code Short Title	**>1**	**1- 2**	**AD**	**2 -4**	**BS**	**PBS**	**MS**	**PMS**	**Doc**	**Total**
Web Development	48	165	2150	0	678	0	0	0	0	3041
Web Administration	0	0	0	0	4	0	0	0	0	4
Tech Comm	0	0	0	0	0	0	0	0	0	0
DTP	0	1	0	0	0	0	0	0	0	1
Digital Arts	0	0	0	0	0	0	0	0	0	0
E-Commerce	0	0	0	0	208	0	3	0	0	211
Totals	48	166	2150	0	890	0	3	0	0	3257

Total Graduates within the Quad Web Development Programs. While the total number of graduates from the Quad is 3014, this does not indicate that all four programs have an impact on the number of graduates. Therefore, I segregated the Quad data for the total number of graduates, by institution and award level (see Table 6).

Table 6

Graduate Degrees Awarded in Web Development by Award Level for the Quad

	Award Level										
CIP Code Short Title	**>1**		**1- 2**	**AD**	**2 -4**	**BS**	**PBS**	**MS**	**PMS**	**Doc**	**Total**
University of Phoenix	39	0	819	0	241	0	0	0	0	1099	36%
The Art Institutes	9	165	210	0	437	0	0	0	0	821	27%
ITT Technical Institutes	0	0	889	0	0	0	0	0	0	889	29%
DeVry	0	0	232	0	0	0	0	0	0	232	8%
Totals	48	165	2150	0	678	0	0	0	0	3041	100%

Note: Because only 10 of the 238 degrees awarded from Anthem Institute and Colleges were associate degrees, they were not included in the Quad.

The University of Phoenix Online programs conferred 1099 (36%) web development degrees awarded by the Quad supporting that this program had the number of graduates in web development overall other programs in the WPD. Remember, there were only 6297 total for all schools for web development degrees awarded. This meant, this one program, graduated 17.4% or slightly more than one-sixth of the graduates in web development in the entire country!

But this wasn't the full story. The University of Phoenix had 819 (19.4%) graduates with associate degrees and 197 (11.2%) graduates with bachelor degrees. Close behind, the ITT Technical Institutes had 899 (29%) graduates in web development and all of these were associate degrees. Although the University of Phoenix conferred the greatest number of web development degrees, ITT Technical colleges are not far behind.

Web Development and Web-Related Programs Excluding the Quad. The Quad programs needed to be removed from the WDP to identify which program was the most common. After removing the Quad programs, of the remaining 1211 web and web-related programs, 636 (53%) were web development programs (see Table 7). Again, the most common award level for web development was the associate degree with 223 programs. Web development is the most common program of web and web-related programs.

The second most common award level was the one to two-year certificate followed by the bachelor degree, which is consistent with the results for the entire dataset. However, the ordering of the third most common award level is different from the WPD. In the entire dataset, the bachelor degree was the third most common award level. Without the Quad impact, the less than one-year certificate was the third most common award level, followed by the bachelor degree.

While the second common award level is the one to two-year certificate, this study will survey faculty teaching at institutions that have either an associate or bachelor degree program. As seen earlier, professionalization theories such as Hall (1968) provide for training, they expect the training to evolve into university affiliated education programs.

Table 7

Web and Web-Related Programs by CIP Code and Award Level Excluding the Quad

CIP Code Short Title	>1	1- 2	AD	2 -4	BS	PBS	MS	PMS	Doc	Total
	Award Level									
Web Development	143	173	223	15	65	8	8	1	0	636
Web Administration	41	54	74	1	12	1	1	0	0	184
Tech Comm	0	0	1	0	5	1	6	0	1	14
DTP	48	46	61	4	9	1	1	0	0	170
Digital Arts	2	3	8	0	27	0	3	0	0	43
E-Commerce	23	21	42	2	44	9	20	2	1	164
Totals	257	297	409	22	162	20	39	3	2	1211

Web and Web-Related Programs Graduates Excluding the Quad. It is important to identify number of degrees awarded at institutions outside of the Quad to identify which program is the most popular. There were 5596 (63%) of the 8,853 total degrees were awarded across all web and web-related programs excluding graduates from the Quad institutions. The most degrees awarded from non-Quad schools were in web development with 3256 (58%) graduates.

The ranking of web development degrees by award level did vary slightly from the WPD. The associate degree had the largest number of degrees awarded for web development with 1151 (35%). However, the second and third place was the less than on-year and one to two-year certificate programs, and they had a combined 1496 (44%) graduates. The bachelor degree programs had only 456 graduates.

The variation in the number of graduates by award level can be partially explained because when the first certificate programs were created in Illinois, there were no academic degrees to transfer into. (Tabers, 1999). This process of moving from certificate programs to baccalaureate programs is an indication of movement toward professionalization (Wilensky, 1964a). Therefore, it remains important to include in this study the institutions with bachelor degree programs in web development.

Table 8

Graduates from Web and Web-Related Academic Programs by Award Level and CIP Code Excluding the Quad

CIP Code Short Title	Award Level									
	>1	1- 2	AD	2 -4	BS	PBS	MS	PMS	Doc	Total
Web Development	728	731	1151	25	456	19	146	0	0	3256
Web Administration	90	142	371	3	45	0	4	0	0	655
Tech Comm	0	0	2	0	31	1	16	0	6	56
DTP	160	180	352	10	55	1	2	0	0	760
Digital Arts	67	11	120	0	186	0	30	0	0	414
E-Commerce	120	39	67	1	89	43	92	3	1	455
Totals	1165	1103	2063	39	862	64	290	3	7	5596

Note: The WPD does not indicate if a student graduated with more than one degree during this time.

Identifying Institutions Which Offered Web Development Programs. This study will survey faculty who teach within institutions that offer web development programs at the associate or bachelor degree levels. While institutions may offer one or more programs in web development, some institutions may not have many students graduating from their existing programs. Identifying which institutions have faculty who are experienced in web development is a challenge.

To narrow down the potential faculty, the WPD was used to extract 636 institutions that offer web development programs, excluding the Quad institutions. Combining the all of the web development programs by the institution offering the programs returned a list of 378 distinct institutions. Not all of these institutions provide an associate or bachelor degree program. There were 151 institutions that did not offer either degree. There were 182 unique institutions that offered an associate degree program, and 38 institutions that offered a bachelor degree program, and 7 institutions that offered both degrees in web development for a total of 227 institutions. A listing of 26 institutions that reported offering either an associate degree or a bachelor degree in web development and reported ten or more graduates in 2010 is presented in Appendix E. Although this survey attempted to locate and invite potential subjects at all 227 institutions, only 86 were represented in the study.

Summary of Web and Web-Related Programs. Wilensky (1968) asserted that a profession needs to have training, and the more formal the education required, the closer the field comes to the traditional professions. The WPD data show that the largest number of graduate degrees awarded across all web and web-related academic program and award levels are in web development. The associate degree has the largest number of programs and the most graduates even if the Quad institutions are removed from the dataset. The bachelor degree and certificate degrees are also popular based on the number of programs and datasets. As a result of this data exploration, it is clear that the field of web development does have both training and formal university degree programs.

Unique Body of Knowledge

Wilensky (1964a) described how the training reflected the body of knowledge of the profession. Although there are case studies on web development courses, the literature search indicates a Web technology field that is far from having a consensus for content, technologies, and tools across courses.

Verbyla and Roberts (1998) argued that the current model to teach computer science and information technology topics was not sufficient for Web technology related courses. Verbyla and Roberts desired both a breadth and depth of technology but were not concerned with narrow computing topics on individual technologies.

There are a number of articles that could be used to help support the existence of a core body of knowledge and its development over time. In 1998, Lim reported that he was unable to locate a comprehensive course in web technology in the literature search. Lim (1998) created a web development course called Web Development Technologies, while Verbyla and Roberts (1998) called their course Providing Interactive Web Services. Klassner (2000) called their course Internet Application Design: Theory and Practice. Sorkin, Mento, Tupper, and Harmeyer (2000) called their courses Multimedia Authoring I, and Internet Programming. Chaytor and Leung (2003) also called their course Internet Programming. In 2004, Yue and Ding (2004) called the web development course Internet Applications Development.

Early Course Content. The research showed that these early web development courses may be called different names, but they contain similar content. Lim (1998) developed a course at Illinois State University that covered HTML, JavaScript, Java, CGI, and web databases. Author Likewise, Verbyla and Roberts (1998) at Mary Washington College created two courses which covered an introduction to the Internet, legal, ethical and security issues and the advanced web development, installing a web server, creating a home page with images, audio and video, install and use a tool to analyze log files, processing forms with Perl Scripts, secure server configuration, user validation, authorization, and authentication, and working with JavaScripts and Java applets. Many of these courses required prerequisites (Lim, 1998; Verbyla & Roberts, 1998).

Some of the core body of knowledge in the web profession is derived from other disciplines, such as computer programming, networking, graphic design, marketing, business, and communications. Many researchers have published recommendations for curriculum for individual web development courses which included HTML, introduction to the Internet, JavaScript, Java, web server programming, and web server management (Verbyla & Roberts, 1998; E. L. Walker & Browne, 1999). As the web technologies evolved, the course content evolved. In 2003, (Chaytor & Leung) presented a course on using Microsoft ASP.Net. By 2005, Logan found that up to 20% of the 134 institutions studied taught ASP and 31.3# taught ASP.NET.

Early Web Development Curricula Designs. Early implementations of web content occurred through integration of the content within existing courses (Klassner, 2000) and others adopted the use of individual courses (Lim, 1998), and still others presented the content across two courses (Ackermann, 1999).

Over time, faculty began to create web certificate and degree programs (Hufford, 2001; Sorkin et al., 2000; Sorkin et al., 2003). Hufford contended that developing web applications "requires people skilled in the use of emerging technologies", and therefore students should not just learn a "random assortment of skills" and will not be able to learn the skills necessary "from a non-integrated set of courses" (p. 143).

Identifying a unique body of knowledge is challenging for the web development field because the courses are taught across departments (Logan, 2005). The University of Michigan's, School of Information and Library Science discovered while designing a digital documents curriculum that the program required integration of coursework across multiple departments (Besser, 1996). This integration included managing the content, design, and distribution of the course materials.

Logan (2005) found that there were no studies that compare web development curriculum across literature. By 2005, Logan found that over 40% of the institutions did not offer a web development course and seven models for implementing a web curriculum.

While web development is not offered at all higher education institutions, it is clear web development courses and programs are available. Early in the development of the field, individual faculty embraced the field and began offering courses in web development, which in some cases evolved into programs. Although there appears to be similar content across courses and there are some curricula models that have been identified, there is no consensus on this content or the organization of the curricula (Rudy, Hawkins, Wallace, & NetLibrary, 2002). Rudy et al. (2002) wrote that the standards "must reflect the consensus of the industry professionals in the IT career field" to be effective" (p. 27).

Professional Associations

Hall (1968) felt that a professional association was a major structural component of a profession and the professional organization as a major reference is an attitudinal component. In 1996, the International Webmaster Association (IWA), a not-for-profit international professional organization, was established to provide education and certification in web development. With the web site reporting over 300,000 members, the leader of the executive board is the founder of the organization. Any individual may join the organization and complete the certification exams.

Started in 1997, the World Organization of Webmasters (WOW), is the national professional organization dedicated to the support of individuals and organizations who create, manage, or market web sites and focuses on education, certification, and building community and advocacy for the web development field. World Organization of Webmasters (WOW), also known as WebProfessionals.org, continues to be led by the founder and an advisory board. Any individuals may join the organization and take the certification exams.

After the WebEngineering.org web site went live in 1997, the first international conference on web engineering was held in 2001. The first Journal on Web Engineering was published in 2002 and the International Journal on Web Engineering published in 2003 (Ahmad et al., 2005). In this study, it is not known if the faculty who teach web development belong to any of these professional organizations or what journals they read.

Control Over Entry Into the Practice. One of the responsibilities of professional associations according to Wilensky (1964a) is the control over entry into practice. WOW and the International Webmasters Association (IWA) have strong support for informal and structured training and certification (Cullifer, 2013). However, neither organization controls entry into the practice.

The introduction of tools at lower end costs removes barriers to entry into web development (McGill, 2006). McGill showed that the end users are active in web development, are very little if any formal training, and therefore, believed training is an important approach to reduce risks. Rode (2005) surveyed and interviewed experienced programmers and end users and then used the information to design a teaching method, which would further lower barriers for end users to develop web sites. Individuals who are not web developers, software engineers, or applications programmers can easily build web sites. Anyone can declare themselves a web developer and neither professional organization can prevent anyone from practicing web development. Because there are no barriers to entry into practice, the literature search included reviews of studies related to the entry level practitioner.

Problems may arise from end users utilizing these programs because they do not have formal training. Web Development training could be helpful to prevent configuration and programming design errors. There are no large-scale studies on the impact of the type, length, and location of informal training and the level of security of the web applications. One of the methods of ensuring adequate training for a profession is through certification and licensure (Wilensky, 1964).

Competing Professional Organizations. There are other professional organizations that might impact web development, such as the Association of Computing Machinery (ACM) and the Institute of Electrical and Electronics Engineers (IEEE)-Computing Society, because of their impact on computer science, information systems, and information technology.

It is legitimate to question whether a formal education is required for entry-level development in computer science, computer programming, or web development and whether the training available is adequate to meet the needs of the workforce. Early in computer science education, committees were set up to identify recommended curricula for formal programs. Curriculum 68 and Curriculum 78 recommended the implementation of service courses, minors and courses for non-computer science majors, and continuing education (Beck, Cassel, & Austing, 1989).

The Association for Computing Machinery (ACM) is one of the leading professional organizations for computer science. The ACM provided the initial recommendations for undergraduate computer science programs in 1968 and the 1978 revisions. Later the ACM and the Institute of Electrical and Electronics Engineers (IEEE)-Computer Society created a Joint Task Force on Computing Curricula in 1991 to develop common curricula for computer science. Major revisions of the curricula occurred in 2001 with interim updates in 2008, and a major revision in 2013. In the 2008 recommendations, web development was included with networking in a category called net-centric.

The Computer Science Curricula 2013, separated network communications and security into a separate knowledge area called Information Assurance and Security and moved web development with mobile, game, and industrial development to a new optional knowledge area called Platform-Based Development ("Computer Science Curricula 2013 Curriculum Guidelines for Undergraduate Degree Programs in Computer Science," 2013). Because the web curriculum is optional, there may be computer science programs without web development courses. The extent of the influence of the new computer science recommendations on the web development programs is unknown.

Although the ACM have a special interest group for web development, their tagline is "Advancing Computing as a Science and a Profession" ("Code of Ethics," 2013) which explains why the latest curriculum standards for computer science have the web development knowledge deemed optional (Force, 2013).

ABET is a professional organization that accredits academic programs in applied science, computing, engineering, and engineering technology (ABET, 2013). Through the Computing Sciences Accreditation Board (CSAB), ABET defines the program criteria for computer science, information systems, and information technology. ABET has three members on the CSAB board of directors. The CSAB recommends “web systems and technologies” to be taught within information technology ("2013-2014 Criteria for Accrediting Computing Programs," 2013). The extent of the influence of the CSAB recommendations on the web development programs is unknown.

Autonomy

Although autonomy is both a structural and attitudinal dimension in the Hall (1968) model, there is no study confirming that the web development practitioners function autonomously. However, there are certifications and a beginning development for standards of practice.

Certification and Licensure. The fourth step in professionalization, according to Wilensky (1964), is the political agitation which leads to the first state license law that protects the profession from encroachment from other fields and professions, helps define the authority of the profession and the role of the professional, and can be used to help segregate qualified and unqualified practitioners. Although Wilensky argued that laws and ethical codes can also help protect the monopoly status of the profession by preventing other professions from encroaching on the profession, legal protection is not required to be part of the natural history of professionalization (p. 145).

At this time, no state or federal licensing is required for web developers. In the U.S., companies are required to follow federal and state laws, even for their online web sites. As Bagert (2004) explained, the company can protect itself through contract law by requiring a contract and specifying the deliverables and requirements of the project. Open Web Application Security Project (OWASP) is a non-profit organization that focuses on computer security and produces a top ten list of web application security. B. Sullivan and Liu (2011) explained how most of the security problems identified by OWASP were preventable with training. However, there are no requirements that web developers must follow industry standards, which may go beyond what the law requires. There are no studies linking the educational preparation of web developers to security risks or the financial impact of security breaches on society.

Several organizations have offered industry and professional certificates related to web development and these organizations have developed and morphed over time into different organizations. CompTia retired the i-Net+ and e-Biz+ web-related certifications and, currently, offers a certification on Social Media Security Professional ("Social Media Security Professional," 2013). WOW provides a variety of certifications for the IT industry. The roadmap to certification is organized by job roles, such as Web Designer, Webmaster, Web Developer, and Web Administrator and requires more than one exam. WOW defines learning objectives for their certification exams based on roles and also chooses the body of knowledge to be addressed in the exams. The International Webmasters Association has a Certified Webmaster Program with three levels. The second and third levels require additional work experience in order to recognize web professionals for their experience and knowledge. Although there is no licensure or requirement for certification, there are professional organizations that offer certification opportunities.

Standards of Practice. There are several sources for professional and technical standards set by industry organizations for web development disciplines (Rudy et al., 2002). Tim Berners-Lee created the first web client and web server application in 1990 at CERN, created HTML, a hypertext markup language used to create the first web site around 1991, and created the World Wide Web Consortium now referred to as the W3C ("The birth of the web," 2013). Just over 21 years ago, on April 30, 1993, a research facility called CERN released the Web software invented by Tim Berners-Lee for free to the world. The W3C consortium created the first standards for HTML in 1993 and other web standards such as Cascading Style Sheets ("All standards and drafts," 2013). The W3C today, continues to set standards for languages such as HTML, CSS and other web-related technologies.

The Web Standards Project began in 1998 to promote uniform standards to be applied across all web browsers that would help decrease the cost of development. Standards in web development have always been a problem because compliance within browsers or development tools cannot be enforced (Vaughan-Nichols, 2001). Some authors have attempted to measure compliance with other technology industry standards and attempted to identify reasons why web sites are non-compliant, as B. Sullivan and Liu (2011) suggest. The major reasons why web engineers did not comply with mobile standards in one study was that they lacked time, the standards were impractical, and there was a lack of knowledge on how to use the standards (Dahanayake et al., 2010).

In 1996, the National Workforce Center for Emerging Technologies (NWCET) under initial funding from Microsoft and a National Science Foundation grant, created a set of standards for multiple information technology careers using a Delphi method. In the first standards released by the NWCET, eight career clusters were identified which included web development and administration (Rudy et al., 2002). The standards were created to help companies improve communication with employees about job expectations, and for educational institutions to modify their curricula to close the gap between industry needs and student skills. Although the standards were updated in 1999, 2003, and 2005, there is no plan by NWCET to further update the standards.

Within the context of professionalization, it is important that the industry form a consensus on standards and that these organizations continue to grow and support the profession over time. The extent faculty is aware of these standards and the degree to which these standards impact curriculum and course development is not known.

Code of Ethics

International Webmasters Association ("Standards of Web Professional Practices," 2013) has defined a set of professional standards which include quality of service, full disclosure, fair and reasonable rates, confidential information, advertising and promotional practices, laws and conduct of business, good citizenship, and relationships between employee and employer and clients ("Code of Ethics," 2013). Although the Association of Computing Machinery does have a code of ethics, they are not representative of web development.

In 1998, the PRP Group of the W3 (1998) developed the P3P Guiding Principles. The intention of the PRP Group was to be involved to help "maximize privacy and user confidence and trust on the Web" (W3, 1998). However a search of the W3C web site for "code of ethics" returns no code of ethics for web developers. The closest is a draft code of ethics and professional conduct and guidelines for disciplinary action, which are for members of the W3C groups and are not publicly available.

There is no consensus on a code of ethics or the implementation of service orientation, community sanction, or altruism. WOW, CIW Certified and NWCET have not identified standards of ethics. There is no research on the faculty perception for the need for a code of ethics in web development.

Summary

Web development meets some of the structural requirements of a profession. There is a professional organization and a code of ethics, though not fully supported. There is a full-time status available for workers and there is a body of knowledge starting to be identified through professional literature and informal training and formal degree offerings.

Attitudinal Characteristics of Web Development

Hall (1968) identified attitudinal dimensions of web development. There have been no studies that describe the practitioner or faculty and their views of the field of web development. It is possible that the professional organization has data to support that its membership values the organization because there are some practitioners that are members of the organizations. However, there is not one professional organization that represents all of the practitioners in the field. There have been no studies on how practitioners, the community, or faculty who teach web development perceive web development as a profession.

Chapter 2 Summary

Like other fields that have undergone professionalization, the web development field will benefit from professionalization. However, what extent faculty believes professionalization will benefit the field is unknown. Although static professionalization models use fixed traits to determine if a field meets the threshold of a profession, newer dynamic models view traits on a continuum, or as a process. Some of those theories focus on different characteristics, but most of them support the concepts of a professional organization, a unique body of knowledge, and autonomy. As such, it is possible that a profession can move up or down the continuum between a field, emerging profession, and a full profession. In this study, a dynamic model from Hall will be used that include traits, but allows the field to have varying degrees of support for the traits. Hall's survey tool, modified by Snizek, has been commonly used to identify the attitudinal views of practitioners across multiple fields of study regarding the level of professionalization of their work.

This study will be quantitative and aims to explain the views of web development faculty about the professionalization of the web development. A review of the structural components of the web development profession shows the profession does maintain full-time status for workers, a beginning of a core body of knowledge as demonstrated through a growing number of university level degree programs and the beginnings of scholarly research, and national professional organizations and industry organizations that are attempting to set standards of practice.

There are several professional organizations but only one with professional standards and code of ethics. However, the national professional organization does not provide accreditation of academic programs or control entry or exit from the profession, maintain standards of practice or a code of ethics. There are no requirements for individuals to join professional organizations, to obtain certification or university degrees, and there are no programs to license web developers. There are so many levels and types of certifications and job titles across the professional and industry certifications that its usefulness is questionable. There is no regulation of practice within the discipline and no barriers to entry into the practice. Therefore, the web professional organization does not have a monopoly and may be encroached by other professions. The literature search did not show any research studies that measured the attitudinal characteristics of practitioners, students, or faculty with respect to web development.

Web development only meets some of the structural characteristics of a profession. Although web development has a developed professional organization, a unique body of knowledge, and autonomy, the field has not met other requirements of a profession as defined by Wilensky (1964) and later expanded by Hall (1968). There have been no studies demonstrating how web development meets or does not meet the attitudinal characteristics. Because faculty are key players in many of these characteristics of a profession, this study will try to describe the faculty perceptions of web development.

CHAPTER III: METHODOLOGY

The purpose of the study is to explore how faculty teaching in higher education institutions which offer web development academic programs view the web development profession and how their views are consistent with the Hall (1968) model of professionalization. These five areas, peer reference group, belief in service to public, belief in self-regulation, sense of calling to field and feeling of autonomy, will be the first five variables that will be assessed in the survey. It was not known if faculty who teach in departments which have web development programs have a common view of professionalization or see a need for the web development to achieve professional status. It was important to understand how faculty view web development as a profession, because faculty play the key role in developing and teaching academic courses and programs in higher education systems, support professional organizations, and produce the scholarly research that, in part, forms professional boundaries and norms.

This chapter describes how the study was implemented, including a review the design of the study, instrumentation, the methodology and procedures for data collection, subject identification, and data analysis. Although there are academic degree programs in web development and several professional organizations, the literature search did not return any studies that analyzed the status of web development as a profession. This study will fill that gap and provide information about the faculty and their views toward the professionalization of web development.

Design of the Study

The purpose of the study was to understand how faculty, who teach in institutions with web development program, feel about the professionalization of web development. A non-experimental design helped identify accurate information about the characteristics of the subjects or the frequency about a particular phenomenon (LoBiondo-Wood & Haber, 2002). To learn about the characteristics of faculty who teach web development and how they view the professionalization of web development, a non-experimental, quantitative study design was chosen.

This study used a descriptive design (Burns & Grove, 2008) and described a specific group of faculty and their views of the professionalization of web development. It was important to remember that the population and the characteristics of the members of the population were not known. Sullivan suggested that it was appropriate to use this design method to "learn the characteristics of a population" (p. 15). Burns and Grove went further and stated that these studies can describe the current status of the variables, but can also categorize and identify the frequencies of these variables in the discovery process to help find new meanings. Therefore, descriptive statistics and inferential statistics were be used to compare groups within the study, but not to generalize the results to the population (p. 239).

Although Burns and Grove (2008) classified the level of research quality of this type of design to be relatively weak, this method provided us with a direction of where to conduct further research in this field. The quantitative design used qualitative or categorical variables, which allowed us to classify the faculty based on attributes and characteristics (M. Sullivan, 2008). The study did not manipulate any variables of interest, but rather used a survey methodology "to describe the attitudes, beliefs, and behaviors of a population" (Patten, 1997, p. 9).

Instrumentation

Collectively, the survey used in this study was referred to as the Web Development Professionalism Inventory (WDPI) and consisted of four sections. The first section contained a modified version of the survey tools that Hall (1968) and Snizek (1972) used to study how other professions viewed the status of their professions. Both Hall and Snizek demonstrated that there was plenty of literature on the professionalization process and how a wide range of professionals views the profession to which they belong. The survey tool Hall designed, which was modified by Snizek, has been employed across multiple fields and over time (Carlan and McMullan, 2009; Chan, 2005; Hampton and Hampton, 2004; Wimmer, 2009). These survey tools provided a way to measure the attitudes of the participants and have been tested across fields. The other sections of the WDPI contained questions on the faculty job roles, demographics and their view related to the structural components of the professionalization of web development.

Some of the questions of the WDPI were rearranged to improve the readability and survey completion rate. For example, some survey questions were grouped together so that the participant did not need to scroll down the page. The description of each section of the WDPI follows.

WDPI Part I: Faculty Attitudes Toward Professionalization

To understand more about how faculty view the professionalization of web development, the first part of the WDPI contained a modified version of the Hall (1968) Professionalism Scale. In this study the attitudinal characteristics were used to describe the professionalization status of web development across five dimensions.

Mapping questions to the Hall (1968) **Professionalism Scale**. The five attitudinal characteristics included a professional organization as peer reference group, belief in service to public, belief in self-regulation, sense of calling to field, and feeling of autonomy. All are described in depth in the literature review (p. 92). Operationally, these were measured by the questions in the survey tool and measured using the variables listed in Table 9.

Table 9

Map of Survey Questions Mapped to Hall

Short Title	***Survey Questions***	***Survey Questions***	***Hall's Questions***
I. Use of the professional organization as a major referent	PO1, PO2, PO3, PO4, PO5	1, 4, 9, 13, 17	1, 6, 16, 26, 36
II. Belief in public service	PS1, PS2, PS3, PS4, PS5	2, 5, 8,10, 23	2, 7, 12, 17, 47
III. Belief in self regulation	SR1, SR2, SR3, SR4, SR5	6, 11, 14, 20, 22	8, 18, 33, 43, 48
IV. Sense of calling to the field	SC1, SC2, SC3, SC4, SC5	7, 15, 12, 18, 24	9, 14, 24, 39, 49
V. Feeling of autonomy	AT1, AT2, AT3, AT4, AT5	3, 16, 19, 21, 25	5, 15, 40, 45, 50

Note: PO = Professional organization as peer reference group. PS = Belief in service to public. SR = Belief in self-regulation. SC = Sense of calling to field. AT = Feeling of autonomy.

Snizek (1972) mapped his questions to Hall's initial questions. The questions on the Hall survey that Snizek recommended keeping include 1, 2, 5, 6, 7, 8, 9, 12, 14, 15, 16, 17, 18, 24, 26, 33, 36, 39, 40, 43, 45, 47, 48, 49 and 50 with five questions measuring each dimension. The mapping of the variables and questions are shown below. Total scores for the Hall's Professionalism Scale range from 25 to 125, with higher scores indicative of professionalism.

Modification to the survey questions. The order of the questions will remain similar to other studies (Miller and Fry, 1976; Shafer, Park and Liao, 2002; Hampton and Hampton, 2004; Wimmer, 2009;). The order scheme prevented order effects such as "increased positiveness of summary items when asked after specific items on the same subject" (Lumsden, 2007, p. 89) . To prevent this, eleven questions were scored using reverse ordering.

The wording was changed to identify how the faculty interprets what web developers do and how the faculty believes that other web developers think and behave. The wording from the Professionalism Scale shown in the Appendix F that was removed was crossed out and the inserted text is identified with italics. (For comparison, the final version inserted in the study survey is also located in Appendix F.) The mappings to the original questions are identified in parenthesis. Because the survey was not administered to professionals in the field, slight modifications of the survey questions were made to reflect the faculty view of the web professional's role and not their own faculty role. For example, for this study, in question 1, the word "I" is replaced with "Web developers". This could have made the difference between whether the respondent has the opinion or are interpreting how people in the web development profession act or feel.

Lumsden (2007) recommended asking questions that would not require considerable thought in order to obtain the most reliable responses from subjects and avoid leading questions. The subject having knowledge of the characteristics of professionalization from the study would more likely remind the subject about the definition of a profession potentially leading to more in depth responses.

Dillman (2000) recommended, the first question apply to all survey takers and it does in this survey, because the survey asked for their opinion on if web developers read professional journals. However, the second question was not easy to answer because of the word "mine". The subject may not have been working directly in web development and might have referred to information technology, computer science, software engineering, and other fields. Therefore, it was important to insert the name of the profession in some of the questions to avoid ambiguity.

Modifications to the survey qualifiers. Ordinal questions used in this study indicate a level of agreement with a statement (Lumsden, 2007). Hall (1968) initially used a scale to measure agreement with the survey statements which ranged from very well, well, "?" for neutral, poor and very poor. The question mark was used as neutral and could be misunderstood by the subjects. Dillman (2000) stated that having the subject use numbers as the measurement in agreement for attitudinal and belief survey questions could have a greater potential for measurement error. The qualifiers have been changed to this same set of qualifiers across multiple studies that relied on Snizek's (1972) and Hall's (1968) studies. For this study, these quantifiers have been changed to strongly agree, agree, neutral, disagree and strongly disagree with strongly agree on the right side (Lumsden, 2000).

WDPI Part II: Structural Components of Professionalization

The second part of the survey inquired about the subject's knowledge about the structural components of a profession. According to Hall (1968), the profession requires a fulltime employment status, training schools with a body of knowledge and university affiliation, a professional association, which defines the title, and tasks of the practitioners, eliminates incompetent practitioners and protects the profession from encroachment from other fields, and a code of ethics enforced by professional organizations.

Closed-ended questions were used in order to be able to rank and categorize the responses (Lumsden, 2007). Some of the questions include the option "Other" to allow respondents to specify an option that is not within the list of possible options. Most of these questions are categorical or ordinal-scaled values. The response options were consistent with the values in the NCES IPEDS tables presented earlier in the literature review.

Minimum level of education for web developers. The first question identified the minimum level of education that the web developer should have achieved. The NCES IPEDS showed that the most common degree at this time is an associate degree. With so few graduates in master's degree and doctoral degrees in web development, the academic community may not have enough students and faculty to contribute substantially to the body of knowledge. Because faculty are scholars for the field, this question was important to the discussion of professionalization (Young, 1987).

Having a body of knowledge is a requirement in professionalization models (Goode, 1960; Wilensky 1964; Millerson, 1964; Hall, 1968). It was unknown to what extent other fields may be adding the content to the body of knowledge. The largest schools varied with the level of degree programs. It was unknown why there wss a difference between the numbers of graduates in each award level for each school. Therefore, this study surveyed faculty to identify what they believed should be the minimum degree awarded for a web developer.

Primary professional organization for web development. Researchers felt that professional associations were important to a profession (Hall, 1968; Carr-Saunders and Wilson, 1933). Therefore they survey included a question to identify which professional organization is perceived by faculty to represent the community of web developers. The literature review showed that a profession includes a single professional organization that speaks for the profession, a commonly accepted code of conduct or standards of practice or controls over entry into the practice. However, only the IWA and ACM maintain a code of ethics and no professional organization accredits web development curricula or controls the entry into practice or exit out of practice.

Faculty may choose in the first section of the WDPI that they do hold the professional association as a referent, but that does not identify which organization is accepted as the primary professional organization for web developers. Therefore, participants were asked which organization best represented the web development profession.

Academic oversight for web development curricula. Due to the overlapping nature of web development with other fields of study (Logan, 2005), the faculty may have a different opinion about who should oversee the web development curriculum, where web development should be taught, and who should teach the web development courses. This was not unexpected because Dey and Mand (1992) found computer science was affiliated with other departments such as business, engineering, and arts and sciences. Therefore, participants were asked to identify what discipline should oversee the web development curriculum.

Skills and knowledge recommended for entry into practice. While the NCES IPEDS data shows some university programs offer web development certificates and various levels of degree programs, professional organizations and third party companies also offer certifications in web development areas (CIW Web site, 2013). These certification programs and curricula are being adopted in high schools as well as at the state level. It is unknown what faculty thinks about these non-academic options for entry level web developers. The survey asked participants to identify which method provided the best preparation for an entry level web developer.

Requirement of web development content within Computing Science Curricula for 2013. The Computing Science Curricula (CS2013), is a joint set of recommendations from the ACM/IEEE-CS Joint Task Force. In the current version, the ACM/IEEE-CS Joint Task Force (2013) has moved web development out of net-centric computing category to its own subcategory within Platform Based Computing because they are "sufficiently different from “general purpose” programming to warrant this new (wholly elective) K.A." (p. 32). The CS2013 curriculum guidelines cited that the changes in web development was one of the reasons that web development content was moved into its own knowledge area. Therefore, with a major change in the placement of the web development content within the CS2013 standards, participants were asked if they supported web development as an elective or required knowledge area for computer science.

Faculty ability to maintain technical skills and knowledge. The literature search indicated there were a variety of web development courses teaching a wide range of topics (Logan, 2005; Lim, 1998; Sorkin, 2001) Yue (2002) have chosen to use projects for web courses. Bieg (2004) created interactive tutorials using Java. Tabers (2001) indicated the difficulty faculty have keeping up with technology. Polack-Wahl (2003) tried to solve this problem by incorporated a variety of topics into a single engineering course. If a visitor goes today to the W3 web site and looks up the HTML 5 standards, they will see a message that says "This is a work in progress! For the latest updates from the HTML WG, possibly including important bug fixes, please look at the editor's draft instead." (W3, 2014a) However, HTML 5 standards have been in use in web sites and yet the W3 2014 plan specifically says that the final version of HTML 5.0 recommendations will not be ready until the fourth quarter of 2014 and the final version of HTML 5.1 would be ready in the fourth quarter of 2016. Meanwhile, publishers have already been publishing textbooks on HTML 5. If faculty feels they are unprepared in the content area, they may not want to support a new program in web development or teach web development courses. Therefore participants were asked if they believed web development faculty, have difficulty keeping up with web development technology.

Impact of large online institutions. It was not known why more colleges do not offer web development programs. The Quad schools offer web development programs online and graduated over 3,041 (42.8%) of the 6,297 graduates in web development in

2010. Therefore, participants were asked if the presence of large online institutions affected their ability to offer web development programs.

Computer science and web development as professions. The first part the survey tool helped to demonstrate if the participant viewed web development is a profession, based on the dimensions in Hall's (1968) Professionalism Scale. Participants might not agree with Hall's definition of professionalism. The participant may include other factors when considering web development a profession outside the dimensions defined by Hall. Participants may have considered web development a specialization within computer science. Participants were asked directly if they felt computer science was a profession and if web development was a profession.

Code of ethics for web development. Anthropological traditions described by Davis (2009) focus on how the profession would meet the community needs. Millerson (1964) compared characteristics such as altruistic service, indispensable public service, and adherence to a professional code of conduct across professionalization models. The professional role is not defined by the community perception of the profession but rather by the impact of the profession on the community. The literature review showed that the presence of a code of ethics was a characteristic of a profession. Therefore, participants were asked if they believed a code of ethics was needed for web development.

WDPI Part III: Job Roles and Experience of Participants

The second section of the WDPI collected data about the job roles, professional and educational experiences of participants. Chan (2005) surveyed years of experience, level of job position, and professional affiliation as well as other work related experiences as part of the study of the professionalization of building construction related fields. Nothing is known about the work or educational preparation of participants teaching in web development degree programs. The survey provided information on where participants are getting their education, if not from academic degrees. Several questions were asked to provide information about the job role and the work and teaching experience of the participants.

It is important to add that there are studies on faculty, that include computer science faculty. However these studies do not provide information specifically about web development faculty. Surveys like the annual Computing Research Association Taulbee Survey (2011) focused only on institutions that provided doctoral degrees in computer science, computer engineering or information. As demonstrated, most of the web development programs are offered through undergraduate degree programs. Therefore, if was not appropriate to assume that the characteristics of faculty would be the same across groups. Therefore, this study collected information about the faculty job roles, experience, education and demographics.

Primary job role, faculty rank, employment status and primary department. This survey asked participants to identify their primary job role. Faculty may hold administrative positions and teach courses. Their administrative role did not exclude them from the study.

Participants were asked to identify their faculty ranking because there may have be differences in the level of faculty that teach web development courses. We do not know if faculty that are full professors taking on this new field, or if the entry level professors tackling this challenge.

Participants were asked to identify what department they worked in. It is important to understand where the participants worked within the academic organization. Participants were asked to identify which department should have oversight of the web development curricula. This question revealed if participants wanted the control of the web development within their own department. Participants, within the department that oversees the web development curricula, may have more of an impact on the web development profession, than participants from other departments.

Hall (1968) indicated that one of the structural components is that there is full-time employment available. In higher education, some faculty work as adjuncts, like contract workers, and others are regular part-time faculty called adjunct faculty. Participants were asked if they were part-time, full-time, and adjunct or were not working.

The survey did not need to directly inquire about the institutional characteristics because this data was known. The institutional identification number was linked to the email collector. Institutions with different UNITID codes but have the same web address, such as ITT Technical Institutes, were aggregated into one UNITID code per institution. The NCES IPEDS data already has institutional characteristics mapped to the UNIDIT codes. The primary characteristics of interest were PUBLIC, which indicated if the school was a public or private institution, SIZE that indicated the enrollment size, classification according to the Carnegie classification, and STATE, which indicated the location of the primary campus.

Professional experience. As Hall (1968) included use of the professional organization as a major criterion for professionalization, the participation of the faculty in the professional organizations was important to explore. Participants were asked to identify which professional organizations they currently belonged to. This question did not provide details of the type of membership, just that the membership was current. This helped identify if faculty were members of the professional organization that they recommended for the web development profession.

There are differing opinions regarding where core professional knowledge is obtained and how this knowledge is identified. Although Bloom (1956) defined knowledge as information about a subject, this information can be obtained from formal and informal education as well as life experiences. Chan (2005) and others have inquired about the work experience and levels of experience in other surveys on professionalism. Therefore, participants were asked about the number of years of experience working in various computer technology and web-related roles.

Teaching experience. As Young (1987) pointed out, faculty are both scholars and teachers. Philip E. Carlan and McMullan (2009) also looked at the years of experiences of their subjects. Having qualified teachers is important in the ability to provide academic programs. Participants were asked to identify the number of years teaching in higher education.

To explore how experienced the faculty were at teaching web development, participants were asked to identify which web courses that they have taught and how many times they have taught the web courses. The list of courses was derived by looking at the certification listings as well as case studies in development of web related courses.

WDPI Part IV: Education and Demographics of Participants

Burns and Grove (2008) suggested that demographics should be selected based on the focus of the study, the inclusion of variables in previous similar studies and previous evidence from practice. Age, race and gender are demographic variables essential in many research studies according to Burns and Grove. Demographic variables collected were classified as fact variables because they were descriptive of the individual participating in the survey "that are a function of their membership in society" . Because this was a non-experimental design where little information was known about the subjects, an exploratory design, which included basic demographics and educational background, was warranted. The results from this study reported as the sample characteristics, provided an overall picture of the participants, gender, age, race, and education.

Demographics were placed in the last section as Dillman (2000) recommended so that the participants were responding first to direct questions from the survey about the research. The participant may not connect indirect questions such as age and gender with the research topic and thus leave the survey without completing the survey. Because subjects often have ready-made responses for questions involving age, Dillman reports the accuracy of the wording was less important.

Education. The educational background of faculty that teaches web development was not known. We know faculty largely does not have doctoral degrees in web development, because there are not enough doctoral graduates listed in the IPEDS dataset. In 2010 there were no programs identified in web development at the doctoral level and only eight programs at the master's degree level. Therefore, this study collected information on the education of the participants.

Shafer et al. (2002) collected data on education including professional certifications on certified management accountants. In this study, the survey asked participants to identify which professional certifications the subject has completed. The subject was able to enter up to five certifications. The participants were also asked to identify their highest level of school or highest degree achieved, and their major. This question included a space for certificates.

Age, gender and race. This study helped identify the demographics for faculty who are teaching web development. The gender makeup of the faculty who specifically teach in web development programs is not known. In the 2003 NCES Digest of Institutional Statistics, of the 26,000 faculty members for computer science, the majority were white males or females. (see Table 10).

Table 10

Gender and Racial Demographics for Computer Science Faculty in 2003

	Male	Female
White	56.4%	25.3%
Black	4.1%	3.7%
Hispanic	3.01%	*
Asian/Pacific Islander	4.2%	*
American Indian/ Alaska	1.4%	*

Note: N>26,000. The asterisk indicated there were too few cases or inability to provide an accurate count. These numbers were extracted from the NCES datasets. In Table 297 from the 2012 NCES report (released in 2013) the numbers reported were 24,000 rounded total with a SE=1.2 with 51% (SE=2.74) white males and 25.1% (SE=2.15) white females.

Relative frequencies were used in this study to provide a fair comparison between the study participants and computer science faculty. According to the 2003 NCES Digest of Institutional Statistics most of the faculty in computer science were white males (56%)

Because participants may be coming from different professions, the demographics of participants in this study may be different than straight computer science faculty. This data has not been updated in the NCES Digest of Educational Statistics 2012 (2013). Therefore, to determine if racial and gender demographics have an impact on the attitudes of faculty, participants were asked to identify their race and gender.

Survey Calibration

In this study, because the survey was online, there were several additional limitations that were not found in traditional paper-based surveys (Lumsden, 2007). To prevent technical errors, the survey tool selected was one with a strong reputation for both content clarity and technical capabilities. Given that the potential participants are teaching computer science or web development related courses, they may have a stronger knowledge base of mobile web applications and expect a glitch-free survey. Therefore, to identify potential technical problems with the survey as well as to determine if participants clearly and readily understand the questions, the survey was sent out to four faculty members as recommended by Lumsden (2007) for testing calibration. The calibration by other computer science professors known to the researcher verified that the survey instrument was accurately displaying the questions and the survey software was working properly. The faculty did not report any potential survey design or technical issues or problems with the question wording or content.

Despite having no problem with the survey calibration, there were minor technical issues that arose on the morning that the initial invitation was sent. One participant contacted me about having difficulty with the email link and filling out the fields. However, I could see that other participants had no difficulty filling out the survey. In response, the survey questions were modified to require an answer for most of the objective questions. Not having required fields was not an issue that came up during the instrument testing or during survey construction. The participant was resent the web link to the survey. After the changes, the participant reported that the web link and survey worked.

No subjects reported major technical issues, which range from hardware and software issues to problems interpreting the questions. One of the potential problems of online surveys was that the user is not able to clarify the concepts, vocabulary or directions, which could have impacted the response rate for individual questions. The one question that more than one participant asked about was the asking participants to "rank the methods that provide the best preparation for an entry level web developer." Participants expected to have a ranking order, rather than to select the level from a list. Despite these minor issues, only 25 participants entered the survey and did not start the survey.

Study Methods and Procedures

Sampling Methods

This study has chosen to survey faculty who teach within institutions that offer web development programs and not the web development practitioners. Professionalism can be a means to integrate practice, teaching, and research. Morssink (2001) concluded that the guardians of the profession are the faculty and policy making leaders of national professional associations (p. 24). This study was looking specifically at faculty and their views of the professionalization of web development because of their roles within academic programs and professional organizations.

This study surveyed faculty in higher education institutions that offer web development programs. Because this method used a non-random sampling method, this study was not generalized to other faculty or institutions (Patten, 2009). Because it was impractical to identify the population, a non-random sampling method was used. It was impractical and not feasible to survey all of the faculty who might teach a web development course or within a web development program. Therefore, I developed inclusion and exclusion criteria to identify a subset of a faculty that teach web development. The purpose of this study was to understand about what the faculty thinks about web development as a profession. Like qualitative research studies, this study looked to understand the meaning of the professionalization of web development as perceived by faculty, and therefore would not be generalizable to the population (Burns and Grove, 2005). Therefore, a modified purposeful sampling method was used for this study, which occurred in two stages. First, there was a selection of the institutions included in the study, and then there was the selection of the individual faculty within those institutions.

The purposeful sampling method was combined with the snowball method to expand the sample. Snowball sampling, referred to by Burns and Grover (2005) as network sampling, takes advantage of the social and professional networks of individuals.

Potential subjects were able to forward the email to other faculty that might be a better fit for the study. Today, with electronic surveys and email invitations, this could have been a useful tool with this study. Since the subjects will be contacted by email, the study was crafted so that the user could forward their information to another user. The impact of the snowball method was small as only 38 (18.3%) of the participants were unidentifiable.

Identifying the number of surveys to send out is often determined based on the expected return rate and using power analysis (Cohen, 1988). Several authors have attempted to determine the sample size using power analysis based on the effect size. Effect size is a function of the sample size, population effect size and significance criteria (α) according to Burns and Grove (2005) and represented the extent to which the variables are present within the population. However, there was no way to estimate a sample size based on not having information on the population effect size. However, Burns and Grove (2005) allowed for the use of previous studies to estimate effect size. Comrey and Lee (1992) suggested 200 a fair sample size, 300 is good and there should be at least 10 observations for each variable. As this was an exploratory study, a goal of 200 responses was set.

There was evidence in the ACM publications and other scholarly publications on web development topics including what web development content are being taught in computer science courses (Logan, 2005). That means that faculty teaching in traditional computer science courses may be teaching web development courses. Because of the overlapping nature of web development across fields of study, participants may be teaching web development content through multiple academic departments, making it difficult to identify participants who teach web development courses. Web development courses may only be offered sporadically and therefore might not appear on the course schedule.

There was a potential for participants in different academic areas to have a different view of the professionalization of web development. According to private correspondence with Snizek, the interesting part of this study "may well be **differences among** web designers, in terms of their degree of professionalization" and contended "professionals across and within 'professions' differ markedly by their 'attitudinal' degree of professionalization" (Snizek, 2012) .

Procedure to Identify Institutions and Potential Participants

To overcome the challenges of locating participants and to provide diversity within the subject pool, the faculty selected for the study came from a variety of related academic areas. Below is the process that was used to select the participants.

1. I visited the web site that was listed in the NCES IPEDS database for the institution.
2. I tried to locate the academic, department and program home pages for web development, web design, e-commerce, computer science, computer information systems, graphic design, and software engineering.
3. If there appeared to be a certificate program, minor or major degree program in a web related field, or two or more web courses, then the faculty list for that academic area, will be included in the subject pool.
    a. The faculty list must contain the faculty name and email address.
    b. If the list included the department head, whether it is a dean, school chair, and program coordinator or program contact person those names were also included.
    c. Faculty names were included if they are full-time faculty or adjunct faculty
    d. Only adjunct faculty were included if they are listed on the same page as the full-time faculty for a specific related department such as computer science, information technology and graphic design. All faculty, full-time and part-time, adjunct faculty and instructors, were

included if they were teaching a web development or web design program.

e. Information about the faculty such as academic title, academic program and academic unit, was collected if it was available. This information was used to identify characteristics about the subject pool.

4. The list was compiled based on the reporting by the schools to the NCES that they offered a web development program. Therefore, even if there was no individual program identified which met the criteria above, the computer science, computer information systems and graphic design faculty were still included.

Selection of institutions. The inclusion criteria for institutions required that the institution offered an associate degree program, a bachelor degree program, or both degrees in web development. There were a total of 227 institutions that met that criterion. The second criterion was that the institution must have published their faculty lists or department faculty lists with their name and email address on the internet. Exclusion criteria also included the Quad schools as well as schools that did not post the faculty names or email addresses online. Because not all institutions were surveyed, this section describes institutions represented in the survey and how the data collected was used to identify the institution characteristics.

There were 227 institutions identified in the Web Program Dataset (WPD) that offered associate or bachelor programs classified as web development and were not listed as one of the Quad schools. For the purpose of describing the results of the study, these 227 institutions are referred to as “web institutions”. The analysis of the participant responses showed that there were 86 unique institutions represented in the final survey data referred to as the “survey institutions”. An invitation to participate in the survey was sent to at least one person at these survey institutions. Multiple participants worked at the same institution, referred to as the "participant institutions". Therefore, the institutional data was reported for the web institutions, survey institutions and participant institutions.

Identifying Potential Participants Using the Institution Web Site

The web address for these web institutions was located using the IPEDS dataset. If web addresses were not available or incorrect, then the web site was located using the Google search engine. Although the web page address and page classification was collected, many web pages were faculty search pages, which contained dynamic content making it difficult to identify the web page path. Some institutions listed placed the faculty information within their employee directory. Not all institutions posted the name or contact information for individual faculty. Therefore, potential participant names, titles and email addresses were collected from college, department, program web sites and faculty directories. The web sites were classified to obtain information about where the data was retrieved. Program pages were located and searched first, along with department pages and faculty search pages.

This approach yielded 2017 names of instructors, faculty and administrators from 166 unique institutions where an associate degree or bachelor degree program in web development was offered. However, only 86 (41%) institutions were identified in the survey results.

Source of participant names. The participant name and email were collected along with their title and the name of the program or department if the information was available. Some names did not have email addresses listed but the email address was obtained from the email pattern used by the university such as first initial and last name.

Table 11 shows that the majority (52%) of 2017 names were retrieved from department level related web pages.

Table 11

Classification of the Web Pages Where the Potential Participant Names were Located

Classification of the Web Page	Frequency	Percentage
College level page	366	18
Department level page	1054	52
Faculty listing and search pages at the division or college level	272	13
Program level page	325	16

Note: The institution lists and potential subject lists, sorted based on the classification, were maintained using an Excel spreadsheet.

Number of potential participants by program area. The potential 2017 participants were listed as working within 258 distinct department and program areas recoded into 16 areas (see Table 12). The largest number of potential participants came from computer information systems and computer applications areas. The department with the most names listed was computer information systems and computer applications with 409 potential participants, followed by computer science, math and engineering with 367 participants. The smallest numbers were 2 (.1%) named in web and social media communications and 1 (0%) e-commerce or e-business. Only 64 (3.2%) were listed in a department or program with the word "web" in the name. The largest area with the word "web" in the name was web development, web programming or web development and web design with 25 (1.2%) of the names. The purpose of the study was to look at how faculty, including web faculty, viewed web development as a profession. It was unknown at the beginning of the study how many of the potential participants would be classified as ‘web faculty”.

Table 12

Frequency of Potential Participants Grouped By Department and Program Areas

Department and Program Area	Frequency	Percentage
Computer Information Systems and Computer Applications	409	20.3
Computer Science, Math and Engineering	367	18.2
Business Technology and Management Information Systems	331	16.4
Computer Technology or Computer Information Technology	304	15.1
Graphic Design, Digital Media, Animation or Applied Visual Arts	192	9.5
Art or Fine Art	146	7.2
Visual Communications or Communications	140	6.9
Networking	39	1.9
Web Development or Web Programming, or Web Development and Web Design	25	1.2
Web Design or Graphic Design with Web Design	21	1.0
Business or Management	12	0.6
Business and Office Technologies and Web Technologies	10	0.5
Web Management or Webmaster or Internet Networking	5	0.2
Web and Social Media Communications	2	0.1
E-Commerce or E-Business	1	0.0
Other	13	0.6

Job titles of potential participants. The potential participants were selected because their name was listed on a web page where other faculty names were listed on the program, department or university web page. In some cases where no names were available at the institution, the administrators or program advisor was selected, because the survey used the snowball method of identifying participants. The program advisor or administrators could take the survey, but they could also forward the survey to other faculty. An automated process would not have been possible because some web sites use the word “at” rather than the @ symbol in the email address of the faculty members name.

Table 13 shows the number of potential participants grouped by the job title that was provided on the web site. The three largest groups were listed as faculty with no specific ranking, adjunct faculty and instructors. Only 240 (11%) of the potential participants were in administrative roles such as chair, coordinators, department heads and deans. These names were selected because they could potentially forward the study web link to faculty who they knew might be interested in participating in the study.

Table 13

Frequency of Potential Participant Job Titles

Job Titles	Frequency	Percentage
Other or Unknown	38	2
Adjunct Faculty, Adjunct Instructor, Adjunct Professor	397	20
Instructor, Lecturer, Teacher	318	16
Faculty	535	27
Assistant Professor or Faculty	110	5
Associate Professor or Faculty	199	10
Professor	180	9
Program Director or Coordinator, Program Manager	48	2
Chair, Associate Chair or Acting Chair, Department Head	144	7
Dean, Associate Dean or Acting Dean	48	2

To understand more about why participants did not respond to the survey, it was important to look at the potential pool of participants. There were three people that contacted me indicating that they did not teach web development and therefore did not feel they would meet the criteria for the study. In an email to the researcher, one participant wrote, “it occurred to me that I may not qualify, as I don't know what magazines are most prevalent or which jobs are most prevalent.” The researcher contacted the participants by email to answer their questions and invited them to complete the survey.

Data Collection

The WDPI was administered online using Survey Monkey, a web site used to create and administer online research surveys. This section will describe the survey layout and design and the collector methods used to gather the data from participants. A copy of the first part of the survey is located in Appendix F and the second part in Appendix I.

Survey layout and design. The survey layout was consistent with the recommendation in Lumsden (2007) with a welcome and thank-you page. There was no screening test. If the user had a link to the survey, they were able to complete the survey. Lumsden recommended that the total number of questions be below 60 to decrease the likelihood that a user would leave the online survey without completing it. The first part of the survey contained 25 ordinal questions and the second half of the survey contained 24 questions. Although Lumsden recommended the initial question as a routine, easy-to-answer question, this study started off with the questions from the attitudinal scales. The sections of the survey were split across pages, to minimize the user need to scroll down the page to see the questions. The online survey format was simple with readable text, no graphics, and no distractions from color or other web page elements such as animations.

Although Lumsden (2007) recommended to using matrix questions sparingly, this study will be using them for several screens. The survey tool was previewed on an Apple and Windows computer as well as an Apple Mobile Device running iOS version 7. The survey loaded within 10 seconds. Each question in the list of matrix questions did appear on the screen complete. No tree or branching scenarios were used. Every subject was given the same set of questions in the same order. Dillman (2000) recommended, using single questions per screen over having two or more questions per screen because the subject has to think about the questions simultaneously and may go back to the previous question. Therefore, some questions were displayed individually on the page, and at other times, the number of question items per page was limited to prevent undue scrolling. In the same way, as Dillman recommended, the survey did not display the values horizontally but rather will display them vertically. This will made it simpler for individuals to access using different web browsers.

The original survey was given on paper. This survey is being distributed electronically, which has additional implications because subjects can lose focus and concentration (Dillman, 2000). Therefore, the number of questions being displayed to the subject at one time was limited to allow them to focus on the current question.

Lumsden (2007) does not recommend using abbreviations on the survey. So, the abbreviations plus the values will be included in the questions and responses throughout the survey. Lumsden recommends being specific with knowledge questions and providing options if the user does not know the response.

Emailing subjects. The invitation to participate in this study was sent via email to the potential subjects, with a link to the survey. The publically available email addresses of potential participants were uploaded into the Survey Monkey application. Some subjects had configured their email to refuse surveys through Survey Monkey and therefore those names were not included in the survey. Less then 2,000 surveys were sent out as indicated in the HSIRB application.

The application sent out an email to each potential subject, containing a link to the survey and an overview of the study. The email included a statement that after completion of the survey, participants may enter their names into a pool. Three random names were selected from the pool to receive $50 gift certificates from Amazon.com. Burns and Grove (2005) would not consider this coercion because there is no "overt threat of harm or the lure of excessive reward to obtain his or her compliance." (p. 190). The participants within this study will all have jobs based on their names listed on the institutions web site, and therefore, the amount is not considered coercive. Participants are able to request a copy of a final report. This might be helpful for faculty who want to learn more about how other faculty view web development as they review their own web development programs.

The survey was open for a minimum of three weeks. The faculty were busy teaching during the academic year and could have ignored the email. Improving response rates could be accomplished by using effective communication methods (Dillman, 2000). It was important to encourage potential participants to complete the survey expeditiously. Participants who did not return data were resent an email requesting they complete the survey. One of the potential problems with using online email-based surveys is that the users' email program may block the email, by identifying the email as spam or junk email. If the participant did not return the survey after the first week, a follow-up email reminder was sent. After the second week, if the participant does not return the survey, another reminder email will be sent with a link to the survey. These reminders will have slight differences from the initial letter in order to encourage participation in the survey. A total of three emails and a final email were used to remind participants to complete the survey.

In the initial email, a link will be provided which can be forwarded to another potential participant. This will help locate additional potential subjects using a snowball technique. In the initial email, Dillman (2000) recommends indicating the date, address or contact information, a description of what are going to happen and what the survey is about, a description of why the survey is important, a thank-you statement and signature. Although Dillman supports that a pre-notice letter, which may improve response rates in traditional surveys, this initial email contained the actual link to the survey.

Survey collector. The survey data file identified each participant with a unique identification number and collector identification used to identify the how the user initiated the survey. As described, participants were invited to forward a link to the survey, to other colleagues whom they felt should participate in the study. However, the email link was also coded with their institutional identifier. Forwarding to a colleague outside of their institution would skew the data. Therefore, the invitation also included a web link to the survey.

Out of the 233 initial responses, 74 (31.6%) used the email collector and 159 (68.2%) used the web link collector. After removing the records with blank responses, there were only 66 (31.7%) that use the email collector and 142 (68.3%) that used the web collector.

Identifying Institutional Affiliation

The survey did not ask the participant for their institution and therefore their name, email and institutional identifier were not entered into the survey file. If the user replied using the email collector, the institutional ID was carried back into the Survey Monkey database. However, if the participant used the web collector, this information was not carried back into the Survey Monkey database.

In order to identify the institutional data for participants who used the web collector, the data from the drawing was used to map the user back to their institution. The last screen of the survey invited participants to enter their name and email in order to enter the drawing. This information was used to re-insert the name and email address of participants into the original email address field, in order to map the record back to the original data files. The email address and institutional identifier are needed to link the survey data file back to the other data files. The data from the list of potential participants was merged with records in the survey data file using the email address. For participants who did not use their work email address, their names were mapped back to the original file to obtain their work email address. Although three of participants used an alias and one name was missing the prefix in their last name, these three participants were successfully mapped to the original email address. User names and email addresses were removed from the survey data file, after the data was merged with institutional data.

Unfortunately 38 (18.3%) of the participants used the web collector link and did not provide their contact information in any format. These records could not be mapped back to the original records and therefore could not be linked to institutional data. In retrospect, one question asking participants using the web collector link to identify the name of their institution might have improved the ability to map these participants to their institutional identifiers.

Institutional representation in the study. The list of web institutions was derived from the IPEDs dataset. However, this dataset may not be complete, as some programs may not be coded as web development. For example, at Lake Superior State University the web development is a concentration within the bachelor of networking degree program and therefore is not coded in IPEDs as a web development program. It was not possible to use power analysis to identify the number of participants necessary to include in the survey. As indicated in the research, factor analysis provides guidelines on the number of participants to include in the survey. Therefore, there is no aggregate information known about the population of web development programs or web development faculty.

Of the 170 (81.7%) responses with institutional information, 86 unique institutions were identified. Therefore, of the 166 unique institutions where participants were sent invitations to participate in the study, 86 (51.8%) institutions were represented in the survey results.

Imported institutional data. Data from the original participant file, the institutional characteristics and the web school graduated listings was merged using the institutional identifier field using a spreadsheet. The TYPEOFPAGECODE variable merged from the potential participant list identified the coded source of the participant name. The DEPARTMENTCODE and TITLECODE contained the coded participant's title and department information. These variables were used to retrieve information about the participant's role, department, and their institution.

The primary variables merged from the institutional characteristics table from the IPEDs dataset included STABBR which was renamed STATE, CONTROL which was renamed PUBLIC and INSTSIZE which was renamed SIZE. CONTROL identifies if the institution is public, private not-for-profit or private for-profit. ICLEVEL was also included to represent the level of the degrees offered. The level of degrees offered include 4-year or higher, 2-year, and less than 2-year. INSTSIZE represents the institution size category based on enrolled students in Fall 2008.

To help identify more specific information about the location of the institutions, INSTNM, OBEREG, LONGITUD and LATITUDE were also imported to identify the institutional name and precise location of the school, which could be used for mapping data results to geographical maps. OBEREG contains the state information organized into geographical regions. The CARNEGIE field from the institutional characteristics table also imported. Because the field is based on older information, additional Carnegie-related classification fields from the institutional characteristics table were also imported to help classify the institution. This data was then imported into SPSS for further analysis.

Data Privacy, Confidentiality, and Risks to Participants

The data was collected over the Internet through the online survey web site. Some meta data collected was collected by the web site such as the user IP address to identify potential duplicate entries. The participation in the study was not anonymous to the researcher, but personally identifiable information of subjects was never shared and was kept confidential at all times. Once the data file was completely downloaded from

SPSS, and merged with the other data files, the personal data (ie. names and e-mail addresses) of the participants were removed from the downloaded data file.

Although this study contains some personal data, much of the data was already available in the public arena. The place of work, email and names of the participants were retrieved primarily from the public web sites of the institutions where they work. The courses, which they teach, are often publicly available through the course schedules through the institutions web sites. However, consistent with the definition of privacy in Burns and Grove (2005), the subjects have the right to determine which personal information will be shared and under what circumstances. However, the personal data collected in the study included their age. The data survey tool collected their internet protocol (IP) address numbers. Participant names, academic titles, email addresses and institutional data gathered prior to the survey distribution was maintained on a spreadsheet on the researcher's computer which uses an encrypted file system and will be removed from the computer and stored on an encrypted file on a removable disk in a locked office when the entire study has been completed.

At no point were emails or any personal identifiable information of individual participants published. Aggregated data does not include personally identifiable information. The data in the final analysis and external reports did not include personal identifiable information. Institutional information was be reported in the aggregate. No participant included identifiable information in open-ended responses.

Risks to the subject. The risks to the participants were minimal. The content of the survey is of a professional nature and did not require personal data other then the participant's age. All participants were over 18 years of age and legally be able to consent to the study. The participants were informed of the purpose of the study and the overview of the methods. The informed consent was based off the university sample informed consent form, which used a frequently asked question (FAQ) format. The length of the consent form may have been a deterrent to some participants. Six participants indicated that they did not consent to participation and were subsequently removed from the study.

The faculty may ignore the email or simply delete the email if they do not want to participate in the study. If the subject did not respond, a reminder was sent to the subjects. However, the faculty as part of their role was familiar with scholarship, and therefore was knowledgeable about the practice for recruiting participants in a study.

There were minimal potential risks in this study. The use of any data over the web, email, and stored on networked computers was always at risk of being stolen. The data was stored in Excel and SPSS files on an encrypted file system, and were the only files that contained the participant responses. The data stored in Survey Monkey was stored in an encrypted file format where only I had access to the data. The computer was kept with the researcher or stored in a locked private office at all times. The computer was protected with Avira anti-viral software, which was updated regularly and a full system scan is completed weekly.

Benefits of the study to the subjects and society. While there were limitations to this study, there were several benefits. The subjects of this study will have direct and indirect benefits. Nothing was known about faculty who teach in web development programs or courses. This study provided the educational institutions and departments with direct information about faculty teaching web development courses and what faculty thinks about web professionalization. This study revealed the characteristics of faculty teaching in higher education and teaching web development. This information might be useful in understanding what departments are overseeing web development programs.

The decision to select faculty as the subjects for the study was because as Young (1987) stated, faculty "meets all the requirements for professional status" (p. 12). Faculty as scholars are able to use their individual judgment to determine what to study and research but as teachers they are not given autonomy. Although faculty may have academic freedom, the faculty are evaluated and have standards, which may impact their teaching choices. Young believes that faculty should participate in faculty development and refocus programs from teaching to teacher-scholar, which would bring together the roles of the teacher and professional. The study provided web development professional organizations, educational institutions and society about how faculty viewed the professionalization of web development. The survey helped identify how faculty feel about professional organizations for web developers and what organizations they feel are most representative for web developers. The study provided information such as what faculty thinks about the minimum level of entry into the profession and if large online programs impacts their ability to offer web development programs. This study also was able to group faculty based on their experience teaching web-related course and compare their attitudes toward the professionalization of web development with participants who did not have significant experience teaching web-related courses. While the study was interested in faculty that teach web development, several administrators and a few staff members also completed the survey.

Human Subjects Review. The risk to the individual subjects was minimal. The study proposal included copies of the survey, participant invitation email, and consent form, and was submitted to the Western Michigan University Human Subjects Institutional Review Board (HSIRB). No contact with participants occurred prior to receiving written approval from the HSIRB. A copy of the HSIRB approval letter is found in Appendix G. For this study, the benefits to the individual, higher education institutions and society outweighs the risks, this study therefore went forward.

Data Analysis

This study described the subjects, the faculty, as well as their views on professionalization using the results obtained from the survey. The purpose the data analysis in this section was to reduce, organize, and give meaning to the data collected in the study. The section described the overall data analysis plan along with procedures for describing the variables and sample or population, statistical techniques used, and in the case of exploratory studies to identify methods used to provide predications or examine causality (Burns and Grove, 2005, p. 44). According to Burns and Grove, because this was a descriptive study, this type of study does not usually have a hypothesis but looks at research objectives or questions. This study described the subjects, the faculty, as well as their views on professionalization using the results obtained from the survey.

Burns and Grove (2005) explained the descriptive studies could describe the variables as well as examine the relationships among variables. They explained that correlational research could show the type of relationship and the degree or strength of the relationship. The type of associative relationship could be positive, where both variables increase, or negative where they both decrease, or neutral where no relationship exists. The data collected in this study looked at the age of the subject as well as other characteristics such as gender. Combining these pieces of data allowed me to understand the sample better. So, the data analysis provided the ability to describe subgroups, such as male and female faculty. While there was no quantitative hypothesis, the data analysis was focused on describing the data being measured by the instrument.

This study was a descriptive study so no methods were used to provide predictions or examine causality. Looking at relationships among variables required the need to look at the correlation or strength of the relationship. However, in this study, there was no correlation hypothesis being tested because there was no attempt to look at any cause and effect relationships between variables. However, the data was used to show the numbers of male and female faculty and their explicit support for the professionalization of web development. The data analysis looked at the number of men and number of women who support web development professionalization and compared them using relative frequency to determine if one gender had a higher relative frequency for that item. Unlike correlational research, this data was not used to explain the causes any associative relationships identified in this study. Therefore, this study can not explain why there was more of one gender that agreed that web development should be considered a profession.

However, the data helped identify relationships between the variables. In addition to descriptive statistics, other statistics such as *t*-tests were used to help identify relationships between variables identified in the crosswalk tables. A listing of the crosswalk tables is found in Appendix H and the actual questions to the second part of the survey in Appendix I.

Statistical analyses used. The data collected for the categorical variables was reported and summarized using a variety of methods. In this study, both the frequency and the relative frequencies will be reported for each category or value for the variable in a table. Bar graphs were used to identify the frequency for individual variables for each variable as well as to compare the relative frequencies between groups. Groups were made from the data using the values of the variables in order to describe the sample such as gender. Then as explained, the expected and relative frequencies was used to compare the groups and shown in tables, bar charts or histograms (LaRose, 2011; B. Sullivan & Liu, 2011). This process did not allow us to identify the specific relationships, but it did provide information about the faculty.

Cross-tabulations and clustered bar graphs were used to describe the faculty using two categorical variables. For example, the study reported the number of male and female faculty that teach web development courses collectively and for each of the courses reported from part three in the WDPI. This data can be misinterpreted especially when the sample sizes are substantially different so (LaRose, 2011) uses clustered bar graphs using relative frequencies.

For this study the acceptable statistical significance level was set to .05. Unless specified in this report, the percentage reported is representative of the percentage of the 208 participants.

The Analysis of Participant Race, Gender, Age, and Years Teaching

Given that the purpose of this study was to describe the faculty and their views on professionalization of web development, the demographic data was examined using frequencies, percentages and relative frequencies. For example, the relative frequency for gender was analyzed to compare differences in this study with the 2003 NCES computer science faculty data. The demographics were also used to help understand if they might play a role in the view toward the professionalization of web development. For example, do the male subjects have a higher or lower or same value in professionalism as female subjects for each of the dimensions and for the whole survey?

Age, years of teaching and years in professional roles were variables in this study that contained continuous values. These variables were compared between web faculty and non-web faculty using *t*-tests for age, roles and years of teaching.

Variables analyzed included AGE versus TEACHING, AGE versus each of the ROLE variables, and AGE versus COURSE variables as well as TEACHING versus the ROLE variables, and the ROLE variables versus the COURSE variables. This provided information about the faculty members that are teaching the courses to help identify how experienced they are at teaching and teaching web development curricula.

Histograms were used to display relative frequency distributions. These were used to describe the frequency of the quantitative data by dividing the variable into the upper and lower limits, as well as groups of values known as classes (LaRose, 2011). Larose recommends using a scatter plot to describe the presence or direction of a relationship between two variables. The direction can be positive, negative, or no relationship. This does not imply the cause of the relationship. Both the histograms and scatterplots were applied to the quantitative variables, but only important and significant results were reported.

The pairings in the histograms and scatter plots also provide a way to show the relationship mathematically with a regression line, which was represented using a correlation coefficient r (LaRose, 2011). Variables were positively correlated if the r is greater than 0.7 and they were negatively correlated if r is less than -0.7. If the values are between 0.33 and 0.7 or -0.7 and -0.33, then they were mildly positively correlated or mildly negatively correlated. If the r value is between -0.33 and 0.33 there was no correlation. This was the standard that will be used to assess the potential for an association between the two variables. Variability can be a factor.

The Analysis of Participant Roles and Experience Teaching Web Courses

Web-related roles. Faculty that may have worked in web development may have a different view of professionalism. The variables like AGE and TEACHING were be analyzed across faculty reported working for 1 or more years in a web relate role. If they have participated in one or more years in any of those roles, then they were grouped and compared to the non web-developer faculty. Because this was a numeric value, the data was also described using statistics such as mean and standard deviation.

Web-related courses. This study looked to see if faculty teaching web related courses had a different view of professionalism. There are 16 courses based on the literature review of courses that have been studied. Faculty were grouped into those that taught a significant number of web-related courses (web faculty) and those that did not (non-web faculty). These two groups were used to determine if faculty that taught more web development classes had a higher or lower or same value in professionalism as the other faculty.

The Analysis of Participant Attitudes Toward Professionalization

Now that the overall plan implemented has been described, this section reviews the data analysis that was completed after the data was collected. In order to understand the attitudes of the participants toward the professionalization of web development, the first part of the WDPI included a modified attitude scale originally created by Hall (1968) and modified later by Snizek (1972). The scale consists of 25 questions where 11 questions were reversed scored in SPSS in order to avoid subjects from automatically agreeing or disagreeing with all of the statements. The raw scores for the individual items were scored between 25 and 125 because there were 5 levels within each question. The five levels, strongly agree, agree, neutral, disagree and strongly agree were scored as 1, 2, 3, 4, and 5 points. Therefore no score was lower than 25 or higher than 125 unless they left the survey early. A higher score indicates a more favorable view of the field as a profession.

The survey data values were measured with an ordinal scale. Given that the purpose is to describe the faculty and their views, the data was examined using frequencies, percentages, means, standards deviations, and Pearson correlations. The study reported Chronbach's alpha to measure the agreement with the 5 attitudinal concepts, for the breakdown of each of the subscales. Chronbach alpha is the mean of all possible split-half reliabilities, which was computed using variance of the score, number of items, and the summing of raw item scores. This value was then compared to the values of the subscales reported by Hall (1968) and Snizek (1972). Although the study has been validated, a principal component factor analysis was provided to add support to the validity of the tool.

A principal component factor analysis (PCA) with orthogonal rotations using normal Kaiser Varimax criteria was used to identify if the dimensions were not strongly correlated with the other dimensions. Values over were evaluated to determine if the components identified were able to stand separate from the other components. In PCA, only significant correlations, those with at least moderate correlations (.30 to .70) should be included. However, the comparison values are not set in stone. Although Aroian and Norris (2005) suggested including only items with factor loads greater than .40 and Comrey and Lee (1992) suggest that .45 should be the lower level limit. Dixon (2005) found that research supported lower limits as low as .30. Field (2009) suggested starting the analysis by setting the value at .4. Because this was an exploratory study, the broader guidelines were chosen.

The items in this study were evaluated for multicollinearity and to determine if the data was appropriate for principal component analysis. The data was tested using a variety of statistical tools. Like Wimmer (2009), components in this study realigned into different combination of items than the Hall or Snizek components. Both Chan (2005) and Wimmer (2009) experienced similar results, and also needed to remove several items from the analysis. Therefore, this study presents both the original data and the modified version of the principal component analysis.

Data Considerations

This was an exploratory study to help understand what faculty thinks about web development as a profession. Although this was a quantitative study, it is still important to disclose any bias of the researcher. I have over 20 years of experience with creating web pages and web sites, have been teaching web development for over a decade and have taught more than fourteen different web-related courses and over 100 sections. Prior to this study, I did support that web development was a profession, but I did not know what that meant. After completing the literature review, my views changed. While web development might not be a profession, my belief is web development should strive to complete the professionalization process. In order to manage bias, the list of institutions to be included in the study was from the IPEDS dataset and a large number of participants were invited to participate in the study. Data was collected using the same online survey for all participants. Lastly, the WDPI in Appendix F was derived from a previous study, which had been already tested and implemented across many other fields. The second half of the survey is available in Appendix I and was derived from other studies and the literature review.

There were several assumptions made at the beginning of this study about the data collection process. First web sites had listings of faculty that would be easily accessible, or available through the department home pages, program pages, or college faculty listings. Unfortunately, that was not the case. Many web sites made it difficult to locate faculty names, the discipline they teach in or contact information. Second, the assumption was that because the school had a web development program, they would have a comprehensive web site with information about the program and faculty.

Anecdotally, program information was often just the catalog information or occasionally had general descriptions about web development. Lastly, the institutions sampled were from 227 institutions that had web development programs coded with the correct CIP code. Web programs may not have been coded properly and new programs may have been added since 2010 that would therefore not be included in the survey.

Response Rate

There were 41 of the original email addresses bounced and 11 individuals opted out. These names were excluded from the surveys sent out. To comply with the IRB requirements, only 1997 total surveys were sent using the email collector. Two participants responded to the survey in January were included in the study. A condensed survey data file from Survey Monkey was downloaded which contained pre-coded numeric values for the objective responses. I removed the test record leaving a total of 233 participant responses or 11.7% response rate. Appendix J contains a listing of comparable studies that used a modified version of the Hall (1968) survey along with the number of potential subjects, number of responses and their response rate. Many of these studies had higher response rate than this study. However, some of these studies like Miller and Fry (1976), distributed the survey to the participants through their workplace. The lengthy consent form as well as the timing of the survey distribution could also have been a factor. However, the number of responses for the PCA was sufficient for this exploratory study.

Survey Collection Data. Ma and McCord (2007) concurred that most of the "respondents fill out the survey on the first day" (p. 15) and the following day the number is reduced by fifty percent. That was the procedure followed in this study. However they recommended sending the survey out during the week. This survey was sent out on Friday, November 29th, the day after a holiday. On Saturday, 38 participants had responded. By Monday, the total was up to 71. The following Friday, a reminder was sent out and that brought in another 36 responses that day and another eight over the weekend. A week later on a Friday, after another reminder was sent out, 19 responses were returned. At that point, many of the faculty would have been involved in giving out final exams for courses and processing grades. On the following Monday, 30 participants responded. Although the first eight days resulted in 112 (54%) of the valid responses, that would not have been enough for this study. The full three weeks the study was open and the final two surveys submitted after the holiday break, was sufficient to provide enough responses for this study. The survey software provided the ability to not send out reminders to participants who had already filled out the survey. The response rate was adequate for this study but a larger data set might have provided more significant information. While this survey was sent out on the last day of the workweek, given that the survey was administered during a holiday season, the timing might have been better for faculty on Fridays when they have finished teaching their classes for the week.

As Lang (2007) indicated, reported his survey response patterns also showed that a majority of the responses from web surveys were received in the first seven days. Furthermore, Lang also had a similar problem with some respondents indicating they did not have experience in the software they were studying.

Data Collection and Management Issue

Completion time. Three of the 208 records indicated the participant spent over a full day to complete the survey. Removing these three outliers, the average time to complete the survey was 14.1 (Median=11, SD=19.58) minutes. A conservative completion time was given in the email invitation. Participants on average completed the survey faster than the anticipated 30 minutes described in the consent form.

Survey completion rate. Although, 196 (84.1%) participants completed the survey through part one of the survey, only 187 participants completed the survey through the demographics page, the last page of the survey questions. Therefore the overall survey completion rate was at 80.3%. Three names from the 150 participants who completed the survey and entered the drawing were randomly selected and sent gift certificates for Amazon.

Blank responses. The table was sorted by the first survey question, to identify records without any responses, which could not be recreated statistical methods. I removed, 25 more records using listwise deletion where participants submitted no responses, which included 6 records where participants indicated that they did not consent to the survey. The participants indicated their consent to the survey for all of the other submissions. Of the 208 remaining records, 196 (94.2%) records indicated that the participants had completed all of the twenty five questions in the first part of the survey. The nature of the first part of the survey questions was a gathering of the opinions of the participants.

Although multiple imputations could be used to estimate and replace the missing values, instead, missing values for categorical values were coded as “no response”.

Blank responses variables such as years of teaching experience were not replaced with estimated values for categorical values, but recoded into categories. The purpose of this study is to explore what participants think about web development. Therefore, this did not interfere with the overall statistical results.

Non-Normal distributions. One of the assumptions for the use of parametric tests is that the data is approximately normally distributed (Munro, 2005). However, multiple fields in the survey data had non normal distribution either skewed or had kurtosis. For example the number of years working in the networking role and web administration role was skewed to the right, because so many of the participants had no experience in these roles. When the data was recoded into a normal distribution, the method is described with the analysis.

Transformation procedure. The variable such as years of work experience in the networking roles was non-normally distributed with skewness and kurtosis and therefore were transformed using the square root transformation before were used in the analysis.

Recoding variables. One of the assumptions for the use of non-parametric tests such as Chi-Square is that the data have at least 20% of the expected values with 5 or more values (Munro, 2005). Chi-square cannot be used to compare expected frequencies for individual items because the number of cell counts was too low (>20%) in 2 or more cells making the test unreliable. Therefore, some of the variables were recoded into different groupings. When the variable was recoded into a new variable, in order to distinguish between the variables, the name of the variable was the original variable name was used and concatenated with "_RECODED" and "_ORIG" was appended to the original.

Principal Component Analysis

Principal component analysis was used to reduce the questions to a smaller number of components (also called factors) by creating a matrix of correlations between the variables in the Web Development Professionalism Inventory. There are two kinds of factor analysis, exploratory, also known as principal component analysis (PCA), and confirmatory factor analysis (CFA), each with different purposes and assumptions. Aroian and Norris (2005) explained that CFA uses a series of regression equations in order to evaluate the reliability of instruments and allows the researcher to include information on latent or unmeasured variables in the data analysis. With PCA, each item is analyzed for correlation with the other items and the resulting items are grouped by intercorrelations into a subset of components, or factors.

Sample Size and Distribution. Each variable requires a sufficient number of participants in order to detect differences in the observed variables. Without sufficient numbers of participants, the study data might not be reliable. Dixon (2005) suggests that 10 subjects per component are sufficient for generalization purposes. The number of participants in this study was 208, which would be considered sufficient according to Dixon. In this study there were five factors and five items per factor, which would mean that there would be a need for a minimum of 50 subjects. However, Field (2009) suggests that larger numbers.

PCA needs a sufficient sample size to be able to pull out the factor loadings for the items. When you have a lower sample sixe, you need a higher factor loading to be reliable. A factor loading for 200 should be greater than .364 to be reliable based on the alpha level, but may vary with the study requirements.

PCA requires data is approximately normally distributed in order to generalize the results. In this study items were analyzed to identify the item variance using Kolmogorov–Smirnov and Shapiro-Wilk ranged indicating that the distributions were not normal. The ranking on the items, $D(208)$ ranged from .195 to .38, $p < .05$ and $S\text{-}W(208)$ ranged from .721 to .905, $p<.05$, indicating that both distributions were significantly non-normal. The variables were not positive for skewness or kurtosis except for question 8, with kurtosis of 4.38 (SE=.336) which inquired about the participants' belief that the professional web development organizations should be supported.

Field (1009) supports the use of PCA when sample size and distribution assumptions are violated only if the analysis is limited to the sample studied and is not generalized. The data from this study is exploratory and therefore generalized interpretations of the data will be limited to the study participants. Mann-Whitney U test was the non-parametric test used as the primary method to identify differences between two independent groups, which were web faculty, and non-web faculty. The Mann-Whitney U test is comparable to the parametric t-test and was performed using SPSS.

Missing responses and data recoding for the first section of the survey. Although 208 participants started the survey, only 196 participants finished all 25 questions leaving 12 (5.77%) records with incomplete responses. The extent of responses missing was determined by a missing value analysis, which revealed nine participants skipped 15 questions, one missed 10 questions and three missed nine questions. Rather than remove list-wise the records that were incomplete, the data were replaced. George and Mallery (2006) provide three ways to deal with missing values.

Categorical data can be replaced with a new category for missing responses, similar to what has been done previously in this study, but does not apply to ordinal data. Another option is to develop a regression equation to predict the missing values. The option is implemented for this study, was to replace the values with the mean or equivalent methods. According to George and Mallery (2006), replacing the mean for up to 15% of the data, will have little impact on the results. After the original data was copied into new variables, the missing values were replaced into the new variables using the series mean.

There were 11 of the 25 questions in the survey that were recoded with reverse scoring so that 5 would be scored as 1 and 4 as 2, 2 as 4 and 1 as 5. The questions recoded were numbered 2, 8, 10, 11, 13, 14, 16, 17, 19, 20 and 24.

Homogeneity of variance was tested with Levene's test for the groups of web faculty and non-web faculty, indicated that for questions 4, 13, 16, and 22 the variances were significantly different which violated the homogeneity of variance assumption. The results for question 2 $F(1, 186) = 8.56$, $p<.05$, for question 13 with $F(1, 186) = 5.262$, $p<.05$, for question 16 with $F(1, 186) = 9.144$, $p<.05$ and for question 22 with $F(1, 186) = 9.402$, $p<.05$. The variances were equal for web faculty and non-web faculty based on the mean for the other questions indicating that those questions met the assumption requirement.

Chapter 3 Summary

The exploratory research design process was used in this study to help describe the faculty who teach in higher education. The study helps understand their attitudes about the professionalization of web development. The subjects completed a questionnaire online. The participants were identified through a selective process to locate faculty who were teaching at institutions that offered associate or bachelor degree programs in web development. Of the 208 participants only 188 participants could be classified into web faculty and non-web faculty based on their experience teaching web-related courses. There were 1997 invitations to participate in the study emailed with 233 attempts to complete the survey. Only 233 (11%) responded but only 208 are considered participants. Therefore there was a survey completion rate of 80.3%.

The first part of the survey contained a modified version of the Hall (1968) Professionalism Scale, called the Web Development Professionalism Inventory. Data from demographics and their work environment was also gathered. Age, work experience, and role was assessed in light of the overall professionalism status with the goal of understanding what faculty thinks about the professionalization of web development was also collected.

This study sought to understand the attitudinal components of a profession, defined by the Hall (1968) model of professionalization. As such, this study administered a modified version of Hall and Snizek (1972) surveys and analyzed using principal component analysis as described in this chapter.

The next chapter will report out that the PCA extracted factors, compare the results with the Hall model and describe how several questions were removed to improve scale reliability. The data analysis included comparing how web faculty and non-web faculty thought about the attitudinal components of the web development profession.

CHAPTER IV: RESULTS

The purpose of this study was to learn about the faculty attitudes toward the professionalization of web development. The survey consisted of 25 questions derived from the Hall (1968) Professionalism Scale, demographic questions and questions related to the faculty opinions on the structural components of professionalization for web development. The second part of this chapter will describe the participants who responded to the survey invitation and their responses to the survey questions. Because nothing was known about the population of web faculty it was important to understand the demographics of participants, their education, and their work experience. A classification method based on the participants' experience teaching web courses was used to separate web faculty from other participants. Characteristics about the institutions where they worked were also analyzed and reported. The third part of this chapter will explore the data in light of the research questions, including comparing how participants classified as web faculty think about web development as a profession.

Sample Description

This section describes the participants demographic and educational background, work environment, professional memberships, teaching experience and experience teaching web related courses. The percentages are reported based on the total number (N=208) of participants.

Demographics

There were 186 (89.4%) of the 208 participants who completed the demographic questions. This section describes the gender, race and age of participants.

This study results show a higher percentage of females in this study compared to the number of computer science faculty in 2003. Table 10 showed the number of computer science faculty and their gender from 2003 when there were 69.11% male faculty and 29.0% female faculty in computer science. In this study, there were 109 (52.4%) male participants and 78 (37.5%) female participants (see Table 14).

Table 14

Gender of Participants

Gender of Participants	Frequency	Percentage
Male	109	52.4
Female	78	37.5
No response	21	10.1

Note: N=208. Ages reported in this study ranged from 27 to 76 with the M of 50.20 (SD= 11.136) years, indicating a normal distribution.

Table 15 showed that the vast majority (81.7%) of computer science faculty was white with 7.8 % listed as black. Likewise, in this study the vast majority of the respondents (87.2%) reported their race as white.

Table 15

Race of Participants

Race of Participants	Frequency	Percentage
White	163	78.4
Black or African American	8	3.8
Asian	1	0.5
Native Hawaiian or Other Pacific Islander	1	0.5
American Indian or Alaska Native	1	0.5
Other	13	6.3
No Response	21	10.1

Note. N=208.

Summary. In this study, participants came from business, art, computer science, and web-related and other disciplines. The initial faculty gender data mentioned in Table 10 only included computer science faculty. Although this study did not investigate why there are differences in gender and race, recent efforts recruiting women in STEM academic areas, and the variety of disciplines included in this study may account for the slight difference in study participation by female participants.

Education of Participants

The educational background of participants was obtained by asking faculty to identify their highest degree earned, majors in their associate, bachelor, master's and doctoral programs and certificates and certifications earned. This section will help to describe the educational background of participants.

Looking at the majors of each participant at each academic level, there were approximately one-third of the participants with post-graduate degrees in computer-related fields. When two degrees were listed, if one was computer-related, the participant was classified as having the computer-related degree. Web-related degrees were classified as web-related with the terms web, internet or e-commerce in the degree name.

Highest Degree Earned By Participants

Surprisingly, three participants reported their highest level of education was less than a bachelor degree. Recoding into a new variable was necessary because of the low numbers represented to determine if the education level was different between web faculty and non-web faculty. Likewise, 34 (16.4%) participants reported that their highest degree was a bachelor degree. As indicated in Table 16, the majority of participants reported their highest degree was a master's degree (53.4%) or a doctoral degree (20.2 %).

Associate Degree Major

It is not required to complete an associate degree in order to complete a bachelor degree. However, the IPEDs dataset listed 343 associate degree programs out of 857 programs in web development, which graduated 3301 students in 2010. Because there are so many associate degree programs in web development, this survey identified the associate degree majors of participants. Only 31 (14.9%) participants reported having completed an associate degree (see Table 16).

Table 16

Highest Degree Earned by Participants

Degree Level	Frequency	Percentage
Some college but no degree	1	0.5
Associate degree	2	1
Bachelor degree	31	14.9
Master's degree	111	53.4
Doctoral degree	42	20.2
No Response	21	10.1

Note: For N=187, M=4.02 and SD=0.051. The scale ranged 1 to 5 with 5 the highest score.

The associate degree majors were classified as art-related, business-related, computer-related, web-related and other. Art, visual communications, graphic art, graphic and communication majors were recoded to an art-related major. Business and management majors were recoded as business-related majors. Computer science, information technology, computer information technology, information science, networking, engineering and management information systems majors were recoded as computer-related majors. General liberal science and other degrees were recoded into a classification called “other majors”. Web development, web design and e-commerce majors were coded as web-related degrees.

Only 2 (1%) participants were classified as having a web-related associate degree. The majority of the 31 participants with associate degrees majored in some computer-related field. However, this only translated to 16 (7.7%) participants who had completed a computer-related associate degree. The art-related, business-related and other majors aggregated represented 13 of the associate degree majors of participants. Table 17 shows the frequency of each major classification and the academic level of the participants based on the total number of participants.

Table 17

Classification of Academic Major by Level of Degree

	Associate Degree N=31 (14.9%)		Bachelor Degree N=157 (75.5%)		Master’s Degree N=146 (70.2)		Doctoral Degree N=43 (20.9%)	
Major Area	N	Percent	N	Percent	N	Percent	N	Percent
Art-related	4	1.9	30	14.4	23	11.1	4	1.9
Business-related	3	1.4	19	9.1	27	13	4	1.9
Computer-related	16	7.7	43	20.7	47	22.6	15	7.2
Web-related	2	1	0	0	1	0.5	0	0
Other	6	2.9	65	31.3	48	23.1	20	9.6
No Responses	177	85.1	51	24.5	62	29.8	163	79.3

The study did not allow participants to affirmatively state that they did not have an associate’s degree. However, because 157 participants responded with their other degree information, the study is most likely correct in assuming that the participants would have completed the question if they did not have an associate's degree.

Bachelor Degree Major

Only 43 (20.7%) of participants completed a bachelor degree with a computer-related major and none of the participants completed a web-related major (see Table 18. However, 51 (24.5%) participants did not specify any major and 65 (41.4%) participants specified majors in other areas.

There were 114 (54.8%) participants with art-related, business-related or other majors. Therefore, more participants completed a bachelor degree with a non-computer-related major. Therefore the other category was recoded to identify common fields of study. Table 18 shows that 65 (31.3%) participants had listed other majors that are completely unrelated to computer science or web development.

Table 18

Frequency of Other Majors of Participants with Bachelor Degrees

Majors in the Other Category	Frequency	Percentage
Humanities, philosophy, history, religions, music, radio	11	5.3
Psychology, sociology, political science	11	5.3
Mathematics	10	4.8
Education	9	4.3
Environment, engineering, physics, chemistry and biology	9	4.3
English	6	2.9
Languages, linguistics, radio and communication	6	2.9
Agriculture	3	1.4

Master's Degree Major

Only 47 (22.6%) participants completed a master's degree with a computer-related major and only 1 (0.5%) participant completed a web-related major. Therefore, 110 (70.1%) participants did not have a master's degree in a computer-related or web-related field. There were 62 (29.8%) participants who did not specify any major and 48 (23.1%) participants who specified majors in other areas and 98 (47.1%) participants combined with art-related, business-related or other majors.

The largest number of majors listed in the other category was education-related. Table 19, shows how the other category was recoded into four subcategories. Breaking down the other category showed 36 (17.3%) participants reported education-related majors. Only 16 (7.7%) of the education-related majors were in educational technology and technical education. Educational technology was defined as programs where technology was the focus and instructional technology and design was defined as using technology in teaching and learning.

Table 19

Frequency of Other Majors of Participants with Master's Degrees

Majors in Other Category	Frequency	Percentage
Education including adult and higher education	11	5.3
Educational technology and technical education	16	7.7
Instructional technology, instructional design, curriculum technology, online education	9	4.3
Other	12	5.8

No major listed in the other category resulted in greater than 7.7%. Therefore, more participants had a master's degree in a computer-related field than other field. To put this in perspective, less than one in four participants had a master's degree with a computer-related degree.

Doctoral Degree Major

Although 42 (20.2%) participants reported their highest degree was a doctorate, 48 participants reported a major in a doctoral degree program. This discrepancy was partially accounted for because five participants reported that they had started a doctoral degree program but had not yet completed the program. These five records were excluded from the analysis of majors leaving 43 (20.7%) majors. These five records were recoded into the no response category. Only 15 (7.2%) participants reported a computer-related major. Of the 20 (9.6%) participants who reported other majors, 14 (6.7%) were education-related majors (see Table 20).

Table 20

Frequency of Other Majors of Participants with Doctoral Degrees

Major in Other Category	Frequency	Percentage
Education including adult and higher education	6	2.9
Educational Technology and Technical Education	4	1.9
Instructional technology, instructional design, curriculum technology, online education	4	1.9
Other	6	2.9
Total	20	9.6

The data showed that more of the participants chose an education-related major than a computer-related major in their doctoral program. The study did not ask why the participants chose their major or degree program.

Summary

The majority of participants had an associate degree in a computer-related or web-related field. However, the majority of participants did not have a masters or doctoral degree in a computer-related or web-related field. No participants had a bachelor degree or doctoral degree in a web-related field and only one participant had a master's degree in a web related field. Of those that did hold graduate degrees, the largest percentage was in computer science followed by education.

Professional Certifications and Certificate Degrees

Informal education and training in web development or other web-related areas, was identified through asking participants to list web-related professional certifications and certificate degrees that they have received. The difference between these two questions is subtle. Professional certification is often awarded through industry exams. Examples of web-related professional certifications include the CIW, WOW and Adobe certifications. Examples of a certificate degree would be a one-year or two-year certificate program at a higher education institution where the student completes a series of courses. The results of these two questions were used to determine if it was possible to classify if the faculty member had some informal or formal education in web development and to identify the most common types of web-related professional certification and academic certificates.

Professional Certifications

The first question asked, "What web professional certifications have you earned" and provided five textboxes for participants to list up to five certificates. These certifications were treated as individual certifications. Of the 35 (16.8%) that responded to this question, 13 participants specifically stated they had no certification or certificates or listed their bachelor or master's degree. These 13 responses were classified as "0".

The number of participants with a valid response was 22 (10.6%) with a total of 52 certificates. Some participants chose to respond listing more than one certificate a column and therefore their responses had to be coded more than once. The majority of participants with professional certifications had one or two certifications. Nine (4.3%) of the 22 participants listed one certification and seven (3.4%) listed two certifications.

Some participants entered networking, online learning management system and Quality Matters peer review certifications that are clearly not web-related. Other participants provided non-standard abbreviations such as "Net+" which could refer to Network+ or iNet+. Participants provided a generic topic like "multimedia developer", "graphic design", "web development certificate" which may or may not be web-related. Some participants entered in certifications that could be considered web development such as "Adobe certified associate", but they could also be considered graphic design or multimedia. Currently Adobe has expanded their certifications to include most of their products such as Adobe Photoshop. Adobe provides a list of recommended certifications for Web Designers and Web Developers including Cold Fusion, Dreamweaver, Flash and Muse. Although Adobe Photoshop and Illustrator are commonly used to create and edit web graphics, Adobe does not include these certifications for Web Designers and Web Developers. Recoding was necessary to reorganize the listings and separate web-related from non-web related responses.

Web-related professional certifications. The professional certifications were classified as web-related or not web-related and then tallied. Table 21 shows the type of certifications held by participants. The most common type of certification was a web development or web programming certification followed by a web design or web multimedia certification. For six of the certifications, the type of certification could not be provided without the name of the certification.

Table 21

Frequency of Type of Industry Certifications Held by Participants

Type of Web-Related Certification	Frequency	Percentage
Web development or web programming	13	6.3
Web design or web multimedia	8	3.8
Web site and web server management	4	1.9
Graphic design or imaging	3	1.4
No specific classification	6	2.9

Note: There were 28 professional certifications held by 17 participants.

Adobe certifications, graphics and multimedia developer were classified as web-related professional certifications. Recoding resulted in 17 (8.2%) participants with 28 web-related professional certifications. The number of web-related professional certifications per participant was coded into the WEB_PROFCERT variable. Ten (4.8%) of these participants had listed only one web-related professional certification. However, four participants listed two web-related certifications and one participant had four web-related certifications.

These 17 participants with at least one web-related professional certification were coded as having professional web training in the WEB_EDUC variable. The

WEB_EDUC variable identifies that the participant has had informal education and training in a web-related area.

Certificate Degrees

To identify participants with university certificate degrees in a web-related field, the second question asked, "What was your major?" in an academic certification program. There were 21 (10.1%) out of 208 participants who responded with a total of 36 responses. Most of the participants only listed one response. Only 16 participants listed one response. One participant listed six responses and one participant listed seven responses.

This question was asked at the same time the participants were asked to identify their major in their other degrees. However, many of the participants listed professional certifications such as CIW and Cisco, rather than a major in a certificate program. One participant listed "multimedia developer" under the professional certification and "multimedia web developer" as their major in their certificate program. One participant entered "Post-Bach Cert. Web Development" as the professional certification, which should have been included as the certificate degree. The responses to this question needed to be recoded and aggregated to prevent double counting and aggregate the web-related degrees. Of the 36 responses to this question, 11 of these responses from eight participants (3.8%) were classified as web-related. The number of web-related certificates per participant was coded into the WEB_CERTDEGR variable.

Classifying Participants Based on Certification and Certificates

One of the goals of these two questions was to identify which participants had professional certification or academic certificates in a web-related field so that they could be used to classify web faculty and non-web faculty. The WEB_EDUC variable already identified the participants who had professional certifications in a web-related field. So the next step was to identify participants who could be added to this variable based on having at least one web-related certificate degree. The certificate degrees were classified as web-related or not web-related and tallied. Six out of the eight participants with web-related responses for the certificate degree had already been classified in the WEB_EDUC variable. The other two participants were manually coded into the WEB_EDUC variable. Once the duplicates were removed, there were a total of 19 (9.1%) of the 208 participants with 34 responses listing the web-related certifications professional certification and certificates. It was not expected to see such a low representation of participants with certificates or certifications in web-related areas. It is not known if this is an aberration of the study methodology as the majority of participants were working in an academic environment and not in industry. Perhaps professionals in the field are pursuing certificates and certifications but not necessarily the academic community. However, this data did show us that the classification of web faculty and non-web faculty would not be useful if it were based on their achievements of professional certifications and certificate degrees. Therefore, another method was chosen to classify participants as web faculty and non-web faculty.

Web-related Professional Certification Vendors

The two questions were asked, to provide information about which certifications and certificates were most common among participants. The valid responses from these two questions were classified together, based on the vendor. For example “Certified Professional Web Designer” or CPWDS belongs with WOW. In some cases, if the participant did not provide the vendor name, correct certification name or abbreviation, then it was not possible to classify the certification. For example, responses such as graphic design, multimedia web developer and web designer, were classified as other because no vender specific information was provided.

Because both vendors represent different web professional organizations, and because certification can be a means to control entry into a profession, it was important to identify which vendor was more supported by the participants. Table 22 provides a frequency of the professional certifications and certified degrees and the frequency by vendor.

Table 22

Frequency of Certifications and Certificates Held by Participants

Vendor-Related Certifications	Frequency	Percentage
CIW	8	3.8
WOW	6	2.9
Adobe	4	1.9
Other vendor specific technologies	3	1.4
Non-vendor specific responses	13	6.3

Note: Macromedia certificates and certifications are counted under Adobe. WebProfessionals.org is also known as WOW or the World Organization of Webmasters.

Looking at the type of certifications participants held in Table 23 was revealing. There were four individuals with some Adobe or Macromedia certifications. The certifications included Adobe Certified Associate, Dreamweaver 8 Developer and Macromedia Certified Web Developer. One participant did not specify the certification name from Adobe. Although Adobe acquired Macromedia in 2005, Adobe continues to provide Dreamweaver and other web development, web design and web multimedia software.

The three other vendor specific technologies included MCP+I, PHP 5 Certified Professional and Zend PHP. Notice that 13 (6.3%) responses in Table 22 did not mention a specific vendor. These 13 non-vendor specific responses included 3 (1.4%) in graphic design or imaging, 4 (1.9%) in web design or web multimedia, and 6 in web development or web programming.

Certifications with CIW and WebProfessions.org. The CIW certification series includes web foundations, web development, and web design and web security. Each CIW certification requires more than one examination. WOW separates the web-related certifications into web designer, webmaster, web developer, web administrator, e-commerce manager and web consultant with only one examination per certification. Both organizations offer associate and professional levels for each type of certification. It was not always possible to classify the type of the certification. Two of the participants had not specified the certification name from CIW and one simply listed Adobe. One participant listed “CIW Certified Instructor”, but this certification could be classified in any of the CIW certifications.

Table 23 shows that more participants had certifications from CIW than WOW. There were five participants with at least one certification from CIW and only three participants with at least one certification from WOW. Two participants had completed the Certified Professional Webmaster certification.

Table 23

Frequency of CIW and WOW Certifications Held by Participants

WOW (N=3)		CIW Certifications (N=5)	
Professional Certifications	N	Professional Certifications	N
Certified Professional Web Designer Associate	1	CIW	2
Certified Professional Web Designer	1	CIW Associate	1
Certified Professional Web Developer	1	CIW Certified Instructor	1
Certified Associate Webmaster	1	CIW Foundations	1
Certified Professional Webmaster	2	CIW JavaScript Specialist	1
		CIW Site Designer	1
		Master CIW Designer	1

Note: WOW is also known as WebProfessionals.org.

Both vendors were listed multiple times by participants. One participant had two certifications from the WOW and one participant had three certifications. Likewise, one participant had two certifications from the CIW and one participant had three certifications. Although more participants had certifications from CIW than WOW, the difference in the frequencies was .96%, which is not significant.

Summary

The goal of these two questions was to identify which participants had professional certification or academic certificates in a web-related field and to identify what types of web-related professional certification or academic certificates were most common among participants. The vast majority of participants have not received any web-related professional certificates and certifications. The three most common vendors were CIW, WOW and Adobe. Participants who have professional certifications in a web-related area, more often had a certification in the web development or web programming category.

Work Environment

To help understand the work environment of the participants, the survey asked participants to provide information about their job role, faculty rank, and department and work experience.

Job Roles

Participants were asked to classify their job role as instructor, faculty or administrator. The vast majority of the participants were faculty (133 or 63.9%) and instructors (41 or 19.7%).

Only 17 (8.2%) of the participants were administrators (see Table 24). Of the eight participants who chose 'other', five indicated they worked in multiple roles such as faculty and administrator. Eight records were recoded to fit in one of the three roles. Similar to other sections of the survey, 17 (8.2%) participants provided no response.

Table 24

Frequency of Job Roles

Job Roles	Frequency	Percentage
Instructor	41	19.7
Faculty	133	63.9
Administrator	17	8.2
No response	17	8.2

Employment Status

The vast majority of participants were employed full time (see Table 25). There were 153 (80.1%) full-time, 27 (14.1%) adjunct and 11 (5.8%) part-time participants. A total of 37 (19.6) said that they were adjunct or part-time. This data supports at a majority of the number of the participants was working full-time.

Table 25

Employment Status

Employment Status	Frequency	Percentage
Adjunct	27	14.1
Part-Time	11	5.8
Full-Time	153	80.1
No response	17	8.2

Note: Valid responses count was 191 (M=1.87, SD=.538) with a range of 1 to 3.

Faculty Rank

Participants were asked to identify their faculty rank. Participants of all faculty levels participated in this study (see Table 26). Participants who selected "Other" were recoded which lowered the number of participants in the "Other" group to 6 (3.2%). For example, "Part-time faculty" was recoded as adjunct faculty, "residential faculty" as instructor and "Senior Professor of the Practice" as full professor.

Table 26

Frequency of Faculty Rank

Faculty Rank	Frequency	Percentage
Adjunct Faculty	35	16.8
Instructor	53	25.5
Assistant Professor	18	8.7
Associate Professor	29	13.9
Full Professor	48	23.1
Professor Emeritus	2	1.0
Other	6	2.9
No response	17	8.2

Note: Valid response count was 191 (M=2.95, 1.598) with a range of 0 to 6.

After recoding, 95 (45.7%) were ranked as assistant professor, associate professor or full professor and there were 53 (25.5%) ranked as instructor. The number of assistant professors (9.4%) was less than half of the 51 (27.7%) instructors and 48 (25.1%) full professors.

Department

Participants were asked to select the department where they worked. Because faculty and administrators sometimes work across more than one department, participants were able to select multiple departments from a list of 12 departments and allowed to enter a value in an "Other" category. It was not unexpected to see that 17 (8.2%) participants provided no information about their departments because these 17 participants also did not provide any information about their job role or employment status.

Participants listed "other" departments. The "Other" category was used to recode the departments back into the 12 departments. Of the 35 participants who provided information in the "Other" category, 31 did not select a department from the list, but did enter a value in the other field. The other four participants selected one or more departments from the list of departments and entered a value in the "Other" category.

Values in the "Other" category were recoded. Graphic Design, Multimedia Arts, Visual and Applied Art, Applied Art and Design, Electronic and Digital and New Media were coded into Graphic Design. Business Technology, Digital Technology, and Computer and Business Office Technology were coded into information technology. Software and Computer Applications were coded into computer information systems and "Computer Applications-Web Design & Development" as coded as Web Development. One participant that listed Game Programming was already classified in Computer Science and did not need to be recoded.

After recoding, only eight participants were coded using the "Other" category and the values of the other category consisted of Broadcast and Electronic Media, Communication and Journalism, Humanities, Journalism, Mathematics and Physics.

Participants worked in multiple departments. The data analysis showed that there were 129 (62%) participants who selected one department. The survey allowed participants to select more than one department as their place of work. Therefore it was not unexpected to see that 32 (15.4%) participants reported that they worked across two departments. However, it was unexpected to see 54 (26%) participants report that they were working within more than two departments. Two of these participants reported that they worked for eight departments! Perhaps these are part-time faculty who teach across departments. To what extent these participants worked across departments or why they worked across departments was not studied in this survey.

Participants worked in a variety of departments. This data also showed that participants in this study worked in a variety of departments. Table 27 shows the list of departments and how many participants selected each department sorted by number of occurrences. Computer information systems department was the most common department that participants worked in. As Table 29 shows, 65 (31%) out of 208 participants reported that they worked in the computer information systems department.

Table 27

Departments Where Participants Worked

Department	Frequency	Percentage
Computer Information Systems	65	31.3
Information Technology	47	22.6
Computer Science	43	20.7
Graphic Design	33	15.9
Business	26	12.5
Information Science	19	9.1
Web Development	19	9.1
Networking	15	7.2
Web Design	13	6.3
Management Information Science	10	4.8
Fine Art	8	3.8
World Wide Web	1	0.5

Note: Because the participant could select more than one option, the total number of responses was 307. The total percentage is the number of responses out of 208 participants.

A homogeneous group of participants was not desired for this study. Having a strong representation of participants across departments was important for this study to understand how the participants think about web development as a possible inter-disciplinary degree. Therefore, it was important to understand which participants worked in web-related areas and non-web related areas.

The department options were combined into computer-related, art-related and web-related departments, and business-related categories. There were 189 (61.6%) participants who selected one of their departments as computer-related and 33 (10.7%) participants selected at least one web-related department. Table 28 shows the frequency of the membership in these categories.

Table 28

Membership in Departments Grouped by Field

Department	Frequency	Percentage
Computer-related	189	61.6
Art-related	41	13.4
Business-related	36	11.7
Web-related	33	10.7
Other	8	2.6
Total	307	100

Note: Because the participant could select more than one option, the percentage was based on the number of departments mentioned, not the total number of participants.

The question arises then why might there be so many participants who work across departments. One possible reason could be their employment status is part-time and therefore they are able to work or teach across departments. Perhaps these are part-time faculty who teach across departments. This could have explained the interdisciplinary nature of where participants worked. However, further analysis reveals that employment status and the total number of departments that participants worked, are not significantly related (χ^2=1.710, N=191, df=2, p=.423) (see Table 29).

Table 29

Membership in Departments Grouped by Employment Status

	Worked in one department (N=137)		Worked in two or more departments (N=54)			
Employment Status	N	%	N	%	$\chi^2(1)$	p
Adjunct	22	81.50%	5	18.50%	1.710	.423
Part-time	7	63.60%	4a	36.40%		
Full-time	108	70.60%	45	29.40%		

Note: a 1 cells (16.7%) have expected count less than 5. The minimum expected count is 3.11. N=191 with 17 participants with no responses.

The distinction between adjunct and part-time status may not exist in some institutions and was not further defined in the research question. However, this distinction between the employment states could vary across institutions. To what extent these participants worked across departments or why they worked across departments was not studied in this survey.

Participants worked in web-related departments. Some participants worked across multiple web related departments. To help describe the number of faculty that teach web-related courses, the department data was further analyzed to break down the number of participants who work for a web-related department. The web-related category list was divided into web development, web design and world wide web. A total of 23 (11.1%) participants selected at least one of the web-related departments. The 23 participants who worked in a web-related department were coded into a variable named

DEPT_WEB. Participants worked in a web development department and in a web design department (see Table 30).

Table 30

Frequency of Participants Working in a Web-related Department

Web-related department	Number of Participants	Percentage
Not web-related department	168	80.8
Web Development	10	4.8
Web Design and Web Development	8	3.8
Web Design	4	1.9
Web Design, Web Development and World Wide Web	1	0.5
No Response	17	8.2

Note: The percentage was based on the number of participants (N=208).

The data shows 10 (4.8%) participants selected web development as one of the departments where they worked. The largest number of participants Of the 23 participants who worked in a web-related department, the majority (9.1%) worked in a web development department.

Summary

Working in a web-related department was not used to classify participants as faculty or non-web faculty because of the low numbers of participants working in a web-related department. However, this study did show that the participants came from a variety of different departments and many of them worked for multiple departments. This is another indicator that the sample of was not a homogenous group. Some of the participants had different backgrounds than other participants.

Prior Professional Roles

In order to understand the work experience of participants, the participant was asked to identify the how long in years they worked in five specific fields: computer networking, computer programming, web developer, web designer, web administrator and “Other”. The purpose of this question was to help describe their professional experience in relation to web development and computer programming and computer networking were included as a comparison and to determine if the participants could be classified based on their professional roles.

Of the 208 participants in the study, 25 (12%) participants did not respond to any of the questions in this section. Some participants entered zero for the number of years of experience in one or more roles, indicating that did not have work experience in these roles.

There were 183 (88.0%) participants who entered at least one response for one or more roles. In other words, the participant has experience in more than one role. In cases where the participant entered a valid number for at least one role, the number of years was entered as zero for any of the roles that were left blank. There were six participants who were coded as 0 for all six roles because they entered 0 for some of the roles. It is important to add the some participants entered a value for some roles and others left blank or entered “0”. Therefore, the data was recoded to “0” if the participant entered at least one of the responses for their professional role. If the participant did not enter any values the response was coded as zero. Participants who entered stray text characters in the fields were removed to obtain valid statistics.

The data in this study provided a snapshot of the participants work experience. The participants were only allowed to specify the number of years they worked work in the “Other” field option. It is also important to recognize, that participants could be working in more than one field each year. Therefore, the total number of years experience may overlap.

Table 31 shows the number of participants in each role with one or more years of experience, and the number of participants with no experience. More participants had experience in computer programming than any other role. The role with the least representation in the study was web administration with 143 participants having no professional experience in that role.

Table 31

Number of Participants Who Reported Experience in Professional Roles

	Total	No Response	Participants with No Experience	Participants with One or More Years of Experience		
Professional Roles	N	N	N	N	M	SD
Computer programming	208	25	89	94	12.79	10.50
Web development	208	25	95	88	8.14	6.37
Web design	208	25	103	80	7.52	5.69
Other roles	208	25	109	74	15.05	10.71
Computer networking	208	25	124	59	9.17	7.72
Web administration	208	25	143	40	8.08	6.41

Note: N=208. Number of participants who actually responded to one or more of the six roles was 183. There were 25 participants with no response for each of the roles listed. Mean and standard deviation are based on the number of participants with one or more years of experience in the role.

It is important to clarify that Table 31 indicates if a participant had experience in each roles. Participants had experiences across multiple professional roles. The next sections will describe the professional experiences of participants, within individual roles and across multiple roles.

Experience in Computer Networking, Computer Programming and Other Roles

Two of the questions on the survey asked if the participants agreed that web development and computer science were professions. Therefore, it was important to ask participants about their professional experience in computer science. In this study, computer science professional experience was divided into computer programming and computer networking roles.

The survey results shows that the participants did have experience in computer science fields. More participants had more experience in computer programming than any other individual role. There were 94 participants who indicated that they had one or more years of computer programming experience and 74 participants had one or more experiences in “other” roles. Table 32 shows that 59 participants had work experience in computer networking (M= 2.96, SD=6.12), 94 in computer programming (M= 6.57, SD=9.87) and 74 participants in “Other” fields (M=6.09, SD=10.04).

Table 32

Means and Standard Deviations for the Number of Years Participants Worked in Various Professional Roles

Professional Roles	N	%	M	SD	Variance	Skewness	Kurtosis
Computer programming	94	45.2%	6.57	9.869	97.39	1.603	1.68
Other roles	74	35.6%	6.09	10.042	100.85	1.812	2.72
Computer networking	59	28.4%	2.96	6.12	37.46	2.551	6.78

Note: N=208. There were 25 participants with no response for each of the roles listed. For all three roles ses was 0.18 and sek was 0.357. The distribution of both computer programming and other roles exhibited extreme kurtosis (sek= “0.357”) causing a peak, indicating the large numbers of participants with no experience in computer programming and “other” roles.

Of the of 59 participants who had one or more years of experience in computer networking, the mean was about 9 years (SD=7.72). The distribution of participants with experience in the computer networking roles was skewed significantly, as shown in Figure 2, because of the large number of participants (N=124) who did not have any professional experience in networking (ses=0.18, sek=0.357).

Although Monro (2005) recommends removing either the record or transforming the variables when values are missing or the distribution is skewed, the data was not altered. The data is not being used for statistical tests such as a T-Test, so this analysis did not require a normal distribution. In this case, having this data that shows that a large number of the participants do not have networking experience is an important revelation.

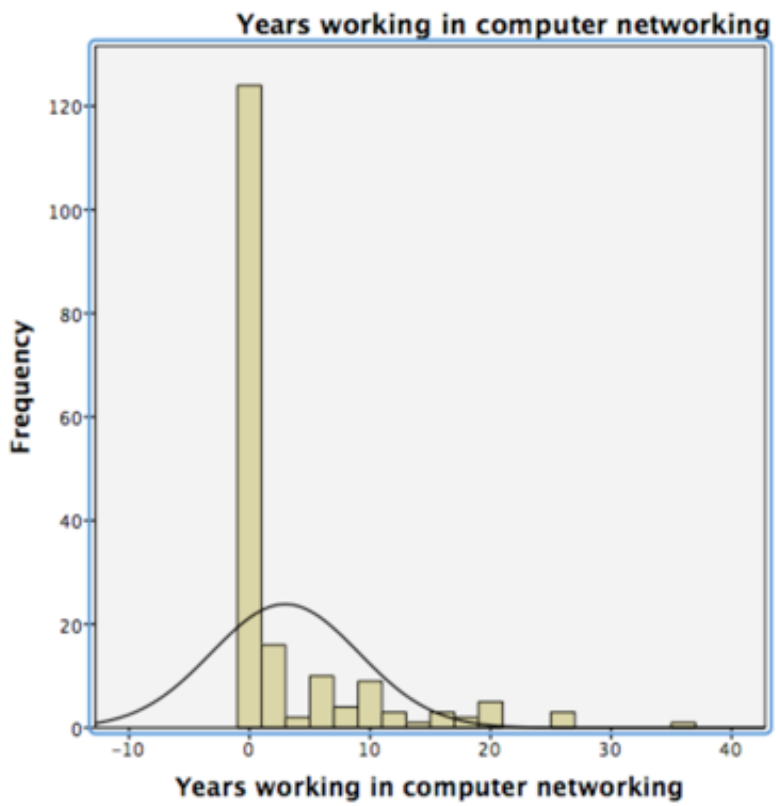

Figure 2. Distribution of the number of years participants worked in a networking role

Combined work experience in computer science roles. Given that participants come from computer-related, business-related, web-related and art-related departments, it is not a surprise that 73 (35.1%) participants did not have experience in computer programming or computer networking. Table 33 shows the number of participants for selected role combinations.

About one-fifth (N=43, 20.7%) of the participants had both computer networking and computer programming experience. However, combining these numbers (51 + 43 + 16) indicated 110 (52.9%, N=208) participants had at least computer programming or computer networking work experience or a combination of both.

Table 33

Frequency of the Possible Combinations of Computer Science Related Professional Roles

Combination of Professional Roles	Number of Participants	Percentage
No professional experience in computer networking or computer programming	73	35.1
Experience in computer programming with no computer network experience	51	24.5
Experience in computer networking and computer programming	43	20.7
Experience in computer networking with no computer programming experience	16	7.7
No response	25	12

Note: N=208. Each of the 183 participants who responded to this question was classified in only one of the options above. No response indicates missing values for all three roles.

Experience in Web-Related Roles

The purpose of this section is to describe the participants work experience in web development roles. Participants had some experience in web development (M=3.9, SD=6.0) and web design (M= 3.3, SD=5.3), and the least a small amount of experience in web administration (M=1.8, SD=4.5) and on average had more experience in web development than web design or web administration (see Table 34).

Table 34

Means and Standard Deviations for the Number of Years Participants Worked in Web-related Professional Roles

Professional Roles	N	%	M	SD	Variance	Skewness	Kurtosis
Web Developer	88	42.3%	3.92	6.005	36.066	1.576	1.352
Web Designer	80	38.5%	3.29	5.297	28.061	1.757	2.325
Web Administrator	40	19.1%	1.77	4.474	20.016	2.888	7.8

Note: N=208. There were 25 participants with no response for each of the roles listed. For all three roles ses was 0.18 and sek was 0.357.

The distribution is positively skewed for the web administrator role and the slightly peaked for web designer role because The web administrator role data showed skewness of 2.888 (SE=.18) and kurtosis of 7.8 (SE=.357). The distribution was acceptable for the web developer role (see Figure 3).

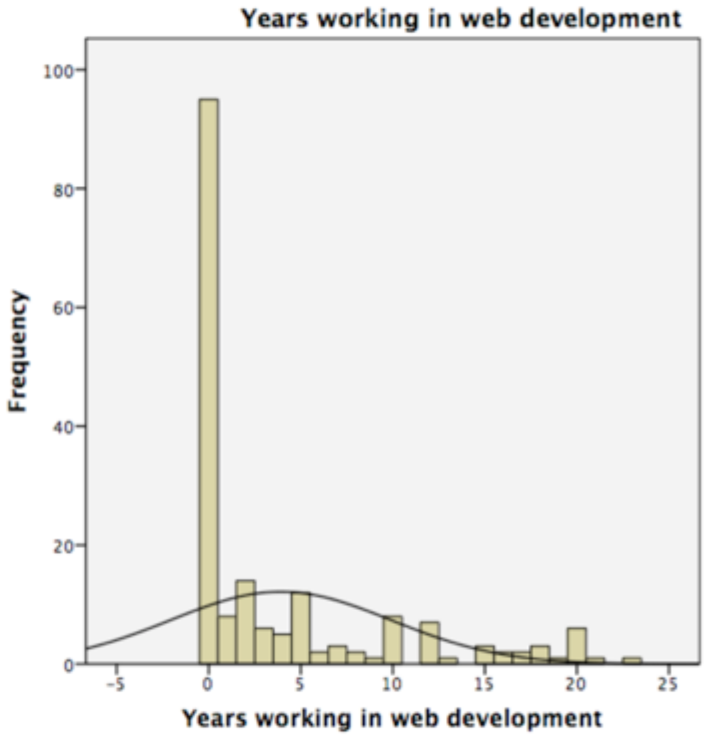

Figure 3. Distribution of the number of years participants worked in a web development role

There were 74 participants with experience in at least one of the three web roles. While the average years of experience is similar, the number out of 208 participants with experience in web development was 88 (42.3%) or web design 80 (38.5%) and is twice as much as the 40 participants with experience as a web administrator (19.2%).

Combined work experience in web related roles. Participants, who have web development experience, might also have experience in one or more web-related roles. The majority (N= 110, 52.9%) of participants did have some work experience in a web-related role. However, 73 (35.1%) participants did not have any professional experience in any of the three web-related roles.

There were 25 participants with experience in both web development and web design, 24 of participants with experience in web development, and close behind are the 21 participants with web design experience (see Table 35). No participants had only web administrator experience. If the participant had web administrator experience, they also had additional experience with web design or web development.

Table 35

Frequency of the Possible Combinations of Web Professional Roles

Combination of Professional Roles	Frequency	Percentage
No experience in any of the three roles	73	35.1
Experience in all three roles	33	15.9
Web Developer and Web Designer	25	12.0
Web Developer	24	11.5
Web Designer	21	10.1
Web Developer and Web Administrator	6	2.9
Web Designer and Web Administrator	1	0.5
Web Administrator	0	0
No response	25	12

Note: Each participant was classified in only one of the options above. Note that participants could not belong to two or more groups, so the total does equal the total number of participants (N=208) in the study. The percentage was calculated out of 208 participants.

The majority of participants did have experience in multiple web-related roles. However, 33 (15.9%) participants had work experience in all three web-related roles and 88 (42%) with some web development work experience.

The total number of hours each participant accumulated in a web-related role was coded into a new variable to identify the 110 participants who had web-related work experiences. Participants experience in web developer and web designer roles ranged from 0 to 23 years. There were 11 participants who have extensive experience in both web development and design for ten or more years.

Summary

The data collected from the professional role question showed that 110 out of the 208 study participants had some professional experience with one of the three web-related fields and the largest number of participants in this group had work experience with web development. Classifying web faculty based on their professional experience in a web-related role was a viable option for this study. However, because the study was looking specifically at how faculty web development as a profession, a better match was to classify the participant based on their web teaching experience. The design of the study was successful in locating participants experienced in web development and design.

Professional Organizations

Participants were asked to identify which professional organization they belonged to from a list of eight professional organizations identified in the literature review. The participants were given the option to select "other", and write in the name of an additional professional organization. Participants were able to select more than one option and to write in an additional professional organization.

Participants were aggregated into three groups, one where participants belonged to a web-related professional organization, one where they did not belong to a web-related professional organization but did belong to at least one other professional organization and one group where participants were not members of any professional organization. Out of 208 participants, 13 (6.3%) participants belonged to both web and non-web related professional organizations compared to 59 (28.4%) participants who only belonged to non-web related professional memberships (see Table 36). Table 36 shows that more participants belonged to non-web related professional organizations than web-related professional organizations.

Table 36

Comparing Membership Frequency in Professional Organizations

Type of Professional Membership	Frequency	Percentage
No professional memberships	119	57.2
Only non-web related professional memberships	59	28.4
Only web-related professional memberships	17	8.2
Both web and non-web professional memberships	13	6.3

No Membership in a Professional Organization

For this question, 142 (68.3%) did not select any of the eight professional organizations. Because the questions did not require a response, it is not possible to say that all of the participants who left the responses blank had no memberships in professional organizations. There was no option for "none" to indicate no membership any professional organizations.

There was an "other" option for this question to allow participants to write in additional professional organizations. Although 42 (20.1%) participants listed membership in other professional organizations, 11 participants used the other field to specifically indicate that they did not currently belong to a professional organization. Participants who indicated they were members of "Mensa" and "teacher" were coded as none. Another participant indicated past membership in a computer-related professional organization, from ten years ago, and was coded as none. One participant listed membership in a "variety of broadcast, video, and journalism professional and academic associations" and was coded as other.

This recoding of data retrieved from the "other" option indicated at least 14 (6.7%) participants had no current membership in a professional organization. However, 124 (59.6%) participants did not indicate membership in any of the listed professional organizations and did not list any memberships in the "other" option. Therefore, this study cannot report that this high of a non-response rate to this question means that the participant skipped the question or that all 124 participants have no membership in a professional organization.

For questions that followed this one in the survey, such as employment status, there were only 17 (8.2%) participants who did not respond to the question. Therefore, a portion of the responses indicated that participants did not belong to a professional organization. If the assumption were that there were only 17 non-responses, then the number of participants with no professional memberships would be 107 (51.4%). Definitely, this study can only report that there were 66 (31.7%) that were members of one or more of the eight professional organizations.

Membership in "Other" Professional Organizations

After recoding, 22 (10.6%) participants provided names of other professional organizations they belonged to which were not on the original survey list. Participants also listed more than one professional organization in the "other" option. While some of these "other" organizations such as the British Computer Society are related to computer science and technology, many of these “other” organizations are not specific to web development. No more than one participant chose any of these 36 “other” professional organizations.

Two professional organizations such as Ruby Users of Minnesota, and the local PHP Meetup and Rails Meetup involve using vendor specific web technologies. The two users that were members of these vendor specific web technologies were classified as other-web professional organizations, so that these two participants would be grouped with the participants who belonged to the other web-related professional organizations.

Table 37 shows the list of 36 professional organizations listed in the “other” field. Three professional organizations were separated out from the list of “other” professional organizations because they were classified as web-related and were submitted by more than one participant. Six (2.9%) of participants were members of AIGA, formerly known as American Institute of Graphic Arts. Three (1.4%) participants were current members of CompTIA and two (1.0 %) participants were members in National Association of Photoshop Professionals (NAPP). AIGA, CompTIA and NAPP were recoded into separate variables.

Table 37

Participant Membership in Other Professional Organizations

Abbreviation	Professional Organization
AHIMA	American Health Information Management Association
AIS	Association for Information Systems
AITP	Association of Information Technology Professionals
BCS	British Computer Society
CCSC	Consortium for Computing Sciences in Colleges
CSEC	Cyber Security Education Consortium
CSSIA	National Center for Systems Security and Information Assurance
	Center for Teaching and Learning
GAG	Graphic Artists Guild
GLGA	Great Lakes Graphics Association
HIMSS	Healthcare Information and Management Systems Society
IACIS	International Association for Computer Information Systems
ICCP	Institute for Certification of Computing Professionals
IGAEA	International Graphic Arts Education Association
Microsoft MCT	Microsoft Certified Trainer
NAAP	National Asian Artists Project
NAEA	National Art Education Association
NBEA	National Business Education Association
NCTM	National Council of Teachers of Mathematics
NCWIT	National Center for Women and Information Technology
NPPA	National Press Photographers Association
NW GIS User Group	Northwest Geographic Information Systems User Group
PIA	Printing Industries of America
RUM	Ruby Users of Minnesota *
SPE	Society for Photographic Education
StackExchange	Stack Exchange
TDWI	The Data Warehousing Institute
URISA	Urban and Regional Information Systems Association
WAURISA	Washington State Chapter of the Urban and Regional Information Systems Association
WEAD	Women Environmental Artist Directory
No abbreviation listed	Certified GIS Professional
	Cisco IT Academies
	Flexographic Association
	Local Linux User Group
	Local PHP Meetup *
	Local Rails Meetup *
	Microsoft IT Academies

Note: One participant response indicated membership in a variety of associations but none were specifically mentioned. Three organizations indicated with an asterisk, indicates that they were recoded as a vendor specific web technology organization.

The list of professional organizations included the Association for Computing Machinery (ACM) and the Special Interest Group on HyperText and the Web (SIG-WEB). However, the ACM SIG-WEB is only one of the 36 special interest groups of the ACM. Two participants were members of one of the other special interest groups of the ACM. The participants reported membership in the ACM Special Interest Group on Computer Science Education (ACM-SIGCSE) and ACM-Special Interest Group on Graphics and Interactive Techniques (ACM-SIGGRAPH).

Two participants indicated membership in the Association for Computing Machinery Special Interest Group on Hypertext and the Web (ACM-SIGWEB) along with the ACM membership. Both of these options were coded as potential web-related professional organizations and already one of the options on the survey. Because these participants were already coded as members of ACM, no recoding was necessary.

Memberships in Professional Organizations

It was important to note that participants were members of more than one professional organization. There were 66 (31.7 %) participants who were members of one or more of the list of eight professional organizations (see Table 38)

Table 38

Frequency of Participation of Memberships in Professional Organizations

Number of Memberships Per Participant	Number of Participants	Percentage
1	41	19.7
2	17	8.2
3	7	3.4
4	1	0.5
No response	142	68.3

Of these 66 members of professional organizations, 41 (19.7%) participants were members of only one organization and 17 (8.2%) participants were members of two organizations.

A number of participants who were members of the some of the professional organizations listed on the survey, including professional organizations where two or more participants listed the organization in the “other” option (see Table 39). The groups referred to as AIGA and NAPP, were added from the “option” list.

Table 39

Memberships in Professional Organizations

Abbreviation	Professional Organizations	Frequency	Percent
ACM	Association of Computer Machinery	43	20.2
IEEE	Institute of Electrical and Electronics Engineers	11	5.3
IEEE-CS	Institute of Electrical and Electronics Engineers - Computing Society	11	5.3
AIGA	American Institute of Graphic Arts	6	2.9
COMPTIA	CompTIA	3	1.4
NAPP	National Association of Photoshop Professionals	2	1.0

The largest participation was in the Association for Computer Machinery (ACM) with 43 (20.2%) participants. The frequency is the number of memberships. A participant could be a member of both ACM and IEEE. Therefore, it is important to remember that participants were able to participate in multiple professional organizations.

Memberships in Web-related Professional Organizations

Participant membership in web-related professional organizations was low (see Table 40). Only two of the 43 members of the ACM specified membership in the Special

Interest Group on Hypertext and the Web. The groups referred to as RUM, PHP and RAILS, were added from the "option" list.

Table 40

Memberships in Web-related Professional Organizations

Abbreviation	Professional Organizations	Frequency	Percentage
W3	World Wide Web Consortium	14	6.7
WOW	World Organization of Webmasters (a.k.a. WebProfessionals.org)	13	6.3
CIW	CIW Certified	4	1.9
IWA	International Webmasters Association	2	1.0
ACM-SIGWEB	Association for Computing Machinery Special Interest Group on Hypertext and the Web	2	1.0
RUM	Ruby Users of Minnesota	1	0.5
PHP	Local PHP Meetup	1	0.5
RAILS	Local Rails Meetup	1	0.5

Note: The asterisk represents the five web related professional organizations.

Of the 208 participants in the study, 30 (14.4%) were members in at least one web-related professional organization (see Table 41). There were 25 (12%) participants who were members of only one web-related professional organization.

Table 41

Frequency of Participation in Web-related Professional Organizations

Number of Memberships	Frequency	Percentage
1	25	12.0
2	4	1.9
3	0	0.0
4	1	0.5
No response	178	85.6

Summary

Thirty (14.4%) participants were coded into a new variable based on their membership in one of the web-related professional organizations. The number of participants with memberships in web-related organizations was not sufficient to classify them as web faculty for this study. Most participants who did belong to a web-related professional organization only belonged to one. The majority of participants who did belong to a web-related professional organization belonged to either the World Wide Web Consortium or WOW.

Teaching Experience

Number of Years Teaching

Teaching experience was determined using several methods. Participants were asked to report the number of years teaching and the number of times they taught web-related courses. The average number of years for the 191 participants was 13.64 (SD= 8.966).

Regrouping the number of years teaching into four groups shows that the majority of participants (N=110, 57.6%) have more than 11 years of experience teaching. There were 146 (76.4%) participants with more than five years of teaching experience. Beginning faculty with fewer than five years of experience only consisted of 45 (23.6%) of the participants (see Table 42) .

Table 42

Participant Number of Years Teaching

Years Teaching	Frequency	Percentage	Valid Percent	Cumulative Percent
0 or Missing	17	8.2		
1 to 5 Years	45	21.6	23.6	23.6
6 to 10 Years	36	17.3	18.8	42.4
11 to 20 Years	75	36.1	39.3	81.7
21 to 40 Years	35	16.8	18.3	100.0
Total Responses	191	91.8	100.0	

The number of years teaching is important because the web was created in the early 1990s and is therefore only 20 years old. It is possible that some faculty had been teaching web-related courses since the beginning of the web. Furthermore, their years of experience may play a role in their experience with and participation in curriculum development. Therefore, another question was asked to identify what courses the participants have taught and how many years they have been teaching specific web topics.

Experience Teaching Web Courses

To get more information about the experience of faculty teaching web development, and to understand the perception of web development as a profession from the view of web-related and non-web related faculty, the participants were asked to provide the number of years they taught 16 introductory and advanced web topics or web courses. Similar to other areas of the study, of the 208 participants, 20 did not complete this section. The data from the 188 participants was used to classify the participants as web faculty and non-web faculty.

The number of times each course was taught was gathered using an ordinal question which included the options of never teaching a course and teaching a course 1-2 times, 3-4 times, 5-6 times or more than 7 times. These values are represented with numerical values from 1 to 5. Participants were also able to write in "other" courses. The participant experience teaching introductory course, advanced courses and the "other" courses were used to help in separating the list of participants into groups based on their experience teaching web courses. The experience teaching web courses was derived by the number of times participants taught the 16 web courses listed in the survey. Of the 205 participants who completed the survey, 33 (15.9%) of the participants reported never teaching any of the web courses listed and 20 (9.6%) did not complete this section of the survey. These participants were then classified that they are not experienced in teaching web courses. That leaves 155 (74.5%) that have taught at least one web course at least one time. On the other extreme, one participant reported teaching every web course listed more than seven times. Before any decision on how to classify the participants could be made, the data from the teaching introductory and advanced web courses was analyzed.

Experience teaching introductory web courses. Early web technologies described in the research included HTML, web editors, introduction to internet tools and technologies and client-side programming such as JavaScript and Cascading Style Sheets. Therefore, these topics were the first courses generally offered in web curricula. Introductory level courses defined in the survey were referred to as Client-side Programming, Creating Web Pages with HTML, Creating Web Pages Web Editors and

Introduction to the Internet, E-Commerce or E-Business, Web Graphics Design and Web Multimedia and Animation.

The mean value for the Creating Web Pages with HTML (M=2.87, SD=1.809) was the highest of all of the introductory courses (see Table 43). The research showed that the Introduction to the Internet and Creating Web Pages with HTML were the first courses offered in the web-related areas.

Table 43

Experience Teaching Introductory Web Courses

Number of Times Teaching Web Course	Never		1-2 times		3-4 times		5-6 times		7 or more times			
	N	%	N	%	N	%	N	%	N	%	M	SD
Client-side Programming	103	49.5	15	7.2	17	8.2	13	6.3	40	19.2	2.32	1.656
Creating Web Pages with HTML	78	37.5	17	8.2	14	6.7	10	4.8	69	33.2	2.87	1.809
Creating Web Pages Web Editors	99	47.6	15	7.2	15	7.2	8	3.8	51	24.5	2.45	1.741
E-Commerce or E-Business	129	62.0	17	8.2	11	5.3	9	4.3	22	10.6	1.82	1.403
Introduction to the Internet	87	41.8	11	5.3	16	7.7	11	5.3	63	30.3	2.74	1.806
Web Graphics Design	116	55.8	11	5.3	16	7.7	5	2.4	40	19.2	2.16	1.647
Web Multimedia and Animation	121	58.2	16	7.7	15	7.2	9	4.3	27	13.0	1.96	1.489

Note: Percentage based on the number of participants (N=208). The scale ranged from 1 (lowest) to 5 (highest) with values of never, 1-2 times, 3-4 times, 5-6 times and 7 or more times. No response (N= 20).

Although 78 (37.5%) participants have never taught this course, the majority (52.9%, N= 110) of participants have taught a course on creating web pages with HTML at least one or more times. There were 101 (48.6%) participants who have taught the Introduction to the Internet at least one time. A greater number of participants have taught these two courses seven or more times, compared the other introductory web courses. Therefore, because the majority of participants have taught these two courses, the assumption could be made that they would also have a basic knowledge level of how to create a web page with HTML and basic Internet technologies.

Resorting the data shows clearly that many of the participants would have basic knowledge in web development because they have taught the beginning web development courses. Over 50% of participants have taught Creating Web Pages with HTML and Introduction to the Internet. Over 30% of participants have taught each of the introductory web courses, at least one time.

The data showed that many participants had experience teaching introductory web courses. HTML, web editors, web graphics and client-side scripting were invented prior to the rise of e-commerce, social networking, web database and web server programming (see Figure 4). Therefore it would be reasonable to expect participants to have more experience teaching these courses and this was indeed the case. However, this data could not be used in isolation to classify web faculty and non-web faculty. The data analysis showed that 33 (15.9%) participants did not teach any of the 16 web courses and that 40 (19.2%) participants did not teach any introductory web course.

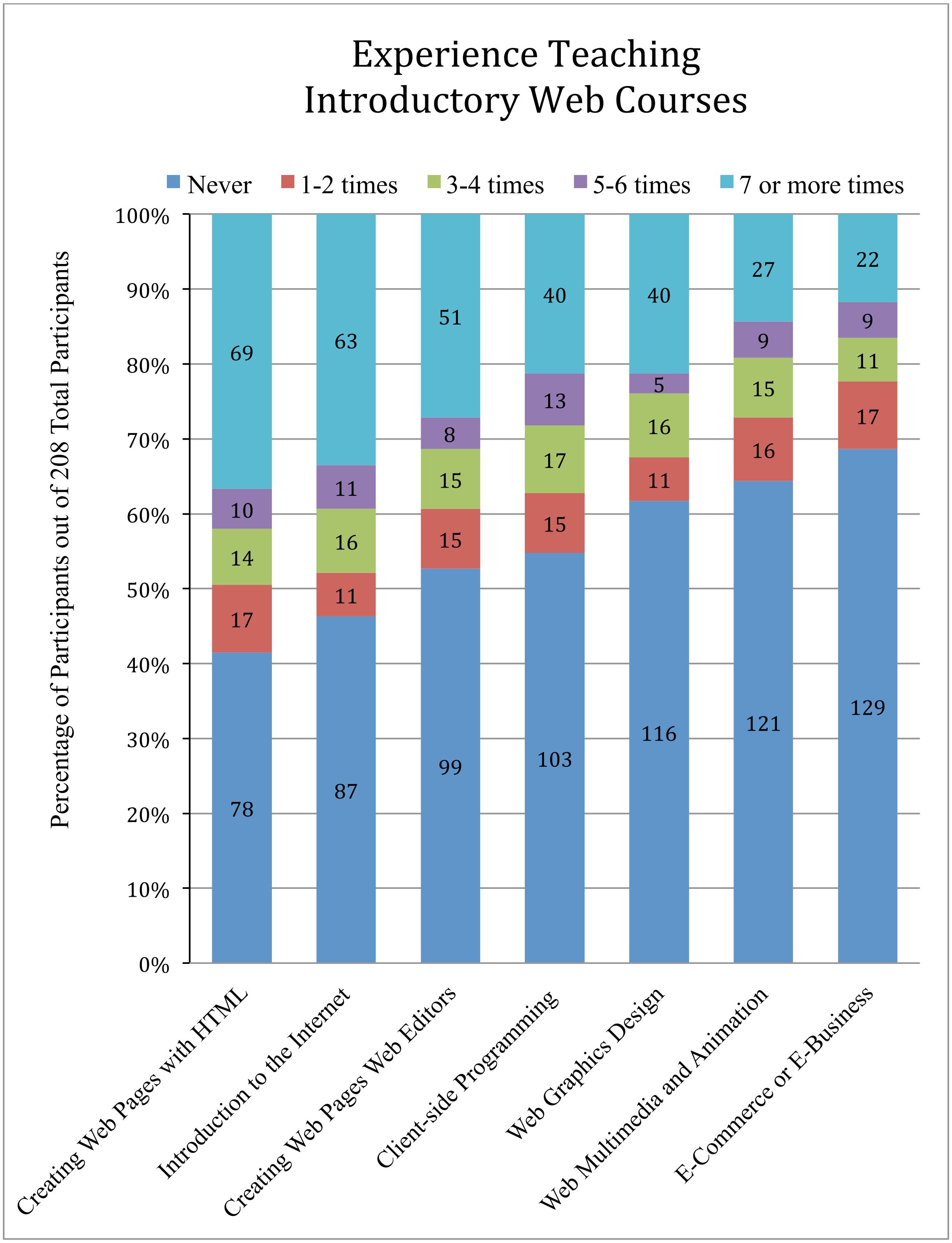

Figure 4. Experience teaching introductory web courses

However, the division between the introductory and advanced courses was reasonable, because there was very little crossover. That means that 7 participants did not teach any introductory course, but they did teach at least one advanced course at least one time. Conversely, the results therefore showed that 148 (71.2%) participants had taught at least one introductory course at least once.

There was one participant that reported teaching all 16 courses seven or more times. While this might be attributed to someone simply replying quickly to answer the questions, further analysis shows that might not be the case. There were 6 (2.9%) participants who taught all seven introductory courses more than seven times. There was evidence to show that a substantial number of participants had experience teaching multiple web courses, multiple times. First, there were 40 (19.2%) participants who taught 4 or more of the 7 courses at least seven or more times. The data showed that although seven participants have never taught any of these introductory courses, they did teach some of the advanced courses.

Experience teaching advanced web courses. There were nine courses included in the survey that could be classified as advanced courses. These courses contain newer content such as Social Networking and Mobile Applications and more complex programming such as Web Database Programming and Web Server Programming. As the research showed, Web Database Programming and Web Server Programming were the first of the advanced web courses to be offered.

The participants were also asked to identify which advanced courses they taught and how many times they had taught the course. Rather than identify the number of years, an ordinal scale was used to help participants quickly classify how often they taught each course. The number of times that participants taught mobile applications, web-based marketing, web graphics marketing, web security and web server management had a distribution that was positively skewed with kurtosis greater than 2. However, the number of times that these courses were taught was not used with parametric testing and therefore the distribution was not modified. Rather, this data was used to help identify the level of experience of the participants and to classify participants as experienced in teaching web-related courses.

It was not surprising that the means for the number of years that participants had taught advanced web courses was higher for web database programming and web graphics marketing than other web courses because the research showed courses had been developed early in web database programming and web server programming. However, this data does not show that the participant who taught an advanced course necessarily taught a beginning web course.

While many participants have never taught many of the advanced courses, many of them have taught at least one of the advanced courses (see Table 44). Detailed analysis of the course data showed the only (N=66, 31.7%) of participants have never taught one of the nine advanced web courses. Recall that there were 33 participants who did not experience teaching any of the web courses. That means that 33 (15.9%) participants have not taught any advanced course, but they have taught at least one beginning course one or more time. A majority of participants (N=157, 75.5%) have never taught a web graphics marketing course or a web-based marketing course (N=155, 74.5%).

Table 44

Experience Teaching Advanced Web Courses

Number of Times Teaching	Never		1-2 times		3-4 times		5-6 times		7 or more times			
Web Course	N	%	N	%	N	%	N	%	N	%	M	SD
Mobile Applications	137	65.9	27	13.0	12	5.8	4	1.9	8	3.8	1.51	1.011
Social Networking	151	72.6	14	6.7	12	5.8	2	1.0	9	4.3	1.43	1.008
Web-based Communications	138	66.3	15	7.2	13	6.3	6	2.9	16	7.7	1.65	1.259
Web-based Marketing	155	74.5	10	4.8	7	3.4	5	2.4	11	5.3	1.44	1.090
Web Database Programming	115	55.3	17	8.2	17	8.2	10	4.8	29	13.9	2.05	1.521
Web Graphics Marketing	157	75.5	9	4.3	9	4.3	6	2.9	7	3.4	2.16	1.647
Web Security	140	67.3	19	9.1	9	4.3	7	3.4	13	6.3	1.59	1.183
Web Server Management	144	69.2	17	8.2	7	3.4	4	1.9	16	7.7	1.57	1.215
Web Server Programming	125	60.1	15	7.2	13	6.3	6	2.9	29	13.9	1.93	1.502

Note: Percentage based on the number of participants (N=208). The scale ranged from 1 (lowest) to 5 (highest) with values of never, 1-2 times, 3-4 times, 5-6 times and 7 or more times. No response (N= 20).

Figure 5 shows the majority of participants had never taught any of the nine advanced web courses. Although many participants have not taught the advanced courses, there were participants who have taught many of the advanced courses multiple times.

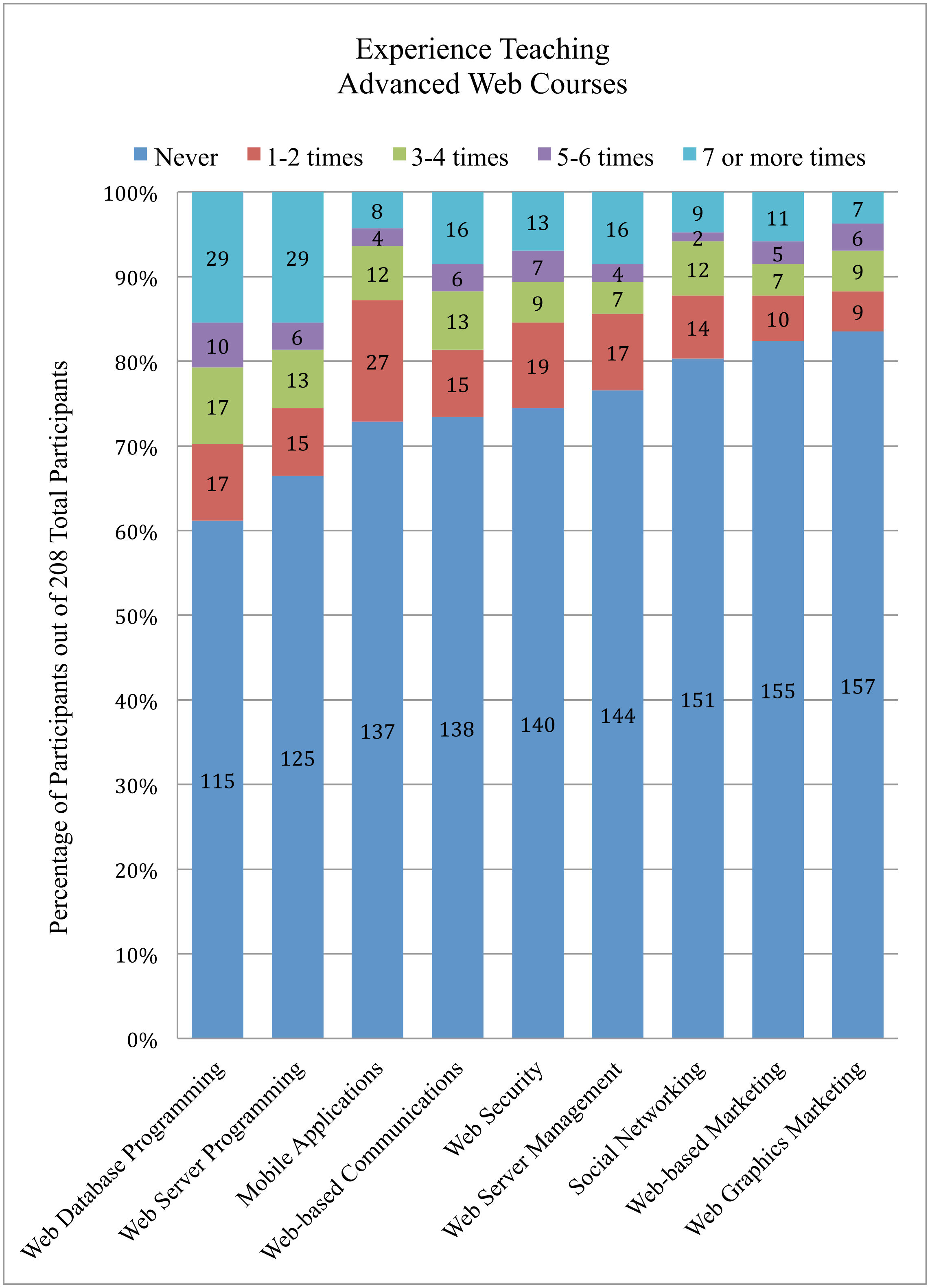

Figure 5. Experience teaching advanced web courses

There were 122 (58.7%) participants who taught at least one advanced course at least once and 21 (10.1%) participants have taught at least one advanced course seven or more times. Only one participant has taught all nine courses seven or more times. That participant was one of the six participants who had taught all of the introductory courses more than seven times.

The largest number of participants who taught an advanced course one or more times taught Web Database Programming (N=73, 35.1%) or Web Server Programming (N=63, 30.3%). Furthermore, there were 29 (13.9) participants have taught web server programming more than seven times and 29 (13.9) participants have taught web database programing more than seven times. Both of these courses were described early in research as the follow-up courses to the beginning web development course.

Summary. The participants in this study did have some experience teaching web-related courses making their opinion on the professionalization of web development more meaningful. There were some participants who taught introductory courses but not advanced courses and visa versa. On average participants taught 3.1 introductory web courses (N=7, SD=2.5) and 2.3 advanced web courses (N=9, SD=2.5). The data showed 40 participants out of the 208, reported not having taught any introductory web course and 60 reported not having taught any advanced web course. The data showed that many participants did teach both introductory and advanced courses, and that many more participants have taught an introductory web course.

Clear lines could not be drawn to separate participants into web faculty and non-web faculty based only on which level of courses they have taught, introductory or advanced. There was some overlap between the classifications. A more comprehensive approach was used to classify participants with experience teaching web courses. The next step in the analysis divided the participants into two groups based on their experience teaching web courses.

Web Faculty Classification

Although there were clear boundaries that identified the web development and web-related work experiences of participants, that did not necessarily equate to experience teaching web courses. The lack of a sufficient number of participants with degrees in web development made education levels not a desirable choice. The combination of teaching beginning and advanced web courses and the teaching "other" web-related courses were not reliable to identify web faculty. There were too many invalid responses, non-web courses and duplicate responses that participants had entered in the "other" category.

The classification of web faculty was accomplished using a two criteria classification system. Students take courses in their discipline and the number of credits will vary with each program and institution. This approach is also consistent with how institutions offer academic programs at the undergraduate level, offering courses on introductory and advanced topics and specialty topics. Because the survey used an ordinal scale to identify the number of times that participants taught a web course the data could not show the exact number of times that a participant taught a specific course.

Because faculty should have an understanding of the curriculum they teach, the participants in this study needed breadth teaching multiple web courses and experience teaching different web courses multiple times. The filtering process classified participants as web faculty based on the breadth of web courses they teach. Therefore, a two-step method was used to classify web development faculty based on a combination of their experience teaching introductory an advanced web courses.

The first step identified participants who taught more then 5 of the 16 web courses. The total number of web courses taught was calculated for each participant. There were 96 participants who taught more than 5 or more of the 16 web courses. The second step required counting the number of courses for each participant, that they taught 5 or more times. The study identified 71 participants who taught 4 or more web courses at least 5 or more times. The participants were segregated if the number of courses they taught 5 or more times was greater than or equal to 4. The last step identified faculty that taught 7 or more different courses, at least once.

Combining these two filters resulted in 101 participants who are classified as web faculty for this research study using a depth and breadth approach. So, if the participant taught 5 of the 16 web courses and taught at least 4 or more courses 5 or more times, or taught at least 7 different web courses, they were included in the web faculty list.

The other 107 were divided between the web 33 participants who have not taught any web course, 20 participants with no responses and 54 participants who have taught at least one web course but were not classified as web faculty. The total of non-web faculty was 87 (33 + 54).

Table 45 shows the frequency of the web faculty and non-web faculty that were classified in this study. The 20 participants with no response were not classified as web faculty or non-web faculty.

Table 45

Number of Web Faculty in the Study Based on Teaching Experience

Web Faculty Status	Frequency	Percent
Web faculty	101	48.6
Not web faculty	87	41.8
No response	20	9.6

It is important to remember that there were participants who have taught web courses but were not classified as web faculty. The decision was also made not to include the "other" courses that participants listed, in the process used to classify web faculty. Instead, the classification is based on the depth and breadth of the web teaching experience of the participants. The purpose of the study is to understand what faculty, (web faculty and non-web faculty) think about web development as a profession. Faculty with greater experience teaching web development might think differently than faculty that have not taught web courses or have only taught a small number of courses. Therefore, the distinction was made that web faculty are referring to faculty who had taught a variety of web courses and taught web courses multiple times.

Identifying "Other" Courses

Although there were 16 web courses identified by this survey, participants were given the chance to add additional web-related courses and identify how many times they taught that course. Although it was decided not to recode the "other" courses back into the list of 16 courses, this analysis sheds light on what other types of courses might be included in future studies.

Invalid responses and non-web related courses. The first challenge in this analysis was to eliminate invalid responses and responses that listed courses that were not web-related. The list of 205 "other" courses was grouped to determine if there were any similarities and differences between courses identified in the survey. Responses that entered in values for the times taught but did not include a course name or topic, were also not included in the analysis. While 86 (41.3%) participants provided a list of 250 "other" courses, 110 participants did not respond and 12 responded with "none", "don't teach web at all" or "various", or provided the number of times having taught a course, but not the name of the course.

The 133 (64.9%) courses from the list of the 205 courses submitted were not web-related and therefore were also removed from the analysis. A majority of these "other" courses were related to computer networking and security (N=36, 27.1%), computer science and programming (N=34, 25.6%), art and graphic design (N=24, 18.0%), management information systems and information technology (N=19, 14.3%) and business (N=8, 6.0%). Participants added 12 courses that were clearly non-web related, such as English 101 & 201, Algebra, Electronic Medical Records Systems and College Success.

At the end of this analysis, only 72 (35.1%) of the "other" courses were separated into web, web-related and potentially web-related courses.

Identifying "other" web and web-related courses. The next challenge in this analysis was to determine if the "other" courses were other web courses that were not in the original list. Thirteen participants listed 16 (7.8%) of the 205 "other" courses that used the word "web" in the course title in reference to a specific course. No courses included the word "Internet" and one of the course included "WWW". All 17 of these courses were classified as web courses.

There were 23 participants who listed 33 (16.6%) of the 205 courses classified as web-related because the topic covers content that would require the web. Search Engine Optimization would be a web-related course because search engines are web based tools to locate content on the web. Technologies such as Cascading Style Sheets were included because this technology is used primarily with web pages.

Participants listed other web-related courses, which they could have classified as one of the 16 web courses. For example, one participant added ASP and ASP.NET that should have been classified as a Web Server Programming course. Client-side Programming was an option in the list of courses in the survey. However, two participants listed courses described as Client side scripting and JavaScript Interactivity that were clearly client-side programming courses. Two participants mentioned Dreamweaver, which should have been classified by participants as Creating Pages Web Editors. One participant reported not having taught Introduction to the Internet. However, that participant listed teaching a course called History of Web Development. Therefore each course was reviewed manually to identify if the course was web-related.

Participants listed teaching several programming languages. ASP and ASP.NET, Introduction to PHP with MySQL, XML and Ruby on Rails Development were included because these technologies are used primarily with web server programming. However, C# and Java Programming were not included as web-related courses because, as the research showed, are used for beginning computer science programming courses. Other web-related courses included were e-publication, and Social Media Marketing because these activities often are implemented in web applications such as Facebook. Courses entitled Accessibility, Usability and Universal Design/accessibility were also included.

Identifying potential web-related courses. Thirteen participants identified 22 (10.7%) out of 205 “other” courses with titles such as Adobe Creative Suite and Digital Media Development that may or may not be a web-related. Although Adobe software includes Flash software to build animations and applications, Flash programs may be embedded within a web page or distributed as a stand-alone application. Because Adobe Flash is commonly used on the web therefore was included in the list of web-related courses.

Not all art, design and graphic related courses were included. Typography, Drawing, Color Theory, Computer Graphics, 3D Design and Game Design were not included as web-related because these courses are often used with print media, computer science programs and game console programming. Courses related to Adobe-specific software such as Dreamweaver or Flash, general web graphic design and mobile development were included in the potential web-related courses.

Multiple courses. The research design only allowed for participants to check the web course and select how many times they have taught that course. Because of this potential for overlap, the web courses written in by participants were not recoded back into the survey. However, the courses listed provided insight as to what web courses might have been overlooked in the initial course listing.

Courses like accessibility, usability, architecture and universal design could be taught as a web communications course or web site design course. Therefore, there was no way to recode the original survey without a risk for altering the meaning of the data.

For example, one participant indicated they never taught a web communications course, and yet taught a course on accessibility and usability over seven times. Three courses were listed, but the participant indicated that they have never taught the course.

The list of "other" courses that were classified as "web" was recoded into 13 groups based on the course title. There was overlap between courses listed in the "other" category and the 16 web courses. The survey did not provide option for participants to report that they have taught more than one web server programming course, such as ASP.NET and PHP as separate classes. There were 8 (16.0%) of "other" courses that could have been classified as web server programming. There were six "other" courses that could have been listed as creating web pages with html, or web editors.

For many of the participants, the number of sections they taught a course, was consistent with the number provided with the other course. For example, one participant that listed Dreamweaver Software reported teaching both this course and a course on Creating Web Page with Web Editors, more than seven times. Another participant did the opposite and reported never teaching Social Networking but then wrote in that they taught Social Media Marketing one or two times.

Participants reported teaching 50 "other" courses that could have been classified as web courses (see Table 46). It was unknown why participants did not select the course in the list of courses.The one area course with the highest frequency was Accessibility, Usability, Architecture and Universal Design, submitted by 11 participants..

Table 46

Frequency of Other Web Courses Grouped by Topic

Courses	Frequency	Percentage (N=50)
Accessibility, Usability, Architecture and Universal Design	11	22
Web Server Programming	8	16
Designing Portfolio and Web Sites	6	12
HTML, CSS and Web Editors	5	10
Mobile Applications	4	8
Search Engine Optimization	4	8
Client-side and Middleware Scripting	3	6
Content Management Systems	2	4
Web Project Management	2	4
Writing for the Web	2	4
Cloud Computing	1	2
History of the Web	1	2
Social Media Marketing	1	2

The titles of this course varied from accessibility to universal design but are related topics. Universal design is a more general topic, which would include accessibility and usability, but also inclusion of other considerations in the design of a web site such as browser version and platform. Participants felt strongly enough to write this in as a separate course

Summary

The purpose of this section was to understand more about the faculty experience teaching web courses, and classify the participants as web faculty and non-web faculty based upon their teaching experience. What was learned from this study was that the participants had a great deal of experience teaching web development and web-related courses at both introductory and advanced levels. However, while the participants were experienced teaching introductory web courses, they were not as experienced teaching advanced web courses.

The study methodology was designed to locate other web faculty and the plan succeeded. Conservatively, the group was split into faculty and non-faculty by their experience teaching web courses. The division could have been split using a more general classification. However, in order to get meaningful results, the group was split into 101 web faculty and 87 non-web faculty based on their teaching at least 5 web courses and experience teaching at least 4 web courses for a total of 5 or more times.

Lastly, participants did provide "other" courses that were not on the list of 16 web courses. In some cases, the participant listed the software product instead of a generic name. In other cases, the participant listed a course that could have been classified in the original course listing. The one course that had the most write-ins was a course on accessibility, usability architecture and universal design.

Characteristics of Institutions in the Study

This section will review the characteristics of the 227 web institutions and the 86 institutions represented in this study. The purpose is to describe the institutional characteristics to explore trends in web development programs, to compare the sample to the population and to describe the institution where the participants worked. This data can also help show if the participant's institutions have a strong representation in the field, demonstrated by the number of associate and bachelor degrees offered.

The 227 "web institutions" represent the initial number of institutions classified in the IPEDs dataset with either an associate degree or bachelor degree program in web development. The 86 (37.9%) out of 227 web institutions in Table 56 represent the number of unique institutions represented in the study by at least one participant and referred to as the "survey institutions". There were 86 unique institutions represented in the study responses for 68 (50.7%) of the 208 study participants. The institutional data from 38 (18.3%) of 208 responses was not available.

Number of Associate and Bachelor Degree Programs

Participants in this study represented over a third of web institutions that offered degree programs in web development based on the IPEDS (2010) dataset (see Table 47).

Table 47

Institutions Offering Associate and Bachelor Degree Programs

Program level	Web Institutions (N=227)	Survey Institutions (N=86)	Percentage
Number of associate degree programs	182	65	35.7%
Number of bachelor degree programs	38	18	47.4%
Combined number of associate and bachelor degree programs	7	3	42.9%
Total number of institutions	227	86	37.8%

Note: The data is based on IPEDS (2010) dataset. The percentage is calculated by the number of survey institutions divided by the number of web institutions.

There was a higher percentage of bachelor degree programs represented compared to the total number of institutions surveyed. However, the number of institutions that offer bachelor degree programs is small compared to the number of institutions that offer associate degree programs in web development.

Number of Graduates Represented in This Study

There were 86 institutions represented in the study. The number of graduates at each educational level represented by participants in this study compared to the number of graduates at the web institutions based on the IPEDS (2010) dataset (see Table 48).

Table 48

Number of Web Development Graduates

Level of program	Web Institutions (N=227)	Survey Institutions (N=86)	Percentage
Associate Degrees	1119	358	32.0
Bachelor Degrees	465	289	62.2
Total graduates from all programs	2429	918	37.8
Total graduates from associate and bachelor programs	1584	647	40.8

Note: The data is based on IPEDS (2010) dataset. The percentage is calculated by the number of survey institutions divided by the number of web institutions.

Collectively the web institutions represented 1,584 total graduates from associate and bachelor degree programs in web development. The participants in the study worked at institutions that graduated 647 (40.8%) students with an associate or bachelor degree in web development. This may or may not be important. If the participants are teaching more web development students, perhaps their view of professionalization of web development may be different from faculty that teach few web development students. However, this association might also be indirectly measured by comparing the frequency and number of web courses that they have taught. Therefore, this was not used to identify web faculty.

Institutional Characteristics

Of the 86 institutions represented in this study, 13 (6.3%) participants worked at the same institution (see Appendix K). There were 50 institutions with only one response. Institutional identification was removed from the list to protect identity of the subjects. It is important to note that 13 (6.6%) of the participants came from one institution.

State representation and geographic region. In this study, 86 unique institutions represented in this study were located in 37 states (see Appendix L). There were 108 (52%) of 208 participants from 9 (24%) of these states. The highest participation rate in the study was from California (8.7%), Washington (8.2%), and Arizona (7.7%).

The regions represented are organized by region in Appendix M. The highest number of participants out of the 37 states represented in the survey was from the Far West and the Great Lakes regions and together accounted for 81 (38.9%) of the 208 participants. The largest group was from the Great Lakes (N=47, 20.7%).

Public and private status. The majority of web institutions were public and the majority of participants worked in public institution. The institutions that offer web development programs were classified using the CONTROL variable from the IPEDs (2010) dataset as public, private not-for-profit and private for-profit in order to explore the control of the institutions. The public status indicates that the oversight or management of the institution is by elected or appointed officials and is publicly funded. A private institution may be for-profit or not for-profit and is funded primarily through private sources such as endowment funds, grants, donations and tuition and fees.

Although the respondents came from both public and private institutions, more participants were from public institutions (see Appendix N).

The ICLEVEL variable in the IPEDS dataset was analyzed to identify what level of degrees web institutions offered. The level of degrees offered include 4-year or higher, 2-year, and less than 2-year (see Appendix O). The majority of the programs were offered at institutions with more than 2-year but less than 4-year degree programs.

Given that a number of participants are working at web institutions that offered associate degree programs, the control status could be improved by expanding the control status analysis to include the level of classification of the institution's programs (see Appendix P). The types of classification of the institution applied to this study were 4-year or higher, 2-year and less than 2-year. Most of the web institutions are public 2-year institutions (N=140, 62%) and therefore it was not unexpected to see that most of the participants responding came from are public 2-year institutions (N=102, 49%).

Institutional size. One way to look at the size of an institution is enrollment numbers according to the Carnegie classification for institutional size. The data was selected from the IPEDS (2010) which categorized institution size based on the total number of students that were enrolled in for-credit courses during the Fall 2008 term.

Appendix Q shows that 87 (38%) of web institutions were between 1,000 and 4,999 students. However, the spread of the distribution was normal and therefore, some institutions had lower and higher enrollment numbers. The study participants also came from institutions with varied enrollment numbers. For example, 51 (24.5%) participants worked at institutions with enrollments between 5,000 and 9,999.

Summary

The types of institutions represented by participants in this study are similar to the institutions represented in the 227 web institutions that offered associate degree or bachelor degree programs in web development. The reason this was not unexpected is that the number of participants who could not be tracked by their institutional ID, was small (N=38, 18%). Therefore, most of the participants came from the subset of the "web institutions".

The 86 institutions represented in this study had more associate degree programs than bachelor degree programs. However, the participants in this study came from institutions that represent 62% of the graduates with bachelor degrees in web development. So the study did capture the participants who worked at institutions that offered associate degree programs and bachelor degree programs in web development.

It is important to recognize that the institutions of participants in this study were roughly a third of the institutions represented in the 227 "web institutions" list. These institutions tended to be public and two-year institutions, which may have an impact on the participant views about the professionalization of web development.

Participant Views About Professionalization

The Web Development Professional Inventory included questions on the structural components that might help explain where web development lies on the professionalization continuum. A group of eleven questions was included on the survey to look at the opinions of participants on the professionalization of web development. Before an analysis can be completed on this set of questions, two questions must first be analyzed because they included the option of ‘Other” and allowed participants to submit a custom response.

Professional Organization That Represents Web Development

The participants were asked to identify the professional organization they believe best represents the collection of web developers within the Unites States. Of the 31 responses provided in the ‘Other” option, 19 of the responses such as “not sure”, “don’t know”, “unknown”, “?”, “I am not familiar with any of these”, “teacher” and similar non-responses were recoded as no response.

One participant that had worked in higher education for over 18 years and computer networking for 35 years responded that no professional organization was representative because the “web field is rapidly dying” and “is being replaced by the app worlds.” At first glance this participant’s response was extreme compared to the other participants. However, this participant had seven years of work experience in web development, three years in web design, and eight years in web administration and was a member of CIW and W3.

Four participants were unable to make a choice. One only knew about CIW but specifically said that it was not “the best representation of all developers.” Three participants felt that it was hard to choose the best and that there was not one organization that represented web developers as a whole.

One participant listed multiple organizations that included ACM, SIGWEB, W3 and IEEE which were already on the list, so his answer was not recoded back into the main survey question. The other felt that the technology organizations were the best and instead listed technologies such as Ruby on Rails, PHP, Java/Android, iOS and C#.

The other organizations that were only mentioned once were AListApart, SIGGRAPH, Sloan-C and StackExchange.com. SIGGRAPH is one of the organizations mentioned by some of the participants as a professional organization that they belonged to.

The purpose was to identify what professional organizations that the participant thought represented the web development profession. Therefore, with only one entry, this was not enough to justify recoding the option back into the main survey question.

For this question, 194 (93.3%) participants responded, with 14 participants who chose not to respond. There were 31 participants who responded with non-web professional organizations. However many of these responses were similar to "I don't know".

The preferred professional organization was the W3 Consortium, chosen by 75 (36.1%) participants followed by the WOW (WebProfessionals.Org) with 42 (20.2%) of the participants. The International Webmasters Association was third, selected by 12 (5.8%) participants.

Despite a large number of participants that belong to IEEE or one of the special interests groups of ACM or IEEE, participants chose the W3 as the professional organization that represented web development (see Table 49). Membership in the W3 is based on company memberships, not individuals. Therefore, their actual membership in the W3 may not be possible for many web professionals and participants.

Table 49

Identifying the Professional Organization that Best Represents Web Developers

Professional Organization	Frequency	Percent
W3 Consortium	75	36.1
WebProfessionals.org (WOW)	42	20.2
Other (Includes "Don't know" responses)	31	14.9
International Webmasters Association (IWA)	12	5.8
Association for Computing Machinery (ACM)	9	4.3
Association for Computing Machinery Special Interest Group on Hypertext and the Web (ACM SIGWEB)	8	3.8
Institute of Electrical and Electronics Engineers (IEEE) Computer Society	7	3.4
Certified Internet Webmasters (CIW)	7	3.4
Institute of Electrical and Electronics Engineers (IEEE)	3	1.4

Note: The values entered into the other variable were not recoded into additional categories for this analysis.

In this study there were 14 participants who were members of W3, 13 that were members of WOW and 4 that were members of CIW. In other words, 75 participants listed the W3 as the professional organization representative of the web profession but only 13 were actually members of W3. Likewise, only 13 were members of WOW yet 42 listed that organization as the professional organization representative of the web profession.

Oversight of Web Development Curricula

The participants were asked to identify what department should have oversight of the entire web development curriculum. The options included graphic arts, business, marketing, computer science, computer information systems and information technology.

Only five of the other responses were non-specific stating that web development was “too general”, “web development hasn’t been defined”, “it depends on the institution” and there “are many facets to the profession.” These responses were classified and recoded as no response leaving 34 (16. 3%) usable responses.

There were three participants who would support the oversight of web development within a computer information sciences and technology category that included information technology, information science, computer science, computer information systems, and technology education. One of these three said these technical areas were “the same depending on the college”. These three responses were counted in the total count of department oversight of web development, as computer information systems and one for information technology. Seven participants used the other category to specify graphic art, digital arts and digital media and all seven were included in the total count as graphics arts.

Interdisciplinary oversight of web development. There were 39 responses in the ‘other” option which was very revealing because most of the participants providing and “other” option were suggesting interdisciplinary oversight. Although two participants specified that web development should have it’s own curricular oversight and department control, there was overwhelming support for web development to be managed as an interdisciplinary science.

Participants chose to create collaboration between two or three departments that would oversee web development (see Table 50). There were 12 participants who specified a combination of either graphics, and one of the computer information systems, information technology or computer science areas. One participant included the marketing department as part of the interdisciplinary team.

Table 50

Departments Oversight of Web Development Programs

Department Listed in the Other Category	Frequency	Percentage
Interdisciplinary (Graphics and CIS/IT/CS/MKTG)	12	5.8
Interdisciplinary	10	4.3
Graphic art and digital media	7	3.4
Computer information sciences and technology	3	1.4
It's own oversight, own department	2	1.0
No response	5	2.4

Note: Participants wrote in "other" departments.

There were 10 more participants who wanted some form of interdisciplinary oversight with some participants specifically identifying an "interdisciplinary curriculum," "cross-disciplinary subject area," and hybrid because web development is "both Technical and Design oriented". It was not expected to see 22 (10.6%) participants agree that the curricular control of web development should be interdisciplinary.

Department oversight for web development curriculum. The 39 "other" responses that were submitted by participants were analyzed and recoded back into the other categories. After combining responses, there were 189 responses and 19 responses that were classified as no response or missing. Although the graphics art and digital media had the most write in votes in the other option, there were only 26 (12.5%) participants who selected graphic arts as the department that should oversee web development curricula.

The department with the most support for the oversight of web development was computer information systems, followed by information technology and then computer science (see Table 51).

Table 51

Classifying the Participant Responses Identifying Which Departments Should Have Oversight of Web Development (N=191)

Department	Frequency	Percentage
Computer Information Systems	54	26.0
Information Technology	38	18.3
Computer Science	27	13.0
Graphic Arts	26	12.5
Interdisciplinary	22	10.6
Marketing	12	5.8
Business	8	3.8
Web Development	2	1.0
No Response	19	9.1

Note: Although 191 responded, the percentage is out of the total number of participants (N=208)

While 22 (10.6%) felt strongly enough about the interdisciplinary nature of web development, to write in comments in the "other" option, the majority (57.2%) supported either computer information systems, information technology or computer science to have control over web development. The lowest support was 20 (9.6%) votes for marketing or business departments to have oversight of web development.

Summary

In this study, 75 (36.1%) participants felt that the W3 was the best organization to represent the web development field, followed by the WOW (N=42, 20.2%). The data showed that the 54 (26%) participants believed that the computer information systems department should oversee the web development programs, followed by information technology (38, 18.3%) and computer science (N=27, 13.0%).

Research Questions

Characteristics of Web Faculty

In order to understand the views of faculty about web development as a profession, it was important to understand the demographic, educational, and professional and work experience of the participants as well as those participants classified as web faculty and non-web faculty. The participants were classified into web faculty and non-web faculty and used as the independent variable in several of the non-parametric and parametric tests in this study.

This section describes the tests used to identify relationships between the web faculty status and their age, gender, years of teaching experience, highest level of education, faculty experience in web roles and other characteristics.

Web faculty age. Although web development is a relatively new field compared to computer science and mathematics, there was no difference in the mean ages between web faculty and non-web faculty. Only 187 of 208 participants completed the demographics questions including age, gender, race and highest level of education (see Table 52).

Table 52

Independent T-Test for the Mean Ages of Web Faculty and Non-Web Faculty

	Web Faculty (N=99)		Non-Web Faculty (N=87)				
Faculty Characteristics	M	SD	M	SD	df	t	p
Age	51.7	11.198	48.49	10.888	184	-1.972	. 050

Note: N=187. p <.05. Levene's test was not significant at p=.927 and therefore age was normally distributed across groups. In this analysis the web faculty status is the independent variable.

Although the mean age for web faculty participants was slightly higher than mean age of 50.2 years for all participants and the mean age for non-web faculty, the difference was significant because the p value was not less than the threshold of p< .05).

Web faculty gender. Cross-tabulation with Chi-Square analysis was used to identify differences in expected frequencies of gender and web faculty status. As indicated from the analysis results were negative (see Table 53).

Table 53

Cross Tabulation of Male Participants (N=109) and Female Participants (n=78) and Web Faculty Status

	Web Faculty (N=100)		Non-Web Faculty (N=87)			
Gender	N	%		%	$\chi^2(1)$	p
Female Participants	38	38	40	46	1. 218	0.27
Male Participants	62	62	47	54		

Although the percentages of males and females are in the same range for web faculty as they are for the participants overall, the trend of having more male participants than female participants was present for both web faculty and non-web faculty.

Web faculty overall level of experience teaching. The average number of years of the web faculty teaching in higher education was 15.26 and that was higher than overall average of 13.64 years for all participants (SD= 8.966, N=191). Comparing the means between web faculty and non-web faculty performed using a T-test (see Table 54). The results of this analysis were statistically significant and showed that there was a difference in the number of years teaching in higher education between the web faculty and non-web faculty (t=-2.926, df=186, p=.004). Therefore, this study concluded that web faculty had been teaching more years in higher education than non-web faculty.

Table 54

Independent T-Test for the Mean Years of Experience Teaching in Higher Education of Web Faculty and Non-Web Faculty

	Web Faculty (N=101)		Non-Web Faculty (N=87)				
Faculty Characteristics	M	SD	M	SD	df	t	p
Years of Teaching Experience	15.26	8.494	11.56	8.79	186	-2.926	. 004

Note: N=208. Significant at p <.05. Levene's test was not significant at p=.902 and therefore the number of years teaching in higher education was normally distributed across groups.

Because the definition of web faculty was based upon the number of times they had taught web courses, the difference in the mean years of experience may be an artifact of the definition and not a true difference.

Highest level of education of web faculty. Cross-tabulation with Chi-Square analysis was also used to identify differences in expected frequencies of the highest level of education between the web faculty and non-web faculty (χ^2= 3.234, df=4, p = .519).

Because very few faculty (3 out of 190), had less than a bachelor's degree (see Table 55), resulting in violation of one of the requirements for the analysis (40% of the cells have an expected count less than 5).

Table 55

Cross Tabulation of Web Faculty and Non-Web Faculty and Highest Level of School Completed

	Non-web faculty (N=87)		Web faculty (N=100)			
Highest level of school completed	N	%	N	%	$\chi^2(1)$	p
Some college but no degree	0	0	1	1	3.234	.519
Associate degree	0	0	2	2		
Bachelor degree	16	18.4	15	15		
Master's degree	50	57.5	61	61		
Doctoral degree	21	24.1	21	21		

Note: N=187. There were 4 cells (40.0%) with expected count less than 5. The minimum expected count is .47.

The level of education was recoded into the same category as the bachelor degree grouping, with no difference in the statistical outcome (χ^2= .305, df=2, p = 0.858). Therefore, there was no significant difference in expected and observed frequencies between the two groups. Therefore there was no significant difference in the highest level of education of web faculty and non-web faculty.

Employment conditions of web faculty and non-web faculty. This study showed that the employment status of participants was no different between participants who worked in one department and participants who worked across two or more departments. Analysis of the work status of participants revealed that employment status and the total number of departments that participants worked, are not significantly related

(χ^2=.1.710, N=191, df=2, p=.423). Similarly, there was no difference between the employment states for web faculty and non-web faculty (χ^2=.5.304, N=188, df=2, p=.07).

Given the responses of the participants indicating their preference for the interdisciplinary oversight of web development, the analysis of the departments was reviewed. Cross-tabulation with chi-square analysis was used to determine if there was a difference between web faculty and non-web faculty that worked in one department and faculty that worked across two or more departments (see Table 56).

Table 56

Cross Tabulation of Web Faculty and Non-Web Faculty Working Across Departments

	Not web faculty (N=87)		Web faculty (N=101)	
Departments	n	%	n	%
Worked across one department	68	50.70%	66	49.30%
Worked across two or more departments	19	35.20%	35	64.80%

Note: a 0 cells (0.0%) have expected count less than 5. The minimum expected count is 24.99. The minimum expected count was 2.91. N=188. No response=20.

The percentage of web faculty (64.8%) that worked across two or more departments was greater than non-web faculty (35.2%). There was a borderline significant difference between web faculty and non-web faculty who worked for one or more than one department (χ^2=3.749, N=188, df=2, p=.053).

Faculty experience in web roles. As previously indicated, the participants identified the number of years of experience in computer networking, computer science, other roles, web development, web design and web administration.

Participants were able to indicate experience across multiple roles and therefore, participants were not classified in an exclusive role by default, so each role was first looked at independently. The results of the analysis were statistically significant, supporting the statement that web faculty had on average more experience in each of the web roles than non-faculty (see Table 57).

Table 57

Independent T-Test for the Mean Years of Experience in Web Roles of Web Faculty and Non-Web Faculty

	Web Faculty (N=101)		Non-Web Faculty (N=87)				
Web Roles	M	SD	M	SD	df	t	p
Web developer	6.16	6.826	1.36	3.456	148.498	-6.095	0
Web designer	5.06	6.028	1.28	3.347	156.015	-5.314	0
Web administrator	2.7	5.468	.7	2.603	143.673	-3.225	0.002

Note: Significant at p <.05. Levene's test was significant at p=.000 for all three roles so equal variances were not assumed and alternate values were reported.

Comparing experience in web roles across web faculty and non-web faculty. Filtering the data showed that of the 87 non-web faculty, 56 (64.4%) had no experience in any of the three web roles, 31 (35.6%) had experience in at least one web role and only 8 (9.2%) had experience in all three web roles. So, the majority of non-web faculty had no work experience in any of the three web roles. Because they had no experience, that lowered the average number of years.

On the other hand, of the 101 web faculty 15 (14.9%) had no experience in any of the three web roles and 3 participants classified, as web faculty did not respond to these questions. Not unexpected, 86 (85.1%) of web faculty had experience in at least one web role and 24 (23.8%) with experience in all three web roles.

Previous analysis showed that 74 of all the 208 participants had experience in at least one of the three web roles. The classification method divided the participants into 101 web faculty and 87 non-web faculty based on the responses to teaching web courses. Of the 8 non-web faculty that worked in all three web roles, only 5 had ten or more years experience as a web developer in contrast to the 30 (29.7%) web faculty that had ten or more years of experience in the web developer role.

The classification using web courses is relatively consistent with the experience faculty had in the web developer role. Only 5 (5.7%) might have been moved over to the web faculty if web developer role had been the criteria for inclusion into the web faculty group. Conversely, using the criteria of 10 years of experience in the web developer role, 68 (67.3%) might not have been included in the web faculty role.

The result of this analysis helps to partially validate the criteria used to select web faculty because the selection process also captured participants with experience in web roles. However, the criteria also brought in more participants with no experience across any web role. So this selection process could be refined in future studies to incorporate experience in web roles.

Relationships Between Characteristics for Web Faculty

Data was analyzed to see if there was any relationship between the age, years of teaching experience, years in various roles, and years teaching using bivariate correlation to identify the Pearson's correlation coefficient. The correlations here merely show that the variables have a linear relationship and may not indicate a causal relationship.

Relationship between age and the number of years teaching in higher education. To determine if participants were experienced faculty, they were asked to report the number of years they worked teaching in higher education (see Table 58). Some of the participants were administrators and may not have as much experience teaching compared to other participants. Faculty may be experienced faculty but not necessarily experienced in teaching web development. The analysis of the relationship between the age of the participants and their years of experience teaching in higher education showed a significant positive correlation (r=.631, p=.000).

Table 58

Bivariate Correlations between the Age of the Participants (N=186) and their Years of Experience Teaching in Higher Education (N=208)

Measure	M	SD	N	*r*	*p*
Age in years	50.2	11.136	186	.631**	.000
Years teaching in higher education	13.63	8.966	191	-	-

Note: ** Correlation is significant at the .01 level (2-tailed).

These results indicate that as the participants' age increased, so did their level of experience teaching in higher education. As r is positive, this meant that as the participants' age increased, so did their level of experience.

Relationship between age and the number of times teaching web courses. The analysis of the survey results shown in Table 74, that there was a significant correlation between the age of the participants, and the number of times teaching several of the introductory courses. There was a positive correlation between age of the participants who taught the Introduction to the Internet, E-Commerce or E-Business, Creating Web

Pages with HTML and Creating Web Pages with Web Editors. All four of these courses are classified as introductory web course.

There were no significant correlations between the age of the participants and the number of times participants taught the web courses. The average number of times that participants taught introductory web courses is clearly more than the number of times they taught advanced web courses (see Table 59). The results showed the largest mean for the introductory course was 2.87 with SD=1.809 for Creating Web Pages with HTML followed by Creating Web Pages with Web Editors (M=2.45, SD=1.741). For the advanced web courses, the results showed that Web Database Programming had the highest mean (M=2.05, SD=1.521).

Table 59

Correlations between the Age of the Participants and Number of Times Teaching Web Courses

Number of Times Participant Taught Each Web Courses	Number of times Teaching Web Courses (N= 188)		Correlation with Participant Age (N=191)	
	M	SD	r	p
Introductory Web Courses				
Creating Web Pages with HTML	2.87	1.809	.150*	0.041
Creating Web Pages Web Editors	2.45	1.741	.185*	0.011
E-Commerce or E-Business	1.82	1.403	.211**	0.004
Introduction to the Internet	2.74	1.806	.248**	0.001

Note: ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the .05 level (2-tailed). The complete table is in Appendix T.

The significance of this data is important because, the results indicate that the older a participant is, the more likely they are to more often have taught these four courses. This leads us to wonder, why only these courses and not any of the newer technology or advanced web courses?

Relationship between number of years teaching, age and the number of years in working in web roles. The analysis of the survey results that there was a statistically significant but low-to-moderate (below .30) correlation between the age of the participants and the number of years of working experience in computer programming, web developer and other roles (see Table 60).

Table 60

Bivariate Correlations between the Number of Years Teaching in Higher Education (N=186) and the Age of the Participants (N=191) and the Participant Years of Experience in Professional Roles (N=183)

	Correlation with Participant Years Teaching in Higher Education (N=186)		Correlation with Participant Age (N=191)	
Years in Professional Roles	r	p	r	p
Professional Roles (N=183)				
Computer Networking	0.041	0.582	0.032	0.671
Computer Programming	.201**	0.006	.284**	0
Other Roles	0.049	0.508	.253**	0.001
Web Professional Roles (N=183)				
Web Developer	.224**	0.002	.147*	0.05
Web Designer	.161*	0.029	0.133	0.076
Web Administrator	0.072	0.334	0.04	0.595

Note: ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the .05 level (2-tailed).

The analysis of the survey results showed that there was a significant correlation between the number of years that participants taught in higher education (N=191, M=13.63, SD=8.966) and the number of years of working experience in computer programming (N=183, M=6.57, SD=9.869) or as a web developer (N=183, M=3.92, SD=6.005) and web designer (N=183, M=3.29, SD=5.297) .

There was no correlation between age or years teaching in higher education, and the years of experience in networking or web administration. Networking is another new field and therefore, there might not be as many participants with networking or web administrator experience.

Relationship between number of times teaching web courses and the number of years in working in professional roles. The number of years teaching Client-side Programming, E-Commerce or E-Business, Web Database Programming, Web Server programming and Web Securely were all positively but moderately correlated with computer programming experience. Working in computer programming was negatively correlated with teaching web graphic design. In other words, participants who had more experience in computer programming had less experience in web graphic design.

The analysis of the survey results showed that there was no correlation between the number of years in computer networking and the number of times teaching any of the introductory courses. However, there was a correlation with seven advanced web courses (see Table 61).

Table 61

Bivariate Correlations between the Number of Times Teaching Web Courses (N=188) and Participant Years of Experience in Professional Roles (N=183)

Professional Roles	Computer Networking		Computer Programming		Other Roles	
Web Courses	r	p	r	p	r	p
Introductory Web Courses						
Client-side Programming	0.099	0.187	.270**	0.000	-.228**	0.002
Creating Web Pages with HTML	0.028	0.709	0.091	0.222	-.162*	0.029
E-Commerce or E-Business	0.087	0.245	.170*	0.022	-0.135	0.071
Web Graphics Design	-0.051	0.497	-.170*	0.022	0.049	0.51
Advanced Web Courses						
Social Networking	.163*	0.028	-0.001	0.985	-0.113	0.131
Web-based Communications	.160*	0.032	-0.027	0.716	0.005	0.952
Web-based Marketing	.182*	0.014	-0.002	0.983	-0.086	0.252
Web Database Programming	.159*	0.033	.354**	0.000	-.198**	0.008
Web Security	.440**	0.000	.206**	0.005	-0.127	0.088
Web Server Management	.404**	0.000	0.01	0.896	-0.079	0.293
Web Server Programming	.173*	0.02	.346**	0.000	-.216**	0.003

Note: ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the .05 level (2-tailed). The complete table is in Appendix U.

Relationship between number of times teaching web courses and the number of years in working in web professional roles. The number of web courses taught was used to classify participants as web faculty and non-web faculty. The Pearson's correlation coefficients was used to describe the relationship between years in web roles and years teaching web courses using bivariate correlation analysis.

In contrast to the three professional roles previously discussed, the survey results overwhelmingly showed many correlations between the number of years in web-related roles and the experience teaching web courses. (see Table 62).

Table 62

Bivariate Correlations between the Number of Times Participants Taught Introductory and Advanced Web Courses (N=188) and Participant Years of Experience in Web Roles (N=183)

Professional Roles / Web Courses	Years working in web development		Years working in web design		Years working in web administration	
	r	p	r	p	r	p
Introductory Web Courses						
Client-side Programming	.547**	0.000	.304**	0.000	.269**	0.000
Creating Web Pages with HTML	.442**	0.000	.364**	0.000	.177*	0.017
Creating Web Pages Web Editors	.378**	0.000	.455**	0.000	.273**	0.000
E-Commerce or E-Business	.319**	0.000	.267**	0.000	.151*	0.042
Introduction to the Internet	.248**	0.001	.275**	0.000	0.112	0.132
Web Graphics Design	.254**	0.001	.532**	0.000	0.128	0.086
Web Multimedia and Animation	.318**	0.000	.488**	0.000	.225**	0.002
Advanced Web Courses						
Mobile Applications	.256**	0.000	.189*	0.011	0.106	0.155
Social Networking	.173*	0.02	.243**	0.001	0.101	0.174
Web-based Communications	.249**	0.001	.339**	0.000	.205**	0.006
Web-based Marketing	.157*	0.035	.253**	0.001	.175*	0.018
Web Database Programming	.380**	0.000	.152*	0.041	.220**	0.003
Web Graphics Marketing	0.136	0.068	.348**	0.000	.210**	0.005
Web Security	.314**	0.000	.272**	0.000	.407**	0.000
Web Server Management	.208**	0.005	0.104	0.162	.257**	0.000
Web Server Programming	.434**	0.000	0.125	0.095	.259**	0.000

Note: ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

The data analysis results for the web development role showed all but one course, Web Graphics Marketing, to be positively correlated. As the participants experience level in web development increased, the number of times they taught web courses increased, their experience level in web development also increased.

There was a positive relationship between the number of years working in web design and teaching all of the introductory web courses and the majority of the advanced web courses.

Although there was no correlation between the number of years working in web design and the number of times teaching web server management or web server programming, there was a significant correlation with the number of years working in web administration and the number of times teaching these two courses.

Membership of web faculty and non-web faculty in professional organizations. The research showed that professional organizations are one of the elements of a profession. Participants identified membership in a variety of professional organizations and web-related professional organizations. Overall participation in web professional memberships for both web-faculty and non-web faculty was low.

The survey data was analyzed to identify if the frequency of membership in a web-related professional organization was different between web faculty and non-web faculty. The web professional organizations were classified as ACM-SIGWEB, CIW, IWA, WOW, W3, RUM, Local Rails Meetup and Local PHP Meetup. Cross-tabulation with Chi-Square analysis was used to identify differences in expected frequencies of professional membership and web faculty status (see Table 63).

Table 63

Cross Tabulation of Membership in Web Professional Organizations and Web Faculty Status

Membership in a Web Professional Organization	Not a Member (N=87)		Member (N=101)			
Web Faculty Status	n	%		%	$\chi^2(1)$	p
Non-web faculty	82	94.3%	5	5.7%	12.588	.000
Web faculty	76	75.2%	25	24.8%		

Note: There were 0 cells (0.0%) with expected count less than 5. The minimum expected count was 13.88 for non-web faculty to belong to a web professional organization.

It was not unexpected to learn from this analysis that 82 (94.3%) of the non-web faculty were not members of a web professional organization. There was a difference in the expected frequency of membership in a web professional organization for participants who were web faculty and non-web faculty as indicated from the analysis results. This means that within this study, web faculty tended to participate more in web professional organizations.

Structural Components of Professionalization Analysis

Department oversight of web development. The structural components of professionalization include the criteria that the field should have control over it's own practice. Demonstrated previously, the majority of the participants supported computer science, information technology, or computer information systems as the department that should oversee web development. But does the participants' web faculty status make a difference in their response?

The Chi-Square analysis was completed but because cells had expected counts less than the minimum, the values were recoded into a new variable (χ^2=4.767, df=6, p=.574). However, as with other non-parametric analyses, the Chi-Square analysis does not require a normal distribution but the results should show a minimum expected count of five responses within each cell, and not more than 20% with less then five counts within a cell.

Web development was removed from the final Chi-Square analysis but one web faculty and one non-web faculty supported web development as the department that should oversee web development curricula (see Table 64). The results after recoding were still not significant (χ^2=.791, df=3, p=.852).

Table 64

Cross Tabulation of Web Faculty and Non-Web Faculty and Department Oversight of Web Development Recoded

	Non-web faculty (N=87)		Web faculty (N=101)			
Department Oversight	n	%	n	%	$\chi^2(1)$	p
Computer Science, Computer Information Systems and Information Technology	53	45.3	64	54.70	.791	.852
Graphic Arts	13	50	13	50		
Marketing and Business	10	55.6	8	44.4		
Interdisciplinary	9	45	11	55		

Note: N=188. Initially there were 3 cells (21.4%) had expected count less than 5. The minimum expected count was 3.70.

A higher relative percent of web faculty chose interdisciplinary over non-web faculty. After recoding the values, the results of the differences between the two groups were not significant. Therefore there was no difference in how web faculty and on-web faculty viewed the department that should have oversight of the web development curricula. However,

Preferred professional organization. The structural components of professionalization include the criteria that describe how a professional organization controls entry and exit from the profession as well as sets standards, maintains a code of ethics, and may have oversight of curriculum through accreditation. The participants were asked which professional organization in the United States they felt best represented the web developer. There were differences in the number of participants who responded with W3 and WOW and the number of participants who belong to the W3 and WOW. In order to identify if there was a difference between the choice made by web faculty and non-web faculty, a Chi-Square analysis was conducted. Because the first run with Chi-Square resulted in more than 10 (55.6%) cells with less than five expected counts, the data was regrouped. ACM was listed twice in the question and the values were combined into one choice with ACM-SIGWEB. The analysis with the recoded data that there was no difference between expected and actual frequencies between groups (χ^2=4.954, df=5, p=.422).

However, this analysis may not be valid because there continued to be cells with expected values less than five. Of those participants who selected the W3, twice as many were web faculty. A larger proportion of web faculty chose the W3 to represent the web faculty than non-web faculty (see Table 65).

Table 65

Cross Tabulation of Web Faculty and Non-Web Faculty Selection of a Web Professional Organization Recoded

	Not web faculty (N=66)		Web faculty (N=96)	
Professional Organizations	n	%	n	%
W3	25	33.80	49	66.20
WOW	19	46.30	22	53.70
ACM and ACM-SIGWEB	9	56.30	7	43.80
IEEE and IEEE-CS	3	33.30	6	66.70
IWA	6	50.00	6	50.00
CIW	4	57.10	3	42.90

Note: After recoding there were 4 cells (33.3%) have expected count less than 5. The minimum expected count was 2.91. N-159.

Recombining the code further, would not be consistent with the type of data. Each entry was it's own organization. Therefore, the offending cells, which were from CIW and IEEE, were filtered out in order to identify if there was a difference between faculty and non-web faculty and their recognition of which professional organization best represented web development. Neither would have been selected as the representative organization for the web profession. After filtering the data, a Chi-Square analysis run resulted on only one cell (12.5%) with an expected count less than five. There was no difference between expected and actual frequencies between the 84 (58.7%) web faculty and 59 (41.3%) non-web faculty groups (χ^2=4.005, df=3, p=.261).

Because there might be a question in the validity of the Chi-Square analysis, a Mann-Whitney U test (a rank sum test) was used to confirm the results from the initial analysis. The results from the Mann-Whitney U test confirmed that the choice of professional organization for the 159 participants was not affected of web faculty status

(Mdn = 83.26) than for non-web faculty (Mdn = 75.41), U = 3,372 p = .259, r = .0895, Z=1.129.

Minimum degree for a web developer. The structural components of a profession include a university degree and the proliferation of scholarly research, which contributes to the profession. A group of six ordinal questions was included on the survey to look at the opinions of participants on the professionalization of web development. Participants responded to six questions which used a ordinal scale ranging from 1 to 5 which represented strongly disagree, disagree, neutral, agree and strongly agree. The participants were asked what they thought should be the minimum degree for a web developer with the options of one year, two to four year or post baccalaureate certificate degrees, or an associate, bachelor, masters or doctoral degree. There were 194 (93.3%) participants who responded to this question (see Table 66).

Table 66

Frequency of Participant Views on the Minimum Degree for a Web Developer

Minimum Degree	Frequency	Percentage
Associate degree	59	28.4
Bachelor degree	55	26.4
2-4 year certificate	46	22.1
1 year certificate	20	9.6
Masters degree	11	5.3
Post baccalaureate certificate	2	1.0
Doctoral degree	1	0.5

Note: The percentage is based on 208 total participants. N=194.

The results of the frequency analysis showed that the preferred minimum degree for a web developer was the associate degree (N=194, X=3.62, SD = 1.52). What is interesting is that although the majority of the participants felt that the minimum degree should be an associate or bachelor degree (N=114, 54.8%), there were still over one third of participants who felt the one-year or two-to-four year certificate level was adequate for a minimum degree for a web developer (N=66, 31.7%).

Cross tabulation and Chi-Square was performed to help understand how web faculty and non-web faculty view the minimum degree requirements for web developers. Although no web faculty felt that the minimum degree should be either a doctorate or post baccalaureate certificate, one non-web faculty chose doctorate and one chose post baccalaureate certificate as the minimum degree requirements.

The initial analysis showed 4 cells (28.6%) had expected count less than 5 and a minimum expected count of .46. Because four cells violated the minimum expected frequency assumption, the values for master degree, doctoral degree and post baccalaureate certificate were recombined into one group and 1-year and 2-4 year certificates were recoded together into a new variable (see Table 67).

Table 67

Cross Tabulation of Web Faculty and Non-Web Faculty and Minimum Degree for a Web Developer Recoded

	Not web faculty (N=66)		Web faculty (N=96)	
Minimum Degree	N	Percentage	N	Percentage
1-year and 2-4 year certificate	31	48.40	33	51.60
Associate degree	20	35.10	37	64.90
Bachelor degree	27	50.00	27	50.00
Masters and Doctoral degree and Post baccalaureate certificate	9	69.20	4	30.80

Note: Chi-square results showed 0 cells (0.0%) had expected count less than 5. The minimum expected count was 6.02.

The results of the Chi-Square analysis on the recoded data showed there was no significant difference between non-web faculty and web faculty and the minimum degree recommended for web development (χ^2=6.047, df=3, p=.109).

Preparation for a beginning career in web development. Because there are no licensing or degree requirements for web development, academic degrees are not the only option for entering web development. Participants were asked to rank the methods that provide the best preparation for an entry level web developer by choosing just one of the options provided. The word "ranking" was confusing to a small number of participants, who contacted me to clarify the question or comment on the wording. The participants may have wanted to choose more than one option. However, the ranking was in the ordering of the entry level starting with creating a portfolio, and followed by obtaining a certificate from a non-academic setting and then an academic setting, and completing an associate degree, bachelor degree and master's degree (see Table 68).

Table 68

Best Preparation for an Entry Level Web Developer

Preparation for an Entry Level Web Developer	Frequency	Percent
Creating a Portfolio	75	36.1
Completing an Associate's Degree	53	25.5
Completing a Bachelor's Degree Program	36	17.3
Obtaining a Certificate from an Academic Setting	21	10.1
Obtaining a Certificate from a Non-Academic Setting	5	2.4
Completing an Master's Degree Program	4	1.9

Note: The percentage is based on 208 total participants. N=294 (93.3%) valid responses. N=14 no response (6.7%)

Of the 194 (93.3%) participants who responded to this question, 75 (36.1%) supported creating a portfolio as the best preparation for an entry level web developer, followed by 53 (25.5%) participants supporting completing an associate degree as the best option.

Do web faculty and non-web faculty have the same view about the best preparation for an entry level developer? A cross tabulation with Chi-Square analysis was completed to help identify differences between the groups.

Because the number of expected cells was less than five, the categories were recoded so that certificate from a non-academic setting or a master's degree was removed and the resulting data set consisted of 180 participants (see Table 69). There was no significant difference in the expected frequencies and observed frequencies between web faculty and non-web faculty regarding the best preparation for an entry level web developer (χ^2=2.098, df=3, p=0.552).

Table 69

Cross Tabulation of Web Faculty and Non-Web Faculty and Entry Level for a Web Developer

	Not web faculty (N=82)		Web faculty (N=98)	
Preparation for an Entry Level Web Developer	N	Percentage	N	Percentage
Creating a Portfolio	31	42.50	42	57.50
Obtaining a Certificate from an Academic Setting	11	55.00	9	45.00
Completing an Associate's Degree	22	41.50	31	58.50
Completing a Bachelor's Degree Program	18	52.90	16	47.10

Note: N=180. There were 0 cells (.0%) with an expected count less than 5. The minimum expected count was 9.11.

Overall, the participants identified creating a portfolio as the method that provides the best preparation for an entry level web developer followed by completing an associate degree. Completing an associate degree or bachelor degree ranked higher than obtaining a certificate from either an academic or non-academic setting.

Selected Structural Components of Professionalization Analysis

Participants were asked to rate their level of agreement with several statements that were also related to the structural components of a profession. Although computer science is not a structural component for the professionalization of web development, may be a barrier to web development becoming a profession.

Consistent with Lubell (1980), computer science may compete with the web field. Similarly, the growth of online academic programs could also be a hindrance for the ability for schools to provide adequate training for entry level web professionals. These questions were used to inquire about how participants feel about the some of the structural components of professionalization as it relates to web development (see Table 70).

Table 70

Participant Views About Selected Structural Components of Professionalization

Survey Question	Strongly Disagree N	Strongly Disagree %	Disagree N	Disagree %	Neutral N	Neutral %	Agree N	Agree %	Strongly Agree N	Strongly Agree %
1. Web Development Required in Computing Curricula 2013	5	2.4	20	9.6	31	14.9	89	42.8	47	22.6
2. Faculty difficulty keeping pace with web development technologies	4	1.9	27	13	24	11.5	96	46.2	41	19.7
3. Large online institutions affect offering web development programs	8	3.8	57	27.4	58	27.9	60	28.8	9	4.3
4. Computer science is a profession	2	1	21	10.1	19	9.1	72	34.6	78	37.5
5. Web development is a profession	2	1	4	1.9	10	4.8	95	45.7	81	38.9
6. Web development professional organization should have Code of Ethics	0	0	2	1	6	2.9	87	41.8	97	46.6

Note: Strongly disagree = 1 and Strongly agree = 5. For each of the questions, 16 (7.7%) of the 208 participants did not respond leaving 192 (92.3%) usable responses.

This study asked participants a series of questions to help understand their views on some of the structural components of the web development profession. These questions were used to inquire about how web faculty compared to non-web faculty feels about these subjects. The results of the survey questions provide information about current status of web development as a profession and are described in the following sections.

Inclusion of web development in computing curricula 2013. This study asked participants if web development should be a required knowledge area within Computing Curricula 2013. The final version of the computing curricula standards prepared by the Joint Task Force on Computing Curricula Association for Computing Machinery (ACM) IEEE Computer Society was released in December 2013.

The standards divided core topics into two core tiers with Core Tier-1 topics, recommended being required in all undergraduate programs. The reorganization of these standards removed web development out of net-centric computing and placed web development along with mobile application development into a new knowledge area within the Core Tier-2, called Platform-Based Development (ACM, 2013).

Because the report recommended that computer science curriculum cover a minimum of 80% of this core tier, web development is not a required element within a computer science curriculum. Therefore, while the final report has already been issued, the information obtained by this study could be used to help identify if the participants of this study value moving web development into a required knowledge area.

The initial review of the responses showed that 89 (42.8%) agreed and 47 (22.6%) strongly agreed that web development should be required in the Computing Curricula 2013 (N=192, M=3.80, SD=1.011). The majority of participants agreed that web development should be a required component.

Armed with the knowledge that participants did support inclusion of web development as a required topic within the standard curricula, the next question was to determine if there were differences between how web faculty and non-web faculty felt about inclusion of web development in the standard curricula. Running a cross tabulation showed that although 14 non-web faculty and 5 web faculty disagreed with the statement that web development should be included as a required area within the Computing Curricula 2013, two non-web faculty and three web faculty strongly disagreed. Therefore in order to run Chi-Square analysis, the groups were reorganized to different categories.

The 192 participants were regrouped into 3 groups (disagree or strongly disagree, neutral and agree or strongly agree) and resulted in a mean of 2.58 (SD=.712). The frequency of participants who agreed or strongly agreed with requiring web development as part of the computing curricula was greater than those that disagreed or strongly disagreed (see Table 71).

Table 71

Recoded Participant Preferences for Inclusion of Web Development as a Required Area within Computing Curricula 2013

Requirement in Computing Curricula 2013	Frequency	Percentage
Disagree or Strongly Disagree	25	12
Neutral	31	14.9
Agree or Strongly Agree	136	65.4
No response	16	7.7

Note: N=208 participants and N=192 (92.3%) usable responses.

Of course, it could be that the difference in frequency is related to the participant status as web faculty. Therefore a Chi-Square analysis was completed to determine if the difference the expected values between groups (see Table 72). There was a significant difference in the expected frequencies and observed frequencies between web faculty and non-web faculty regarding the best preparation for an entry level web developer which was statistically significant (χ^2=6.651, df=2, p=.036).

Table 72

Recoded Cross Tabulation of Web Faculty and Non-Web Faculty and Web Development to be Required within Computing Curricula 2013

	Not web faculty (N=87)		Web faculty (N=101)	
Web Required in Computing Curricula 2013	N	Percentage	N	Percentage
Disagree or Strongly Disagree	16	66.7	8	33.3
Neutral	17	54.8	14	45.2
Agree or Strongly Agree	54	40.6	79	59.4

Note: N=188. There were 0 cells (0.0%) that had expected count less than 5. The minimum expected count was 11.11. N=208 participants and N=192 (92.3%) usable responses.

Chi-Square showed that there was a small difference in the proportions between the two variables. Web faculty agreed that web development should be a required knowledge area within Computing Curricula 2013 but more non-web faculty disagreed. Therefore this study can report that there was a difference in how faculty felt about requiring web development within Computing Curricula 2013.

To understand more about this difference, a Mann-Whitney U test was completed to convert the ordinal scores from 188 participants to ranks and compare the differences in the means of the web faculty and non-web faculty using pairwise comparison. A Mann-Whitney U test indicated that requiring web development in Computing Curricula 2013 was statistically greater for 101 web faculty (Mdn = 101.96) than for 87 non-web faculty (Mdn = 85.84). There was a difference between the means of both groups (U = 5,147, p = .011, r =.186, Z=2.553) with a higher percentage of web faculty agreeing with the required inclusion of web development in Computing Curricula 2013.

Change at the speed of light. It has been shown by Tabers (2001) that some faculty experience challenges keeping up with technologies in web development. Therefore, this study asked participants if they have had a difficult time keeping pace with the new technologies in web development. As shown in Table 88, there were more participants who agreed or strongly agreed than those that disagreed or strongly disagreed.

The data showed that 96 (46.2%) agreed and 41 (19.7%) strongly agreed that they have had a difficult time keeping pace with the new technologies in web development (N=192, M=3.74, SD=1.014). The low numbers in the strongly agree category did cause a problem when running the chi-square analysis because the cells are required to have more than an expected count of 5. Because 2 (20%) of the expected cells contained values less than 5, the data results could be suspect and so the categories were recombined and the analysis rerun with a new recoded variable.

The recoded values were 31 (14.9%) disagree or strongly disagree, 24 (11.5%) neutral, and 137 (65.9%) agree or strongly agree. Although the differences between the groups was not statistically significant (χ^2=2.758, df=2, p=.252), the overwhelming 137 (65.9%) majority of participants agreed or strongly agreed that this is a problem for faculty (see Table 73).

Table 73

Recoded Cross Tabulation Between Web Faculty and Non-Web Faculty and Difficulty Keeping Pace with the New Technologies in Web Development

	Not web faculty (N=87)		Web faculty (N=101)	
Difficulty Keeping Pace with New Technologies in Web Development	N	Percentage	N	Percentage
Disagree or Strongly Disagree	16	53.3	14	46.7
Neutral	14	58.3	10	41.7
Agree or Strongly Agree	57	42.5	77	57.5

Note: N=188. There were 0 cells (0.0%) that had expected count less than 5. The minimum expected count was 11.11. N=188.

A Mann-Whitney U test confirmed that the difficulty keeping pace with new technologies in web development was no greater for the 101 web faculty (Mdn = 98.99) than for 87 non-web faculty (Mdn = 89.29). So both groups tended to find it difficult to keep up with new technologies in web development (U = 4,846.5, p = .083, r = .112, Z=1.532).

Impact of online programs on web development programs. Because online learning is so prevalent today, participants were asked if the large online educational institutions affect their ability to offer web development programs. Table 90 indicated that there was not a strong feeling about the impact of the online programs on the participant's institutions ability to offer web development programs. It is not known what the participants know about online web development programs.

To look at the difference with web-faculty and non-web faculty, a chi-square analysis was conducted. The initial results showed that the number of cells violated the rule and would not be statistically valid. Therefore, the 192 participants in the five groups were recombined into three groups and the analysis rerun with a new recoded variable.

The new recoded values were 65 (31.3%) disagree or strongly disagree, 58 (27.9%) neutral, and 69 (33.2%) agree or strongly agree. There was no statistically significant differences in the expected frequencies and observed frequencies shown in Table 74 between 101 web faculty and 87 non-web faculty regarding impact of large online programs on the offering of web development programs (χ^2=1.898, df=2, p=.387).

Table 74

Recoded Cross Tabulation Between Web Faculty and Non-web Faculty of the Impact of Large Online Programs on the Offering of Web Development Programs

	Not web faculty (N=87)		Web faculty (N=101)	
Level of Agreement	N	Percentage	N	Percentage
Disagree and Strongly Disagree	30	46.9	34	53.1
Neutral	30	52.6	27	47.4
Agree and Strongly Agree	27	40.3	40	59.7

Note: The Chi-Square was valid with no cells with less than five expected values. The minimum expected count was 26.38. N=208. There were192 valid responses.

A Mann-Whitney U test confirmed for the 192 participants the impact of large online programs offering of web development programs was no greater for 101 web faculty (Mdn = 97.19) than for the 87 non-web faculty (Mdn = 91.38). So both groups tended to have the same belief about the impact of large online programs and the ability for the participant’s institution to offer web development programs. (U = 4,665, p = .439, r = .0565, Z=.775).

While there is no statistical difference, this does show that the opinions are split. Further analysis of why this occurred was not completed as part of this study.

Is computer science a profession? The participants were asked if they felt computer science was a profession. There were 150 (72.1%) of the 192 participants agreed or strongly agreed that computer science was a profession.

A Chi-Square analysis was completed to identify if there were differences in the frequencies between how web faculty and non-web faculty viewed computer science as a profession. It was not unexpected to see cells with less than the required expected counts, because two participants strongly disagreed that computer science was a profession (see Table 75).

Table 75

Participant Agreement with Computer Science is a Profession

	Not web faculty (N=87)		Web faculty (N=101)	
Level of Agreement	N	Percentage	N	Percentage
Strongly Disagree	0	0	2	100
Disagree	7	35	13	65
Neutral	11	57.9	8	42.1
Agree	31	44.3	39	55.7
Strongly Agree	38	49.4	39	50.6

Note: There were 2 cells (20.0%) with expected count less than five and the minimum expected count was .93. N=208 participants and N=192 (92.3%) usable responses.

The decision to merge these values combining disagree fields was completed with no cells with expected counts less than five and the minimum expected count was 8.79. Merging the options of disagree and strongly disagree into one option, had no change in the results. There was no statistically significant differences in the expected frequencies and observed frequencies between 101 web faculty and 87 non-web faculty regarding profession status of computer science (χ^2=3.286, df=3, p=.350). What this study can report is that the majority of both web faculty and non-web faculty agreed computer science as a profession.

Is web development a profession? The participants were asked if they felt web development was a profession. It was important to look at their opinion using both the Web Development Professionalism Inventory as well as coming right out and asking participants if they agreed that web development was a profession. This question uses the term profession, which may or not be defined the same across participants. The result from this analysis shows the majority of participants (N= 176, 84.6%) agreed or strongly agreed that web development was a profession (see Table 76).

Table 76

Participant Agreement with Web Development is a Profession

	Not web faculty (N=87)		Web faculty (N=101)	
Level of Agreement	N	Percentage	N	Percentage
Strongly Disagree	0	0	0	0
Disagree	3	50	3	50
Neutral	8	80	2	20
Agree	39	42.9	52	57.1
Strongly Agree	37	45.7	44	54.3

Note: There were 3 cells (37.5%) with expected count less than five and the minimum expected count was 2.78. N=208 participants and N=192 (92.3%) usable responses.

It was unexpected to see that 176 (84.6%) participants supported the statement that web development was a profession and that only 16 participants disagreed or were neutral on this subject. There was no statistically significant differences in the expected frequencies and observed frequencies between 101 web faculty and 87 non-web faculty regarding profession status of web development (χ^2=5.048, df=3, p=.168). Running a

Chi-Square analysis on the data was problematic again because of the small numbers that disagreed with the statement.

Even combining the strongly disagree and disagree fields were problematic. But combining the strongly disagree, disagree and neutral into one category, the chi-square analysis is valid with no cells with expected counts less than five and the minimum expected count of 7.4. However, this recoding made no difference in the results (χ^2=3.690, df=2, p=.158). There was no statistical significance between the two groups. (χ^2=3.690, df=2, p=.158). What this study can report is that the majority of both web faculty and non-web faculty agreed web development as a profession.

A need for a web development code of ethics. It is unknown if participants know that the ACM and IWA do have a code of ethics, but not CIW or the WOW. Participants were asked using a ordinal question if the web development professional organization should have a code of ethics (see Table 77).

Table 77

Participant View that Web Development Needs a Code of Ethics

	Total Responses (N=192)		Not web faculty (N=87)		Web faculty (N=101)	
Level of Agreement	*N*	%	N	%	N	%
Strongly Disagree	0	0	0	0	0	0
Disagree	2	1	1	.5	1	.5
Neutral	6	2.9	2	1	2	1.9
Agree	84	40.4	34	16.3	34	24
Strongly Agree	96	46.2	50	24.0	50	22.1
No response	20					

Note: N=208. There 188 valid responses. No response=16.

Although none of the 192 participants responded strongly disagree, two participants did disagree with the statement that web development should have a code of ethics. The results showed that 184 (95.8%) of participants agree or strongly agree that web development needs a code of ethics (see Table 78).

Table 78

Recoded Cross Tabulation Between Web Faculty and Non-web Faculty of the Need for A Code of Ethics for Web Development

	Not web faculty (N=87)		Web faculty (N=101)	
Level of Agreement	N	Participants	N	Participants
Strongly Disagree	0	0	0	0
Disagree	1	50	1	50
Neutral	2	33.3	4	66.7
Agree	34	40.5	50	59.5
Strongly Agree	50	52.1	46	47.9

Note: The initial Chi-Square was not valid with 4 (50%) cells with less than five expected values. The minimum expected count was .93. The strongly disagree was not included in the analysis. (χ^2=2.854, df=3, p=.415). N=208 participants and N=192 (92.3%) usable responses.

The low numbers were problematic when running a Chi-Square analysis because of the low numbers per cell. The only possible alternative was to combine the strongly disagree, disagree and neutral into one category. However, that resulted in two cells (33%) with less then the required expected values. Therefore, this test cannot report any differences between the two groups. However, this study has shown that there is strong support for web development to have a code of ethics.

Summary. The survey asked participants about some of the structural components that impact the ability for the web field to become a profession. The summary results for the entire group along with the mean and standard deviations are reported in Table 79.

Table 79

Summary of the View of Web Faculty and Non-web Faculty of Selected Structural Components of a Profession Applied to Web Development Measured Using Chi-Square

Survey Question Topic	Summary of the Results	M	SD	χ^2	df	p
1. Web Development Required in Computing Curricula 2013	89 (42.8%) agree; 47 (22.6%) strongly agree	3.80	1.011	6.651	2	. 036*
2. Faculty difficulty keeping pace with web development technologies	137 (65.9%) agree or strongly agree	3.74	1.014	2.758	2	.252
3. Large online institutions affect offering web development programs	65 (31.3%) disagree or strongly disagree; 58 (27.9%) neutral; 69 (33.2%) agree or strongly agree.	3.03	.984	.898	2	.387
4. Computer science is a profession	150 (72.1%) agree or strongly agree	4.06	1.019	3.286	3	. 350
5. Web development is a profession	176 (84.6%) agree or strongly agree	4.3	0.752	3.690	2	.158
6. Web development professional organization should have Code of Ethics	184 (95.8%) agree or strongly agree	4.45	0.612	2.854**	2	.415

Note: * Significant at p<.05. ** The minimum expected count for the Chi-square analysis was under 5 which was greater than 20% leaving this result suspect. Strongly disagree = 1 and strongly agree = 5. 192 out of 208 participants responded to these questions. N=188 for each of the questions.

Although only one test shows a significant difference between the view of web faculty and non-web faculty on requiring web development in Computing Curricula 2013, there were no significant differences in the expected frequencies between these two groups with regards to the other five questions.

Although Chi-square rules leave the data result suspect in some of the questions, it is important to recognize that the data is still quite valid. The fact that so many of the participants in both groups, selected agree or strongly agree with the statements is an important result .

Given the literature on professionalization process in other field, the study did not anticipate wide support for computer science and web development as a profession (see Table 80).

Table 80

Summary of the View of Web Faculty and Non-web Faculty of Selected Structural Components of a Profession Applied to Web Development Measured by the Mann-Whitney U Test

Survey Question Topic	U	p	r	Z	Web Mdn	Non-Web Mdn
1. Web Development Required in Computing Curricula 2013	5147	.011*	.186	2.553	85.84	101.96
2. Faculty difficulty keeping pace with web development technologies	4846.5	.126	.112	1.532	89.29	98.99
3. Large online institutions affect offering web development programs	4665	.439	.057	.775	91.38	97.19
4. Computer science is a profession	4111	.417	-.059	-.811	97.75	91.70
5. Web development is a profession	4627.5	.701	.035	.484	91.81	96.82
6. Web development professional organization should have Code of Ethics	3859.5	-1.628	.008	.104	100.64	89.21

Note: Differences between 101 web faculty and 87 non-web faculty were measured with Chi-Square and Mann-Whitney U tests. * Significant at p<.05. Mdn represents the mean rank.

Chi-Square analysis showed the median values were above 3 and the frequency analysis indicated that most of the participants, web faculty and non-web faculty, agree or strongly agree with five of the survey questions. The only question that did not have a majority support, either agreement or disagreement, was the question on the impact of large online programs and the offering of web development. Given the large numbers of web development students enrolled in a select group of largely online programs, it was a surprise to see that the participants did not have strong agreement that there was an impact on their ability to offer web development programs.

The series of Mann-Whitney U tests confirmed the Chi-Square analysis supporting that the only difference between the web and non-web faculty for each of these survey questions was on their view of requiring web development in Computing Curricula 2013 further supporting the statement that more web development faculty agreed that Computing Curricula 2013 should require the inclusion of web development content.

Table 81 shows a summary of the data analyses, used to identify differences in the responses between web faculty and non-web faculty for the other survey questions that asked participants about structural factors that could impact the professionalization of web development. It is important to remember that while a significant response is meaningful, a non-significant response is also meaningful. The story the results tell us when they are all not significant, is that faculty who are web faculty and non-web faculty have the same beliefs about these questions. Therefore, the focus takes us back to what the faculty as a whole think about these questions.

Table 81

Summary of the View of Web Faculty and Non-web Faculty of Selected Structural Components of a Profession Applied to Web Development

Survey Question	Summary of the Results	Difference Between Web Faculty And Non-Web Faculty
Which department should have "oversight of all web development curricula"?	Computer Science, Computer Information Systems and Information Technology had more support than other areas. However, interdisciplinary was also an option that 20 (10.6%) participants chose.	No significant difference was identified. (χ^2=.791, df=3, p=.852)
Which professional organization "best represents the collection of web developers within the United States"	W3 Consortium had more support with 75 (36.1%) participants followed by WOW with 42 (20.2%) participants.	No significant difference was identified. (χ^2=4.005, df=3, p=.261).
What should be "the minimum degree for a web developer"?	Associate degree with 59 (28.4%) had more support followed by Bachelor degree with 55 (26.4%) and 2-4 year certificate with 46 (22.1%).	No significant difference was identified. (χ^2=6.047, df=3, p=.109)
Which method provides "the best preparation for an entry level web developer"?	Creating a portfolio had more support with 75 (36.1%) followed by completing an associate degree with 53 (25.5%) and bachelor degree with 36 (17.3%)	No significant difference was identified. (χ^2=2.098, df=3, p=0.552)

Note: Significance evaluated at p>.05.

Finding no statistical significant differences across the board between web faculty and non-faculty was not anticipated. But the results from these questions are conceptually significant in this study because there was not a strong agreement with each question. While conceptually the majority of participants agreed web development is a profession, when the specific details of the components of a profession were mentioned, the participants did not have strong agreement.

Views of Web Development as a Profession

Web Development Professionalism Inventory includes questions modified from the Hall (1968) Professionalism Scale later modified by Snizek (1972). The scale is divided into five factors include use of the professional organization as a major referent, belief in public service, belief in self-regulation, sense of calling to the field and feeling of autonomy. The survey uses 25 questions, similar to Snizek with slight modifications in the wording to identify the web development field as the profession of interest.

Organization of extracted factors using five attitudinal components of professionalization. Details on the methods used in the PCA analysis and identification of factor loadings, eigenvalues and variance are available in the Appendix T. Items with low factor loadings and items, which loaded on multiple factors, were identified and removed. Five factors emerged from the principal component analysis.

The factor loadings were compared and mapped to the Hall (1968) Professionalism Inventory Scale. Two factors were clearly identified as distinct factors. The first factor in this study represented the belief in a public service tenant and the second factor represented the belief in self-regulation. Partial factor loadings on some of the items indicated that there might be some overlap in the concepts of self-regulation and belief in public service. shows the results from the PCA sorted by the factors and items as classified by Hall. This presents a better picture of the factors that loaded strong.

The third factor in this study mapped closest to Hall's component the use of the professional organization as a major referent. The belief in self-regulation and the use of the professional organization as a major referent may have overlap in how they are measured by two of the factors. As explained earlier, for web development, there was no unifying professional organization selected by the majority of participants. Therefore, the tendency to include this conceptually with the self-regulation may be more plausible. The fourth factor in this study mapped closest to the feeling of autonomy factor after two items were removed. The fifth factor in this study mapped closest to the sense of calling to the field after two items being removed.

The final factor analysis. After removal of the items, the modified inventory was again tested to determine if the modified inventory was appropriate to be analyzed with PCA and if there were differences in the factor loadings from the previous analysis. A principal component analysis with orthogonal rotation (varimax) was conducted on the modified inventory using the same data analysis technique described in Appendix T. The five components were retained in the final analysis had eigenvalues over Kaiser's criterion of one and in combination explained 58.56% of the variance. Most of this variance was explained by the belief in public service factor. The overall reliability (α) of the new 17-item scale was .699. A detailed description of the reliability of the scale as well as the individual items is provided in Appendix T.

Higher overall average scores could not be directly compared because the number of items varied with the first factor (see Table 82). The mean in the table is the mean of the sum scores for the factor. The lowest scores were in feeling of autonomy and belief in public service.

Table 82

Summary of Exploratory Factor Analysis Organized by Halls' Five Attitudinal Dimensions of Professionalization

Map	No.	Survey Question Item	Factors 1	2	3	4	5
I. Use of the professional organization as a major referent (PO)							
PO1	1	A web developer regularly reads the professional journals.			.71		
PO2	4	Web developers regularly attend professional meetings at the local level.			.681		
PO3	9	I believe that the professional web development organizations(s) should be supported.					.464
PO4	13	The web development professional organization doesn't really do too much for the 'rank-in-file' member.		.503	.351		
PO5	17	Although they would like to, web developers really don't read the journals very thoroughly.		.359	.53		
II. Belief in public service (PS)							
PS1	2	Other occupations are actually more vital to society than web development.	.803				
PS2	5	I think that this profession, more than any other, is essential for society.	.749				
PS3	8	The importance of this profession is sometimes overstressed.	.667				
PS4	10	Some other occupations are actually more important to society than web development.	.736				
PS5	23	If ever an occupation were indispensable, it is this one.	.575				
III. Belief in self regulation (SR)							
SR1	6	My fellow web development professionals have a pretty good idea about each other's competence.		.509			.359
SR2	11	A problem in the web development profession is that no one really knows what one's fellow professionals are doing.		.715			
SR3	14	Web developers really have no way of judging each other's competence.		.797			
SR4	20	There is not much opportunity to judge how other web developers do their work.		.753			
SR5	22	Persons who violate professional standards should be judged by their professional peers.					.329
IV. Sense of calling to the field (SC)							
SC1	7	People in this profession have a real "calling' for their work.					.608
SC2	15	I find the dedication of people in this field is most gratifying.	.3		.433	.301	.376
SC3	12	It is encouraging to see the high level of idealism which is maintained by people in the web development field.			.496	.346	
SC4	18	Most people would stay in the web development profession even if their incomes were reduced.					
SC5	24	There are very few practitioners who really believe in their work.			.326		.471
V. Feeling of autonomy (AT)							
AT1	3	Web developers make their own decisions in regard to what is to be done in their work.				.578	
AT2	16	Web developers don't have much opportunity to exercise their own judgement.		.43			
AT3	19	In this kind of work, a person's decisions are subject to review.					-.459
AT4	21	I am my own boss in almost every work-related situation.				.673	
AT5	25	I know that my own judgement on most matters is final judgement.				.786	

Note: Factor loadings less then .3 not displayed. Extraction Method: Principal Component Analysis. Varimax rotation with Kaiser Normalization where rotation converged in 7 iterations.

Table 83

Summary of Item Counts per Factor, Means, Standard Deviations, Eigenvalues, Percentage of Variance Explained, Cumulative Percentage of Variance and Chronbach's Alpha for the Five Factors

Factors	N	X	SD	Eigenvalues	% of Variance	α
1 PS Belief in public service	5	12.9	3.62	3.345	16.223	.783
2 SR Belief in self regulation	3	10.48	2.002	2.257	12.453	.722
3 PO Use of the professional organization as a major referent	3	9.57	1.91	1.885	10.733	.629
4 SC Sense of calling to the field	3	9.84	1.63	1.372	9.758	.526
5 AT Feeling of autonomy	3	8.03	1.932	1.096	9.392	.571

Note: Strongly disagree = 1 and Strongly agree = 5. The five factors had a cumulative variance of 58.560%.

Overall Factor Scores. A weighted percentage value was calculated to obtain the average points within the total possible points. This method allows comparison of factor one with the other four factors (see Table 84). If neutral is the middle response, then responses on either side of the 50% marker indicated the level of agreement or disagreement. All five factors had scores over 50%, indicating the average of the participants, agreed with each of the five factors of professionalization.

Table 84

Means, Standard Deviation and Sums for Each Factor

		All Participants (N=208)	
Factor	Range *	M	%
PS	5 to 25	12.9	51.6%
SR	5 to 15	10.48	69.9%
PO	5 to15	9.57	63.8%
SC	5 to15	9.84	65.6%
AT	5 to15	8.03	53.5%
Total	25 to 85	50.83	59.8%

Note: * Range represents the minimum and maximum possible total points for that factor. The percentage is the average number of total points divided by the maximum value.

Individual Factor Scores. Table 106 shows the factor loadings after varimax orthogonal rotation. Although the overall average for each factor was over 50%, the values for individual items varied. With neutral scoring at three points, the mean was above average for nine items and below average for eight items.

Table 85

Summary of Factor loading, Mean, Standard Deviation, Chronbach's Alpha and Communalities for each Item Sorted by Factor.

Item		Factor loading	M	SD	α	h^2
Factor 1: Belief in Public Service						
PS1	2	.813	2.77	1.122	.813	.679
PS2	5	.783	2.65	1.019	.783	.655
PS3	8	.665	3.05	.977	.665	.551
PS4	10	.742	2	.805	.742	.631
PS5	23	.572	2.43	.998	.572	.463
Factor 2: Belief in Self Regulation						
SR2	11	.724	3.22	.845	.724	.581
SR3	14	.812	3.74	.843	.812	.669
SR4	20	.807	3.52	.808	.807	.672
Factor 3: Use Of The Professional Organization as a Major Referent						
PO1	1	.805	3.39	.915	.805	.658
PO2	4	.775	3.19	.867	.775	.626
PO5	17	.563	3	.726	.563	.474
Factor 4: Sense of Calling to the Field						
SC1	7	.589	3.53	.754	.589	.407
SC2	15	.611	3.51	.673	.611	.526
SC4	18	.744	2.8	.839	.744	.568
Factor 5: Feeling of Autonomy						
AT4	21	.593	2.93	.961	.593	.547
AT5	25	.809	2.52	.789	.809	.693
AT1	3	.726	2.59	.875	.726	.554

Note: h2 = communality. Strongly disagree = 1, neutral =3 and strongly agree = 5

Comparison of web faculty and non-web faculty. The factor analysis was rerun to compare how web faculty and non-web faculty responded to the items (see Table 86).

Table 86

Factor Loadings for Web Faculty and Non-Web Faculty

		Factor Loading	
Factors	Item	Non-web Faculty	Web Faculty
Factor 1: Belief in public service			
PS1	2	.836	.781
PS2	5	.747	.787
PS3	8	.657	.682
PS4	10	.763	.75
PS5	23	.472	.677
Factor 4: Belief in self regulation			
SR2	11	.596	.791
SR3	14	.83	.773
SR4	20	.83	.808
Factor 3: Use of the professional organization as a major referent			
PO1	1	.78	.783
PO2	4	.702	.687
PO5	17	.661	.591
Factor 4: Sense of calling to the field			
SC1	7	.725	.66
SC2	15	.61	.407
SC4	18	.626	.837
Factor 5: Feeling of autonomy			
AT1	3	-.604	.763
AT4	21	.809	.562
AT5	25	.765	.795

Note: Both sets of principal component factors were extracted using varimax rotation with Kaiser normalization. Rotation converged in 5 iterations for web faculty and 6 iterations for non-web faculty.

The difference between web faculty and non-web faculty for all of the factor loadings was less than the absolute value of .22. So, the differences between groups were small and both groups had similar factor loadings. However, while the difference was slight, there was an inverse factor loading on Item 3. Item 3 loaded in the autonomy factor, and asked participants if they agreed "Web developers make their own decisions in regard to what is to be done in their work." Factor loading for web-faculty was very high at .763 while the factor loading for non-web faculty was -.604.

For non-web faculty, item 23 loads into belief in public service but also loaded onto sense of calling to the field at .455. For web faculty, item 21 loads into the autonomy factor (.809) and also loaded onto the professional organization as a major referent factor (-.428).

What this tells us is that there might be slight differences in how the participants are responding to the questions or the question isn't quite getting at the construct, in this case the factor, in the same way for both groups. To understand more about these differences in the factor analysis, it was important to look at how the groups responded to the individual items.

Item statistics for web faculty and non-web faculty. Table 87 shows the mean, standard deviation for individual items for both web faculty and non-web faculty. The ordinal scale ranges from a value of 1 for strongly disagree to 5 for strongly agree. So it is important to convert the difference to percentages when comparing them across factors. Item 1 asked participants if they agreed, "A web developer regularly reads the professional journals." Web faculty responded more positively by .2 points. However, this translated into a 5.68% difference between the two groups, which isn't much.

Table 87

Standard Deviation and Differences in Means for Individual Test Items for Web Faculty and Non-web Faculty

		Non-web Faculty (N=87)		*Web Faculty (N=101)*			
Factors	Item	M	SD	M	SD	Difference	% Change
		Factor 1: Belief in public service					
PS1	2	2.74	1.115	2.85	1.169	.11	3.86%
PS2	5	2.67	1.008	2.69	1.065	.02	0.74%
PS3	8	3.15	.959	3.02	.99	-.13	-4.30%
PS4	10	1.97	.784	2.03	.842	.06	2.96%
PS5	23	2.46	1.087	2.41	1.012	-.05	-2.07%
		Factor 2: Belief in self regulation					
SR2	11	3.18	.843	3.29	.887	.11	3.34%
SR3	14	3.87	.744	3.77	.847	-.1	-2.65%
SR4	20	3.62	.735	3.58	.828	-.04	-1.12%
		Factor 3: Use of the professional organization as a major referent					
PO1	1	3.32	.869	3.52	.934	.2	5.68%
PO2	4	3.16	.791	3.23	.947	.07	2.17%
PO5	17	3.06	.783	2.95	.74	-.11	-3.73%
		Factor 4: Sense of calling to the field					
SC1	7	3.49	.68	3.61	.812	.12	3.32%
SC2	15	3.41	.657	3.63	.689	.22*	6.06%
SC4	18	2.7	.864	2.88	.864	.18	6.25%
		Factor 5: Feeling of autonomy					
AT1	3	2.61	.881	2.6	.884	-.01	-0.38%
AT4	21	3	1	2.87	.997	-.13	-4.53%
AT5	25	2.48	.874	2.52	.769	.04	1.59%

Note: N=208. However, only 188 were classified as faculty and web faculty based on their responses to the number and type of web courses that they have taught. The greatest difference in the means was only +/- .062. The scale of the items were strongly disagree = 1 to strongly agree = 5. * This difference was statistically significant based on an independent t-test which is discussed an upcoming section of this chapter.

Collectively, the scores of each of the factors were calculated for the web faculty and non-web faculty to identify if there was any difference between the means or reliability. The greatest difference in the means between the two groups was for item 18 (sense of calling to the field) which asked participants if they agreed, “Most people would stay in the web development profession even if their incomes were reduced.” The web faculty scored .18 (6.25%) higher than non-web faculty, a slight increase. So more web faculty agreed web developers overall would stay in the field if their incomes were reduced, than non-web faculty.

The next largest difference in the means between the two groups was for item 15 (also sense of calling to the field) which asked participants if they agreed, “I find the dedication of people in this field is most gratifying.” The web faculty scored .22 (6.06%) higher than non-web faculty, a slight increase. So more web faculty agreed that they found if gratifying that web developers were dedicated in their field.

Factor statistics for web faculty and non-web faculty. Collectively, the scores of the mean, standard deviation and Chronbach’s alpha for the five factors for both web faculty, non-web faculty and all participants (see Table 88). The interesting thing to note is that the item means continue to be all above 2.5. There were few people that strongly disagreed with the items. The value of .52 represents the arithmetic differences between the means for the faculty and non-web faculty groups for the sense of calling factor. Note that the web faculty mean for the factor group was .52 higher than non-web faculty. The differences between the two group means was very small, indicating that overall both groups viewed professionalization for the web field the same.

Table 88

Summary of Factor Mean, Mean of the Total Scores, Standard Deviations and Chronbach's Alpha for the Five Factors Grouped by Web Faculty and Non-web Faculty.

Factor Groups		*# Items*	*Aggregate Item Mean*	*M*	*SD*	*α*
All Participants (N=208)						
1	PS	5	2.581	12.9	3.62	0.738
2	SR	3	3.494	10.48	2.002	0.722
3	PO	3	3.191	9.57	1.91	0.629
4	SC	3	3.279	9.84	1.63	0.526
5	AT	3	2.677	8.03	1.932	0.571
Non-web Faculty (N=87)						
1	PS	5	2.595	12.98	3.593	0.768
2	SR	3	3.559	10.68	1.82	0.683
3	PO	3	3.18	9.54	1.964	0.724
4	SC	3	3.203	9.61	1.543	0.466
5	AT	3	2.697	8.09	1.969	0.517
Web Faculty (N=101)						
1	PS	5	2.6	13	3.803	0.799
2	SR	3	3.548	10.64	2.072	0.735
3	PO	3	3.234	9.7	1.926	0.563
4	SC	3	3.376	10.13	1.753	0.583
5	AT	3	2.667	8	1.99	0.604
Differences between the means of Web Faculty and Non-web Faculty						
1	PS		0.005	0.02	0.21	0.031
2	SR		-0.011	-0.04	0.252	0.052
3	PO		0.054	0.16	-0.038	-0.161
4	SC		0.173	0.52	0.21	0.117
5	AT		-0.03	-0.09	0.021	0.087

Note: The item mean is the average for all of the items in that factor. The Strongly disagree = 1 and Strongly agree = 5. M is the mean of the sum of all of the items in each factor. Chronbach's alpha was used to measure scale reliability as Field (2009) suggested. All alpha values are over .5 indicating that the data is reliable.

Chan's (2005) mean score for all factors was 3.2 above the neutral mean (M=3.0), indicating agreement with the professionalization of building professionals. Philip E. Carlan and McMullan (2009) studied police in municipal police departments and found the lowest average of all dimensions was feeling of autonomy (3.14). Carlan and McMulan found that gender did not play a role in the view of the profession. In this study the mean of individual factors ranged from 2.677 to 3.494.

Factor Scores for Web Faculty and Non-Web Faculty

The total score for each participant was analyzed and a t-test was conducted with independent samples to compare web faculty and non-web faculty responses for each item and each of the five factors. The analysis was performed on all items, but only one had scores significantly different between web faculty and non-web faculty and was used in the final factor analysis (see Table 89).

Table 89

Independent T-Test for the Item Scores for Web Faculty and Non-Web Faculty

		Non-web Faculty (N=87)		*Web Faculty (N=101)*					
Item	#	M	SD	M	SD	df	t	p	M Difference
SC2	15	3.41	.657	3.63	.689	186	-2.23	.027	-0.22

Note: N=208. p <.05. Levene's test was not significant (f=.007, p>.935), and therefore item scores were normally distributed across the two groups. Items 4, 13, 16 and 22 were significant for Levene's test but are not included because the difference between web faculty and non-web faculty was not significant. In this analysis the web faculty status is the independent variable. Results from the 2-tailed analysis are reported. Only question number 15 was included in the final factor analysis and had significant findings.

Item 15 was in the sense of calling to the field component and asked participants if they agreed with the statement, "I find the dedication of people in this field is most gratifying." The mean for web faculty (M=3.36) was significantly higher than for non-web faculty (M=3.41). Therefore web faculty agreed more that web developers had a sense of calling to the field, based on this question (see Table 90).

Table 90

Independent T-Test Comparing the Means, Standard Deviation and Sums for Each Factor between Web Faculty and Non-web Faculty

	All Participants (N=208)			*Non-web Faculty (N-87)*		*Web Faculty (N=101)*				
Factor	M	SD	Sum	M	SD	M	SD	df	t	p
PS	12.9	3.62	2684	12.98	3.593	13	3.803	186	-.042	.966
SR	10.48	2.002	2180	10.68	1.82	10.64	2.072	186	.121	.904
PO	9.57	1.91	1991	9.54	1.964	9.7	1.926	186	-.572	.568
SC	9.84	1.63	2046	9.61	1.543	10.13	1.753	186	-2.141	.034*
AT	8.03	1.932	1670	8.09	1.969	8	1.99	186	.317	.751
Total	50.83	6.191	10572	50.9	6.05	51.48	6.418	186	-.633	.528

Note: The range for individual items was from 1=strongly disagree to 5=strongly agree. PS had five items on the survey and the other factors had four items. Levene's test was not significant so the distribution was not variable between the two groups. N=186 for all factors.

However, just one question does not reflect the factor. All three items together reflect the factors. Therefore, the scores for each participant were summed, for each factor and the total sum for all five factors. The analysis shows that the mean for belief in public service, professional organization as a major referent, and sense of calling to the field were higher for web faculty than non-wen faculty. Then an independent t-test was performed and the results showed a statistically significant difference on how web faculty and non-web faculty responded to one of the factors. The results showed that the web faculty viewed web development having a higher sense of calling to the field than non-web faculty.

The means of the individual items have already been compared as well as the means between the groups. Though we know there are differences between the means, this does not explain what the data means. The purpose of the research was to find out how the faculty view web development as a profession. The 17 items were scored with 1 being the lowest level of professionalism and 5 being the highest. The minimum value for an individual participant was 17, one point for each item. The total possible score for any one item was 5. However, the belief in public service factor had five items on the survey and the other factors had three items on the survey. Therefore, the maximum number of points was different with the first factor than the other four factors. The total possible for the five items for the first factor was then 25 points compared to 15 points for the other components.

Comparison of the means across factors was not acceptable because the total number of points was different for factor one and the other four factors. Therefore, the mean of the total score was calculated and can be compared across groups.

If a participant responded with neutral to each question, the score would be 51 or 50% of the total points. If the participants responded to agree for all questions, the score would be 68 or 75% of the total points. The relative percentage for each of the components was compared across factors.

The range of the means, for all participants is from 51.6% to 69.9% and for web faculty from 52% to 70.9%. None of the means are above 75% and none are below 50% (see Table 91).

Table 91

Comparing the Relative Total Score for Each Factor between Web Faculty, Non-web Faculty and All Participants

		All Participants (N=208)		*Non-web Faculty (N=87)*		*Web Faculty (N=101)*	
Factor	Range	M	%	M	%	M	%
PS	5 to 25	12.9	51.6%	12.98	51.9%	13	52%
SR	5 to 15	10.48	69.9%	10.68	71.2%	10.64	70.9%
PO	5 to15	9.57	63.8%	9.54	63.6%	9.7	64.7%
SC	5 to15	9.84	65.6%	9.61	64.1%	10.13	67.5%
AT	5 to15	8.03	53.5%	8.09	53.9%	8	53.3%
Total	25 to 85	50.83	59.8%	50.9	59.9%	51.48	60.6%

Note: The range for individual items was from 1=strongly disagree to 5=strongly agree. PS had five items on the survey and the other factors had four items. The percentage is based on the maximum points listed in the range.

Therefore, this study can say that all participants, and including the web faculty and non-web faculty subgroups, agreed that web development has a professional organization as a major referent, belief in self-regulation, belief in public service, sense of calling to the field and a feeling of autonomy.

These five factors are the attitudinal components of a profession according to Hall (1968) and therefore act as a proxy for the view of the participants on the professionalization of web development. Therefore, this study can report that web development is viewed as a profession.

Figure 6 provides a chart of the total points for each factor for web faculty, non-web faculty and all participants. It is clear in the chart that a sense of calling has the greatest difference between web faculty and non-web faculty. The important result though is that all three groups had mean scores above the neutral for all five factors.

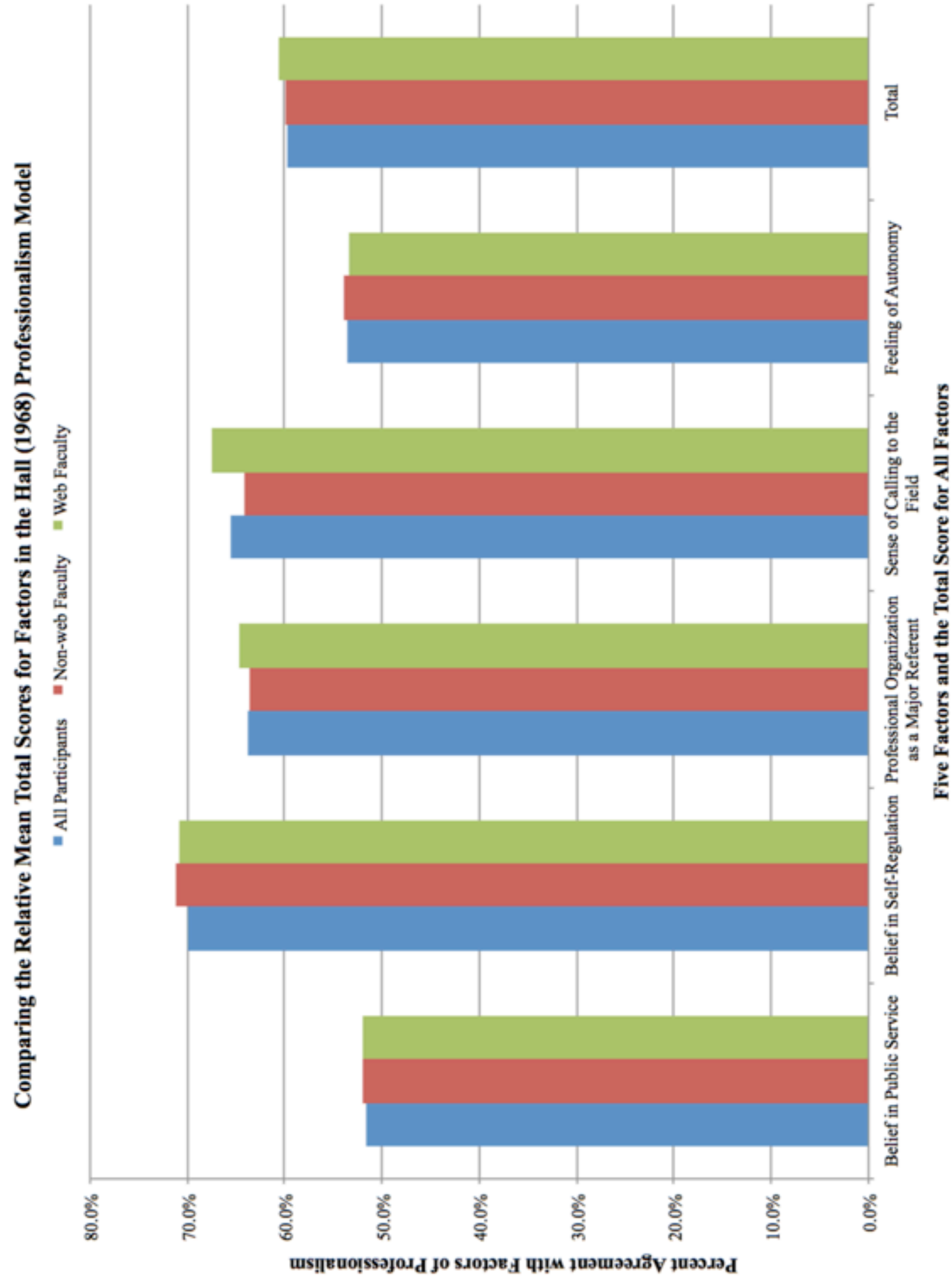

Figure 6. A Comparison of the total points for each factor for web faculty, non-web faculty and all participants.

Uncorrelated Score Testing with the Anderson-Rubin Method. Field (2009) recommends the Anderson-Rubin method to report uncorrelated scores and then further analyzed using other statistical tests such as t-tests. The method used to identify individual scores for each of the 5 factors was the Anderson-Rubin and then further analyzed with the Mann-Whitney U test. The scores for each factor for each individual were saved as variables with the data set. The purpose of the factor scores is to see if the participants have a higher factor score for each of the factors. Higher scores represent a greater support for the factors or the professionalization of web development. The mean scores for were obtained for factors and presented (see Table 92).

Table 92

Standard Deviation and Differences in Means for Individual Test Items for Web Faculty and Non-web Faculty Using the Anderson Rubin Method

		Non-web Faculty (N=87)		*Web Faculty (N=101)*		
Factors	Factor	M	SD	M	SD	Difference
1	PS	0.03	0.97	0.01	1.06	-0.02
2	SR	0.13	0.92	0.04	1.04	-0.09
3	PO	-0.06	0.95	0.09	1.06	0.15
4	SC	0.02	1.01	0.01	1.03	-0.01
5	AT	-0.14	1.00	0.13	1.05	0.27*

Note: N=118. No response=20. * The difference is calculated by subtracting the non-web faculty mean from the web faculty mean with the greatest difference between means for the feeling of autonomy factor.

The largest difference between the means for each factor is for factor five, feeling of autonomy. To determine if this difference of the means between these two groups is significant, a Mann-Whitney U test was completed.

Mann-Whitney U Testing. A Mann-Whitney U test was used to test if there was a difference in the five factor scores between the web faculty and non-web faculty. The results from the Mann-Whitney U test confirmed that the distribution for the scores for all factors were the same, except for factor five (see Table 93).

Table 93

Comparison of Web Faculty and Non-web Faculty Factor Scores Measured by the Mann-Whitney U Test

Survey Question Topic	U	p	r	Z	Web Mdn	Non-Web Mdn
1. Belief in public service	4395	.997	2972.54	.004	94.51	94.48
2. Belief in self regulation	4389	.90	1716.2	-.012	94.46	94.55
3. Use of the professional organization as a major referent	4762	.322	188.85	.991	98.15	90.26
4. Sense of calling to the field	4291	.783	357.85	-.276	93.49	95.68
5. Feeling of Autonomy	5142	.044*	312.54	2.012	101.91	85.90

Note: N=188. Missing 20 cases. Differences between 101 web faculty and 87 non-web faculty were measured with Mann-Whitney U tests. * Significant at p<.05. r= Z divided by the square root of N. Because there are two independent groups, the Mann-Whitney U test and the Kruskal-Wallis both return the same values. Therefore only the Mann-Whitney U test results are reported here.

The factor 5 represented the feeling of autonomy. This was not a surprise given the low factor mean (M=8.03, SD=1.932). Therefore, this study can report that the difference in the factor scores for the feeling of autonomy factor was affected of web faculty status (Mdn = 101.91) than for non-web faculty (Mdn = 85.90), U = 5,142 p=.044, r = 312.5, Z = 2.012.

This data analysis means that the higher scores for the sense of calling was significant between web faculty and non-web faculty. Web faculty had supported a higher sense of calling for web developers than non-web faculty.

Factor Scores Compared with the Gender of Participants

The data was reviewed for reliability and the factor scores were compared across web faculty and non-web faculty groups. But the factor scores could be used to also evaluate other factors that might impact the view or participants toward the professionalization of web development. The data was reviewed to determine if male subjects had a higher or lower or same value in professionalism as female subjects for each of the dimensions and for the whole survey. An independent t-test for each factor was completed to determine if the mean of the factor scores was different for the female and male group (see Table 94).

Table 94

Independent T-Test Comparing the Means, Standard Deviation and Sums for Each Factor between Web Faculty and Non-web Faculty

	All Participants (N=208)		*Female (N=78)*		*Male (N=109)*				
Factor	M	SD	M	SD	M	SD	df	t	p
PS	12.9	3.62	14.27	3.298	12.05	3.708	185	4.231	0*
SR	10.48	2.002	10.79	1.761	10.55	2.088	185	.841	.401
PO	9.57	1.91	9.9	2.004	9.4	1.857	185	1.735	.084
SC	9.84	1.63	9.88	1.872	9.89	1.536	145.009	-.021	.984
AT	8.03	1.932	7.51	1.734	8.42	2.065	185	-3.17	.002*
Total	50.83	6.191	52.36	6.187	50.31	6.149	185	2.239	.026*

Note: SC was significant for Levene's test at P>.035, F=4.56 and therefore the distribution of the means was not normal. * Factor PS, AT and Total were significant at P>.05.

As the table shows, there were significant differences between the mean factor scores for the PS and AT factor and the total factor scores, between the male group and female group. Female participants had a statistically significant stronger view in the belief in public service (M=14.27, SD=3.298) compared to male participants (M=12.05, SD=3.708). Male participants had a stronger view in the feeling of autonomy (M=8.42, SD=2.065) compared to female participants (M=7.51, SD=1.734). However, the female participants (M=52.36, SD=6.187) had a statistically significant stronger view of the professionalization of web development than the male participants (M=50.31, SD=6.149).

The percentages of the factor scores and total scores could be compared to all participants (see Table 95). As you can see, the female participants score higher than all participants in all factors except the feeling of autonomy (AT). The male participants score higher in all factors except the professional organization as a referent (PO).

Table 95

Comparing the Relative Total Score for Each Factor between Male and Female Participants and All Participants

		All Participants (N=208)		*Female (N=78)*		*Male (N=109)*	
Factor	Range	M	%	M	%	M	%
PS	5 to 25	12.9	51.6%	14.27	57.1%	12.05	80.3%
SR	5 to 15	10.48	69.9%	10.79	71.9%	10.55	70.3%
PO	5 to15	9.57	63.8%	9.9	66.0%	9.4	62.7%
SC	5 to15	9.84	65.6%	9.88	65.9%	9.89	65.9%
AT	5 to15	8.03	53.5%	7.51	50.1%	8.42	56.1%
Total	25 to 85	50.83	59.8%	52.36	61.6%	50.31	59.2%

Note: The range for individual items was from 1=strongly disagree to 5=strongly agree. PS had five items on the survey and the other factors had four items. The percentage is based on the total maximum number of points listed in the range.

This data analysis shows that there was a difference between how female and male participants viewed the professionalization of web development. Is was also important to see is that the range of the factor scores continues to be over 50% for all factors, signaling that both groups agreed that web development was a profession.

Yet while there is a difference in the means between the two groups, triangulating this data with a chi-square analysis shows that there was not a difference in the view that web development was a profession when the participants were asked directly. The analysis required removing the strongly disagree and disagree categories to correct for cells with less than five counts. The results showed that of the 78 female participants, 37 (47.4%) female participants agreed and 36 (46.2%) strongly agreed that web development was a profession. However, of the 109 male participants, compared to 54 males that agreed and 44 males that strongly agreed that web development was a profession. There was no statistical difference between the groups ($t=1.117$, $df=2$, $p=.572$). What this data analysis shows is that the view of professionalization may mean different things to participants. Therefore, WDPI was needed to determine if there was a difference between the groups in the individual and total factors of professionalization.

Summary

The views of participants on the professionalization of web development were measured using the WDPI derived from the Hall (1968) Professionalism Scale. Using principal component factor analysis, five factors were extracted that parallel Hall's five factors. However, eight of the original questions were removed. The reanalysis of the data showed that the PCA test was appropriate for the number surveyed and produced reliable results.

Similar to the other questions in the survey, the differences in the scores on the WDPI between the web faculty and non-web faculty were small. The responses were similar between faculty and non-web faculty with the exception of the feeling of autonomy dimension. The web-faculty responded to this question differently than the non-web faculty. The mean score for the feeling of autonomy was higher for web faculty than non-web faculty indicating more agreement with the autonomy role for web developers.

Chapter 4 Summary

This exploratory study cast a net to learn more about web faculty and the professionalization of the web development field. A number of findings were uncovered during this process. The participants were similar in demographics to the demographics of faculty working in higher education. However, their educational background was not strong in computer science or web development. Rather, many participants had formal education in non-computer science related fields. Very few had any formal academic degrees in web development and when they did, it was at the associate degree, certificate degree or certification level. The faculty experience in teaching in higher education was consistent between faculty and non-faculty. However, the participants work roles varied and a 110 participants had work experience in at least one of the three web roles.

The participants were divided based upon their teaching experience with both introductory and advanced web courses. Faculty who taught five more web courses and at taught least four courses five or more times, were classified as web faculty. Though this might appear arbitrary, this index was based upon analysis of the type and number of courses taught by the participants in order to obtain faculty who would have had breadth and depth of knowledge of the web field. That does not mean that the non-web faculty did have any experience teaching web courses. The non-web faculty may have taught a few web courses, but they did not have the same depth or breadth of experience a web faculty. Rather There were 20 participants who did not respond to the teaching web courses questions, and therefore could not be coded as web faculty or non-web faculty. The study showed that there were 101 web faculty and 87 non-web faculty. Therefore, the data sampling methods were able to provide an adequate representation of web faculty for this study.

The view of the structural components of the professionalization of web development was ascertained by direct and indirect means. Overwhelmingly, both web faculty and non-web faculty supported both computer science and web development as a profession. More participants supported web development as a profession than they supported computer science as a profession. However, when it came to the specific structural components, participants continued to have different opinions about the level of entry, entry level degree, department control of the web development curricula and oversight of the field by a professional organization. The majority of participants agreed that keeping up with technology is difficult, but they did not have strong agreement on whether the large online institutions impacted their ability to offer web development programs.

The participants as a whole supported the establishment of a code of ethics as well as the requirement of inclusion of web development in the Computing Curricula 2013. However, the difference between web development support for inclusion of the web development curricula was significant with more web faculty supporting the inclusion than non-web faculty.

Lastly, the views of participants of the professionalization of web development were ascertained indirectly using the WDPI, a modified scale of the Hall (1968) Professionalism Scale. After a thorough analysis using principal component factor analysis, eight items were removed from the scale. Tests were run to shot the reliability of the modified scale. What is important is that when the analysis was complete, the scores indicated that web faculty and non-web faculty had similar views for four factors, but not for factor five, feeling of autonomy. Web faculty had a statistically significant stronger feeling of autonomy for web development than non-web faculty.

In the next chapter, I will discuss these findings and how this study connects with other professionalization research and current practices. I will also discuss the limitations of the study and implications of future research.

CHAPTER V: DISCUSSION

This study proposed that web development is a field that may be in the process of emerging as a profession and subsequently surveyed faculty to learn about their views toward the professionalization of web development. This chapter provides a brief review of the research problem, methodology and a discussion of the limitations of this study. An overview of the research problem and methodology, key findings and implications of these findings, recommendations for practice and how these findings connect with professional literature, is also presented here, followed by recommendations for future research.

Review of the Research Problem

Before this study was conducted, there were no research studies describing the faculty who teach web development and their feelings toward the professionalization of web development. This study surveyed both web faculty and non-web faculty, to explore their experiences teaching web development and their attitudes about the web field as profession. The purpose of this study, therefore, was to help understand the perceptions of faculty toward professionalization of web development in order to identify potential factors, which have an influence on the process of professionalization as defined by the Hall (1968) model of professionalism. This study helps researchers understand where web development lies on the professionalization continuum and determine if web development is emerging as a profession.

This study sought to answer the following questions.

1) What does the profession of web development mean to faculty?

2) How is their view of the profession of web development consistent with the professionalization model as defined by the Hall's model of professionalization?

Review of the Study Methodology

To accomplish the study purpose, participants were selected from a list of higher education institutions that offered an associate degree or bachelor degree program in web development. Four institutions, which offer 21% of the programs and 48% of the graduates in web development, were not included in order to limit their impact on the study. Participant names from were retrieved through the university web sites by manually searching through department and program web pages including the information technology, web development, web design and graphics design, business technology and e-commerce, information systems and electronic media departments. Although 1997 invitations to participate in the study were emailed, a web link also provided participants the ability to invite other colleagues into the study.

Participants responding to the invitation completed the Web Development Professionalism Inventory (WDPI) using an online survey tool. The WDPI incorporated a modified version of the Hall (1968) Professionalism Scale along with additional questions to help clarify the participant views of the web development field. In addition to demographics, information about the faculty job roles, teaching experience, professional memberships and educational accomplishments were included. The participants were separated into web faculty and non-web faculty based on their experience teaching web courses.

Although 233 (11.7%) participants responded to the survey, only 196 (84.1%) of these participants completed the survey through part one of the survey and an 80.3% overall survey completion rate.

During the data analysis, 188 participants were split into two groups, faculty and non-faculty, based on their experience teaching 16 web courses. The survey data was then analyzed to compare the responses between these two groups. The majority of participants had never taught any of the nine advanced web courses but had taught may of the introductory web courses. The selection process was not arbitrary but based upon the participant's experience teaching web courses.

Key Findings

This study was an exploratory study to understand how faculty views the professionalization of web development. This exploratory study unveiled previously unknown information about the collective properties of faculty who teach web development and their views on the structural and attitudinal components of the professionalization of web development. Although not all of the findings were statistically significant, the knowledge gained from the participants' responses is valuable and can be used to help design future studies. Therefore both statistically significant and important findings are discussed in this section.

Demographics

The demographics of participants in this study continue to be similar to those for computer science faculty, with a higher percentage of males (52.4%) then females (37.5%) in this study and the overall mean age 50.2. The vast majority of participants were faculty (63.9%) and instructors (19.7%) divided across the ranks working full-time (80.1%) working at primarily public two-year institutions (49%), which may have an impact on the participant views about the professionalization of web development.

Below is a summary list of key findings from this study related the demographics of the participants and the web faculty.

- The mean age for web faculty (M=51.6) was significantly higher (p=.05) than for non-faculty (48.49).
- While there were no statistical differences between the gender frequencies for web faculty and non-web faculty. However, the trend to have more male faculty than female faculty existed in both groups.
- The mean total score for female participants was statistically significant higher in the belief in public service (M=14.27, SD=3.298) and lower for feeling of autonomy (M=7.51, SD=1.734) than male participants. Male participants were lower in belief in public service (M=12.05, SD=3.708) and higher with feeling of autonomy (M=8.42, SD=2.065).
- Female participants had a statistically significant higher total factor score than the male participants (M=50.31, SD=6.149).

Both gender groups responded similarly to the direct question that asked participants if web development was a profession. However, the differences between in the mean scores for male and female participants indicate that the two groups varied in their support for web development as a profession. The female participants had stronger support of web development as a profession as measured by the WDPI.

Education

Education of the participants and their view of the educational requirement of members of the field was important to study to understand how participants viewed the professionalization of web development. Below is a summary list of key findings from this study related to the education of the participants and the web faculty.

- Less than a majority of participants have a computer science related degree and less than one in four participants held a master's degree or bachelor's degree with a computer-related major.
- The over-whelming majority of participants have no formal education in a web-related area with only a small number (9.1%) with informal certifications or certificate degrees in a web-related area.
- More participants had certifications from CIW (N=5) than with WOW (N=3).

This study showed that the majority of participants were not formally educated in computer-related majors or web-related majors. This study showed that few participants (15%) had an associate's degree. Only two (1%) of the total participants with a web-related associates degree and 7.7% had a computer-related associates degree.

It was not unexpected that the majority of participants had a bachelor degree (75.5%) and master's degree (70.5%). However, no participants had a bachelor degree in a web-related field and only one participant (.5%) had a master's degree in a web-related field. One-fifth (20.7%) of participants had a bachelor's degree in computer science. The majority of majors for the participants' bachelor degrees were in other areas including math (4.8%) and education (4.3%). More participants reported a master's degree (70.2%) with a computer-related major (22.6) followed by education (17.3%). Likewise, participants who reported a doctorate degree (20.9%) had a computer-related major (7.2%) or education (6.7%). The data analysis shows participants lack formal education in web development or other web-related majors.

The vast majority of participants have not received any web-related professional certificates and certifications. Participants who have professional certifications in a web-related area, more often had a certification in the web development or web programming category. In contrast to their lack of formal education in web development, some participants (9.1%) have completed web-related certification programs (8.2%) or certificate degrees (3.8%) or a combination of both. More participants had certifications from CIW than WOW, but the difference was insignificant.

Work Environment and Work Experience of Participants

The results of the data analysis showed some support that web development is an interdisciplinary field. Some (10.7%) reported working in a web-related department and the majority (61.6%) worked a computer-related department. However, this study also showed that 54 (26%) participants worked across departments. The percentage of web faculty (64.8%) that worked across two or more departments was greater than non-web faculty (35.2%). There was a borderline significant difference between web faculty and non-web faculty who worked for one or more than one department (χ^2=3.749, N=188, df=2, p=.053) supporting the concept that web development may be an interdisciplinary field.

Below is a summary list of key findings from this study related to the work environment and professional work roles of the participants in this study:

- A fourth of participants (26%) reported that they worked across two or more departments, which may be a characteristic of the interdisciplinary nature of the web development field.
- More web faculty worked for one or more than one department than non-web faculty (χ^2=3.749, N=188, df=2, p=.053).
- More participants had experience in a web-related role (52.9%) compared to networking experience (28.4%)

The institutions where the participants worked ("survey institutions") were representative of the 227 web institutions that offered web development associate and bachelor degree programs in 2010. The 208 participants worked at 86 (37.9%) of the 227 web institutions. The majority (N=65) offered associate degree programs and 18 offered bachelor degree programs in 2010. The survey institutions came from 37 states with the highest participation from the Far West and the Great Lakes regions. The majority (62%) were public 2-year institutions. A third (38%) had enrollments between 1,000 and 4,999 students and a fourth (24.5%) came from larger institutions with enrollments between 5,000 and 9,999.

More participants had more experience in computer programming (45.2%) than any other individual role. Over half (52.9%) had professional work experience in either computer programming or computer networking roles or both roles. Likewise, the majority of participants (52.9%) had some experience in one or more of the web-related roles. Participants had some web development experience (42.3%) as well as experience as a web designer (38.5%).

Teaching Experience

The sampling method was able to reach faculty that have work experience across web-related roles and have experience teaching web courses. The average number of years teaching in higher education for all participants was 13.64 (SD=8.966). However web faculty have been teaching longer in higher education than non-web faculty.

The list of courses included in the survey was acceptable for this study. At least one or more faculty had taught at least time, each of the 16 web courses. One course not included in the original 16 courses had been taught by participants (22%). This course was listed as accessibility, usability, architecture or universal design. Future studies may want to include this web course.

The selection criteria used to define web faculty was that the participant had to have taught at least 5 web courses at least one time, and experience teaching at least 4 web courses for a total of 5 or more times or taught 7 or more different web courses. Based on the selection criteria the participants were classified as web faculty (N=101) and non-web faculty (N=87).

Below is a summary list of key findings from this study related to the teaching experience of participants and web faculty.

- The number of years web faculty were teaching in higher education (15.26) was significantly higher (P=.004) than for non-web faculty (11.56).
- The majority of participants (75%) had taught at least one of the 16 we courses at least one time.
- Over one-fourth or more of participants have taught each of the introductory web courses, at least one time.
- More participants are teaching introductory web courses than advanced web courses.
- The most commonly taught introductory web courses included Creating Web Pages with HTML (53%), Introduction to the Internet (49%) and Creating Web Pages with Web Editors (43%).
- The most commonly taught advanced web courses were Web Database Programming (35%) and Web Server Programming (30%).

A very thorough analysis showed the participants and web faculty in this study had both teaching experience in higher education and experience teaching introductory and advanced web courses.

There were significant findings in the age of the participant and the number of times that the participant taught an introductory web course. Older participants, tended to teach four introductory courses more then younger participants. As described in Chapter 4, these four courses included Creating Web Pages with HTML, Creating Web Pages with Web Editors, E-Commerce or E-Business and Introduction to the Internet.

There was a correlation with the number of years the 186 participants were teaching in higher education and the number of years working in computer programming (r=.201, p=.006), web development (r=.224, p=.002), and web design(r=.161, p=.029). There was a correlation with the number of years the 191 participants age and the number of years working in computer programming (r=.284, p=.000), web development (r=.253, p=.001), and web design(r=.147, p=.05).

There were many significant findings showed participants with experiences in certain roles, tended to teach some courses more than faculty without experiences in those roles. This was important to look at to understand the background of the participants teaching these courses. Below is a summary list of key findings from this study related to the teaching experience and work experience of participants and web faculty. To provide a clear understanding, the statistical results are not repeated from Chapter 4.

- The number of years that participants worked in computer networking was positively related with the number of times they taught seven of the nine advanced web courses.
- The number of years that participants worked in computer programming was positively related with the number of times they taught seven of the nine advanced web Client-side Programming, E-Commerce or E-Business, Web Database Programming, Web Security, and Web Server Programming.
- The number of years that participants worked in "other roles" was inversely related with the number of times they taught Client-side Programming, Creating Web Pages with HTML, Web Database Programming, and Web Server Programming.
- The number of years that participants worked in web development was positively related with the number of times they taught all seven introductory courses and eight of the nine web courses. The web course not correlated was Web Graphics Marketing.
- The number of years that participants worked in web design was positively related with the number of times they taught all seven introductory courses and seven of the nine web courses. The two web

courses not correlated were Web Server Management and Web Server Programming.

- The number of years that participants worked in web administration was positively related with the number of times they taught five introductory courses and seven of the nine web courses. The two web courses not correlated were Mobile Applications and Social Networking.

Research Questions

The professionalization status of Web development and other fields can be analyzed using many different theories and methods. The data analysis helps shed light on how web-faculty and non-web faculty view the professionalization of web development. The results of the data analysis tie back into the two research questions. To gather accurate data on the concept of professionalization, the study gathered some data using multiple methods. The participants were asked multiple questions on some of the structural aspects of a profession. The participants were also asked using direct questions, if they believed web development was a profession. The participants also completed the Hall (1968) Professionalism Scale to understand the attitudinal components of the professionalism.

What Does the Profession of Web Development Mean to Faculty?

The participants were asked if computer science and web development were professions. For both questions, there was no difference in the responses between web faculty and non-web faculty. However, what is really important is that more of the participants agreed or strongly agreed that web development (84.6%) was a profession than computer science (72.1%). Web faculty are teaching web-related courses and advancing the core body of knowledge as new curricula is introduced and they support the requirement of web development in the Computing Curricula 2013 standards and the need for a code of ethics.

Although participants agree that web development is a profession, they do not appear to be supporting some of the requirements for web development to transition to a full profession. For example, only 25 out of 101 web faculty, belong to a web-related professional organization. Only a small number of participants have any formal education and when they do pursue informal certification or certificate degrees in web development they choose programs offered by different professional organizations and vendors and each program has their own certification process and standards. The web faculty cannot even agree with a clear front runner for a single professional organization to speak for the profession. Faculty supported an associate degree in web development as a beginning step in the career of a web developer, but also supports portfolios and 2- to 4-year certificate programs. It is unknown why more web faculty chose not to support the baccalaureate degree as an entry level for web developers.

Faculty View of the Web Development Profession

Hall (1968) reviewed professions based on structural and attitudinal components. This study shows that web development meets some of these requirements.

Structural Components. Hall (1968) viewed the structural components as: (a) full-time employment status, (b) training which can include formal education programs and help define the core body of knowledge, (c) a professional association which controls entry into and out of the field, and provide the standards of practice, and (d) a code of ethics.

Full-time employment status. While this study did not address the employment status of web developers. It is not known if the participants would have this information. However, this information was obtained from the government web site and discussed in the literature review. The U.S Bureau of Labor and Statistics (2013) job data in the Occupational Outlook Handbook shows that web development (21.7%) has a faster than average (14%) growth rate with a low unemployment rate (4.2%). The job outlook has been updated in 2014 to show that there are 141,000 jobs not counting other professions and the job growth from 2012 to 2022 is projected at 20% (Statistics, 2014) with a median pay of $62,500 per year.

Surveys have been completed regularly of the web developers through organizations such as WOW and A List Apart magazine. The A List Apart survey results are published online and freely available ("Findings from the A LIST APART Survey, 2011," 2012). It is important to recognize that there are differences between the faculty and participant population and web developers working in the industry. The mean web faculty age is older than web developers, according to the 2011 survey results that show 92.9% o the 14,747 responses were from web developers that were between 19 and 44 years old. While web faculty are more likely to have genders closer to the population norms, 81.6% of web developers are male. The A List Apart survey also reported 74.3% participants felt that there was probably not or definitely not an age bias in the field, and 68% said there was definitely not a gender bias in the field.

Similar to the breadth of web courses web faculty teach, web developers are split between the roles of developer (39.4%), web designer (10.9%) and other roles ("Findings from the A LIST APART Survey, 2011," 2012). This study focused on faculty in the

United States and the A List Apart reported 60.1% of the developers in their study were from North America and Central America with 31.3% from Europe. The top country represented was the U.S.A with 52.7% followed by the Kingdom of Great Britain and Northern Ireland (11.5%) and Canada (6.6%).

Although the larger number or participants in this study reported the minimum degree should be an associate's degree, the A List Apart (2011) study did not separate the diploma, associate and bachelor degree programs in their final report. However, 14.1% reported they did have a master's degree. In this study web faculty agreed that there was some autonomy with web development. The A List Apart study reported 29.4% were either freelance workers or self-employed and another 45% worked in companies with less than 25 employees. The majority (52.3%) worked between 40 and 49 hours per week with 18.9% working above 49 hours per week. There was a skewed number of workers (31%) that had been in the field for over 10 years and 58.5% worked in their current job for 2 or less years. In other words, most of the web developers have changed jobs. Most of the web developers (60.6%) reported that 'nearly all' of their work was web-related. Additional results were presented about salary and working conditions.

The A List Apart (2011) survey results show that web development is a thriving field in the U.S. and in some ways, web developers are similar to web faculty but they are certainly very different in their demographic characteristics. Given the data from the U.S. Bureau of Labor and Statistics (2014) and this survey, web development appears to not only provide full-time employment, but is in a growth pattern and will continue in this direction for at least a decade.

Training through formal education programs and core body of knowledge. This study shows that formal education is being offered in higher education institutions. Web faculty taught a variety of courses multiple times. The web courses and degree-based programs are a good place to start in the supporting that web development has a core body of knowledge. However another part of the generation of this knowledge includes scholarly research, which was not addressed directly in this survey.

Participants were asked if web development should be a required knowledge area within Computing Curricula 2013. While there was strong support among participants, there was a statistically significant difference between how web faculty and non-web faculty responded to this question (χ^2=6.651, N=192, df=2, p=.036). Web faculty (59.4%) agreed or strongly agreed more, that web development should be required in Computing Curricula, than non-web faculty (40.6%).

Participants were asked to choose a department to have oversight of web development programs. There was no difference in how web faculty and non-web faculty responded. However, some participants (10.6%) suggested that the curricular control of web development should be interdisciplinary.

Participants were asked if they thought large online institutions affect their ability to offer web development programs. The participants did not have strong feelings about this statement. While some participants disagreed (27.4%), others agreed (28.3%) and others remained neutral (27.8%). There was no difference in how web faculty and non-web faculty responded. Because the number of graduates and programs was taken from the 2010 IPEDS data set, it is unknown if this list is reflective of the current program offerings. As the number of users and web sites grow, and the demand for web developers grows, perhaps more institutions are offering web development. That could explain why participants did not feel strongly for or against the statement.

Participants were asked what should be the minimum degree level for an entry-level web developer. There was no significant difference between which level chosen by web faculty and non-web faculty. The majority of participants (54.8%) chose the associate degree (28.4%) or bachelor degree (26.4%) as the minimum degree for a web developer. However one-fifth of the participants (22.1%) chose a 2-4 year certificate degree as the minimum degree for a web developer. There was no difference in how web faculty and non-web faculty responded.

Participants were asked what was the best preparation for a beginning career in web development. There was no difference in how web faculty and non-web faculty responded. Overall, creating a portfolio (36.1%), completing an associate's degree (25.5%) and completing a bachelor's degree (17.3) were ranked the highest.

What is really illuminating, is that the current web site for the Occupational Handbook was updated in January 2014 and indicates that the entry level degree for a web developer is an associate's degree (Statistics, 2014).

The majority (65.9%) of participants agreed (46.2%) or strongly agreed (19.7%) that faculty is having difficulty keeping pace with web development technologies. There was no difference in how web faculty and non-web faculty responded.

The largest group of participants selected creating a portfolio (36.1%) as the best preparation for an entry level web developer, followed by an associate's degree (25.5%). There was no difference in how web faculty and non-web faculty responded.

A professional association controls membership and provides standards of practice. The survey did not ask participants directly if they supported the need for a web-related professional organization or if there should be one or more web-related professional organizations. No professional association controls entry into the field. However, some of the web-related professional associations do provide standards. The key findings from this study related to the membership of participants, in this study are:

- Both web faculty and non-web faculty (36.1%) chose the W3 to represent the web development profession.
- Web faculty tended to participate more in web professional organizations than non-web faculty (χ^2=12.588, df=1, p=.000).
- The professional organization with highest level of participation for all participants was the ACM (20.2%) followed by IEEE (5.3%) and IEEE-CS (5.3%).
- Participation in web-related organizations was lower than other professional organizations with the largest membership in the W3 (6.7%) followed by WOW (6.3%), CIW (1.9%) and IWA (1%).
- Most participants who belonged to a web-related professional organization only belonged to one web-related professional organization (12%).
- There was no significant difference between which professional organization chosen by web faculty and non-web faculty.

There was not wide participation in professional organizations or web-related organizations. Participants can demonstrate their ability to meet standards defined through professional organizations through the completion of their certification programs. However, there are multiple web-related professional organizations. Few of the participants in this study are members of any web-related professional organization or have taken the step to complete a certificate degree or certification program.

Code of ethics. Currently, the W3C, Adobe and the WOW do not have a code of ethics for web development practitioners, but ACM and IWA does. The participants were asked if the web development field needed a code of ethics. There was no difference in how web faculty and non-web faculty responded. Both groups overwhelming agreed (40.4%) or strongly agreed (46.2%) that web development needs a code of ethics. This study did not ascertain if participants knew if there was a code of ethics or were aware of the code of ethics from ACM or IWA.

Attitudinal Components. The attitudinal components defined by Hall (1968) include: (a) use of the professional organization as a referent, (b) a belief in public service, (c) belief in self-regulation, (d) sense of calling to the field, and (d) autonomy.

Principal component analysis reliably ($\alpha = .699$) identified the five factors which were measured using a modified version of the Hall (1968) Professionalism Scale that contained 17-ordinal questions. The Chronbach alpha can be used to measure reliability with factor analysis (Group, 2014; Schwab, 2002). The initial factor loading for Hall ranged from .01 to .71 and for Snizek .07 to .73. For this study the initial factor loadings range from .065 to .803, necessitating the removal of eight items. The Cronbach alpha of the final factor loadings for individual items (.563 to .813) in this study was comparable to for the Hall sample (69 to .76) and Snizek sample (.58 to .74).

The results from the Mann-Whitney U test confirmed that the distribution for the scores for all factors were the same, except for factor five, feeling of autonomy. The difference in the factor scores for the feeling of autonomy factor was affected of web faculty status (Mdn = 101.91) more than for non-web faculty (Mdn = 85.90), U = 5,142 p=.044, r = 312.5, Z=2.012.

Summary

This study shows that although faculty are older and more experienced teaching in higher education, have similar educational backgrounds to non-web faculty with respect to web development. Web faculty and non-web faculty both lack formal education in web development and largely inactive in web development professional organizations. However, web faculty had experience in all three web-related roles as well as experience in teaching web courses. Web faculty indicated that keeping up with the changing web technologies is difficult.

This study showed that both web faculty and non-web faculty view web development as a profession but do not support all the aspects of professionalization required to solidify web development as a profession.

Web faculty support the structural components of a profession such as the need for a professional organization to lead the profession, the inclusion of web development in the Computing Curricula 2013 standards and a code of ethics. However, they continue to support the associate's degree as the minimum level for web development education or a portfolio. The literature search results show that web development does have full-time employment and a core body of knowledge.

Faculty had different views on who should oversee web development programs with some suggesting interdisciplinary oversight of the program. Web faculty did not differ from non-web faculty in their support for a web-related professional organization. The highest number of memberships in web-related professional organizations was for the W3 and WOW. However, the participants hold certifications from both WOW and

CIW. The participants continued to support that the W3 best represents web developers, followed by WOW.

Faculty attitudinal views toward the professionalization of web development were very positive. For all five factors, the mean for both web faculty and non-web faculty was between 51.6% and 70.9%, indicating agreement with web development as a profession. Web faculty and non-web faculty, agreed that web development has a professional organization as a major referent, belief in self-regulation, belief in public service, sense of calling to the field and a feeling of autonomy. Web faculty believed web development had a statistically significant stronger sense of calling for the field than non-web faculty.

Implications of Research Findings

There are several implications of the study findings. First, this study identified two methods that can be used to identify web faculty, experience in web-related roles and experience teaching web courses. Because the purpose of the study was to look at how other web faculty view web development as a profession, it was important to identify web faculty, and not just faculty with web-related professional experiences. This study used a methodology that was successful at locating faculty who teach web courses.

Both web faculty and non-web faculty perceive computer science and web development as a profession. However, it is not known how the participants define a profession. From their responses, they appear to support the professionalization of web development, but do not take part in professional activities such as membership in web-related professional organizations or formal and informal education in web development.

Although the data analysis shows the highest degree earned is similar for web faculty, including at the doctoral level. However, both web faculty and non-web faculty, do not widely support a bachelor's degree as the entry level of web development. A vast majority of participants have a master's degree and some had a doctorate. I would have expected to see faculty be more supportive today of a bachelor's degree as an entry-level degree for web developers. A bachelor degree would provide more opportunity to offer more web courses to students than an associate's degree. The ability to offer more courses would be desirable because web faculty are already teaching the 16 web courses listed in the survey, and additional courses not on the list. Perhaps faculty are not able to offer more courses because the study showed that they feel that keeping up with web development is difficult. Perhaps because the majority of participants in this study work at 2-year public institutions has an impact on their choices. All of this is speculation. It is not known why faculty do not support the bachelor degree as the entry level for web development.

Discussions of the Findings Related to Literature

There are key areas that connect with current literature involve the body of knowledge, the oversight of the academic programs, code of ethics, web faculty qualifications and web professional organization.

Body of Knowledge. Across literature, many theorists cited a core body of expert knowledge and skill as a primary factor in any profession. Coyle's literature search concluded that the core body of knowledge was "an essential attribute to the profession" (2004, p. v). This study showed that the web courses listed on the survey, which were identified through the literature review, were reflective of the courses being taught in practice with the exception of the course on accessibility, usability, architecture and universal design. There are two main themes that connect with the concept of a core body of knowledge in web development that came up in this study.

The first theme is about identification of the specifics of the core body of knowledge. This study did not differentiate or describe the content within the web courses. The content of individual courses have been described in literature (Verbyla & Roberts, 1998; E. L. Walker & Browne, 1999) and content has been also integrated within other courses (Klassner, 2000). Other authors such as (Harmeyer, Tupper, Beck, & Sorkin, 2001) brought the internet and multimedia together from a non-traditional perspective and offered courses in a discipline called Internet and Multimedia Technology.

Although some authors felt that there needed to be consensus on this content or the organization of the curricula (Rudy et al., 2002). This study did show consensus because, most of the web faculty had taught several of the beginning web courses. Over a third of participants have taught Client-side Programming (40.9%), Creating Web Pages Web Editors (42.8%) and Web Graphics Design (34.6%). Some (10.1%) participants have taught at least one advanced course seven or more times. But this survey did not define what was taught inside the actual courses across web programs.

Logan (2005) did complete a beginning analysis of courses and topics but the list was informal based on public information. A syllabus repository system in computer science was attempted and successfully collected and automated the process of analyzing syllabi (Tungare et al., 2007; Yu et al., 2007). Using a syllabus repository that contains course learning outcomes and textbook information, a beginning of a web content system may be possible. From that, a more detailed model can be derived for developing courses and web program models.

The second theme involves the need for a comprehensive web curriculum. Logan (2005) identified seven courses that could be a practical model for a web development curriculum. However, as seen in this study, web faculty are teaching up to 16 different web courses which is enough to create a major in a bachelor degree program. However, the data showed that many of the faculty was from 2-year public institutions. Faculty may fear that requiring a bachelor degree as an entry level degree might impact the enrollment in their associate's degree and certificate programs. Even the W3 HTML 5 Working Group has many things to complete before the final approval of the HML 5 standards is completed. They have found and dealt with over 600 bugs and currently have 10 open issues, 300 bugs left to address and 11 formal complaints. The complexity is something that even the experts need time to deal with.

Bunch (2009) showed that you could create a bachelor degree program, which is consistent with the Computing Curricula 2005 standards. However, with the release of Computing Curricula 2013, web development is now included in an optional knowledge area. This study shows that not only web faculty but also non-web faculty overwhelmingly support that web development be a required knowledge area within the Computing Curricula 2013. Therefore, there is a need for a requirement of web development within the computer science curriculum.

Programmatic Oversight. The web faculty and non-web faculty agreed that web developers had a belief in self-regulation. Faculty could not agree with who should maintain the oversight of web development programs. Computing Curricula 2013 moved web development and mobile development out from net-centric computing because they have become more common and distinct. Certainly Computing Curricula 2013 recognized changes in the demand for web and mobile applications and even included web content in the information assurance security knowledge area. Computing Curricula 2013 and the past versions, have been used for many years to provide a framework for computer science curricula. The Computing Curricula is supportive of a model where programming skills are taught independent of the platform. This study showed some participants felt that the web development curriculum should be managed by computer information science (26%) and other felt that should be an interdisciplinary responsibility (10.6%) and others supported graphic arts (12.5%). There was no consensus as to which department should maintain the oversight for web development. We can see that web professional organizations like WOW and CIW and vendors such as Adobe, have set standards for web-related content and certifications.

If computing science is to maintain oversight, then web development standards become more critical to include in Computing Curricula standards. WOW performs annual surveys with its' membership to identify trends in web development careers. It is not known if this curriculum is adequate for web developers or what the career options in today's marketplace are for computer science majors with little or no web development education and skills. Is a computer science student with some web development training a better option for the employer than a web developer with a degree in web development?

It would be a drastic recommendation to pull web development content completely of Computing Curricula 2013. But is this curricula, preparing computer science graduates, to be able to create and maintain complex web programs in companies today? The study can support that faculty feel there is a need for requiring web development in the Computing Curricula 2013 standards.

Code of Ethics. This study showed that a code of ethics is needed for web development but does not exist within the W3 or WOW. Hall (1968) included the code of ethics as a major referent as a factor in the professionalization model. Is this because the ACM and IWA already have a code of ethics? Does the need for a code of ethics depend on where the professional works or the degree of autonomy of the practitioner? Doctors and nurses may work in hospitals, health care centers and yet both professions have a code of ethics. Millerson (1985) showed many theorists supported inclusion of ethics in their professionalization theories. Even (Abbott, 1993; Andrew, 1998)that was critical of the trait theories, supported inclusion of a code of ethics. If the WOW and the W3 are the lead professional organizations and do not have a code of ethics for the web developer role, can web development still become a profession? Can a code of ethics be developed outside the professional organization? Many theorists would disagree because the need for the code of ethics ties into the autonomy of the practitioner as well as the control over entry into the practice (W. Goode, 1960; Greenwood, 1957; Larson, 1977; Wilensky, 1964b). This study found that both web faculty and non-web faculty agreed that web development did have a feeling of autonomy. Because there is no control over entry into practice for web development, there is no way to enforce a code of ethics. Hall (1968) referred to fields without all of the required components of professionalization as marginal professions. Without a code of ethics, will web development remain a marginal profession?

Web Faculty Qualifications. There were two main themes that came out from this study about the web faculty education. The first theme was that the majority of web faculty in this study did not have formal degrees, certifications or certificates in web development but did have professional experience in web-related roles. Like Chan (2005) this survey inquired about the work experience and levels of experience of the participants. The participants were asked about their experience in teaching in higher education, teaching beginning and advanced web courses, and the number of years of experience in three web-related roles. This comprehensive approach provided this study with rich data about the participants.

Consistent with Smith (1988), I found the majority of the participants had majors outside of computer science. The Taulbee Survey only focuses on institutions that provide doctoral degrees in computer science and related areas (Zweben, 2012). However, only a small portion of the participants in this study had a doctoral degree.

This study shows that many of the web faculty had worked in web-related professions and that is likely where they gained their expertise in the content areas that they teach. This was not unexpected because there were no bachelor degree or master's degree programs in web development. If faculty 'learn web development on the fly', then perhaps that might be one reason they don't support a bachelor's degree in web development as an entry level degree for web developers.

The second theme focuses on how the faculty is able to keep up with the constant changes in the body of knowledge that they are responsible to teach. Abbot (1988) felt that "changes in technology provide most new professional tasks" . As a result of these changes, the core body of knowledge within computer technologies is frequently changing (Tabers, 2002). Tabers study of computer information technology faculty showed the need for faculty to engage in ongoing professional development. Although this study showed faculty are expanding their offerings of web courses, but have not expanded their own formal education in web development. The achievement of academic degrees may not indicate the participants experience or informal education in web development. The survey did not ask participants if they engaged in ongoing professional development such as continuing education workshops, conferences or independent study. WOW sent out a link to a survey in 2014 through the WOW LinkedIn web site for educators and inquired as to which topics they "are interested in." The results are not yet publicly available. However, this does not help identify how web faculty keeps up with new web technologies. While faculty are supposed to be both scholars and teachers (Young, 1987) how are faculty able to balance these job requirements with their need to spend ongoing time in professional development? This study did not look at how faculty are meeting their professional development needs.

The faculty in this study agreed that they have difficulty keeping up with the web technology changes. While there have been studies about the content in individual web courses, and web curriculum (Logan, 2005), there are no studies showing that the extent of content in web courses that changes over time. It is shown in the literature search that the technology and tools change, but how that impacts the course development process specifically for web faculty has not been researched. Do web faculty wait to teach new concepts until they have mastered the content or do they learn as they teach? How much time is spent learning new content areas and is this comparable to faculty from other disciplines? How are web faculty compensated for the additional workload to keep up with the content changes in their fields? What impact does this have on student learning, employment opportunities and web site security? This study showed that the problem of keeping up with technology still continues today for faculty.

Web Professional Organization. Hall (1968) included the presence of a professional organization as a major referent as a factor in the professionalization model. Of course it was not unexpected to see web faculty participate more in web professional organizations than non-web faculty. However, 75.2% of web faculty did not belong to any web professional organization.

Both web faculty and non-web faculty agreed that there was a professional organization as a major referent for web development. This study showed that there was not wide membership in web development professional organizations, but they both supported the W3 as the leading professional organization. Yes, the W3 is not listed on the contact page for other organizations for web developers (Statistics, 2014).

Summary. Hall (1968) provides the framework for understanding the structural and attitudinal components of a profession. The data analysis from this study clearly supports that the participants as well as web faculty view web development as a profession according to the Hall (1968) model of professionalization. However, key components such as a code of ethics, and control of the entry into the profession, are missing that prevent web development from moving from a field to a profession.

Recommendations for Practice

Body of Knowledge. Given the strong support for the inclusion of web development as a required area within Computing Curricula 2013, the study results should be disseminated to other professionals who participate in the process of determining the inclusion of content in the standards.

The other recommendation is that a larger study of the web curricula be conducted. The study would need to include programmatic information as well as course level content.

In the past, the educational requirement was flexible, allowing for companies to recruit web developers that varied in their level of education from a high school diploma to a bachelor's degree (U.S. Bureau of Labor Statistics, 2012). Just two years later, the Occupational Handbook has been updated to indicate that an associate's degree should be the minimum level of education. Educators, professional organizations, and educational institutions that offer certificates, certifications should be informed of this change. Educational institutions should plan a transition of their programs from certificate-based to degree based programs. This does not preclude institutions from offering certificates or certifications. However, the advertising of these programs should be clear that the recommended minimum education based on the current employment data is an associate's degree.

Code of ethics. The obvious recommendation is that the professional organizations should have a code of ethics, specific to web development. Without a clear code of ethics, supported by the primary professional organizations for the field, employers or the government needs to take on that role to ensure that the consumers are protected. With no ethical code of conduct web developers could partake in activities, which might be legal, but not necessarily good business practices and leave consumers even more concerned about their data protection and more skittish about completing web-based transactions. Unfortunately, similar to faculty, government regulations may not be able to keep up with the technology. Employers may have conflicts of interests where their profit margins may dictate the job descriptions and work of the web developer. Consumers might not even be aware that they are visiting a web site that might contain malicious code or is involved in identify theft. So, what is the solution? One possibility might be to bring up the education of consumers and increase the availability of software that can be used to protect consumers from web sites and companies that might take advantage of the consumer. Uniformity on how security and privacy information could be standardized across browsers to help consumers identify when data privacy or security issues may arise with a particular web site.

Web faculty education. This study showed a need for formal education, certifications or certificate degrees for web faculty. However, this study also showed how difficult the faculty had with keeping up with web development technologies. The literature showed that there are already numerous certifications and certificate programs available.

This study did show that faculty are qualified to teach web courses based on their professional experience but not formal education. Faculty are teaching web courses without formal education, certifications or certificate degrees. To what extent they are participating in professional development and ongoing learning with respect to web development is unknown.

With the security, financial and privacy risks that are inherent with web applications, are the faculty prepared to teach the skills necessary for web developers to build secure web sites? This study did not attempt to link the faculty lack of education in web development with an increase in security risks to the nation. However, it is true that many web sites today lack the security needed to protect the needs of the individual and society. Is there a linkage with the web developers education, job role and supervision, or are web developers not acting 'professional' taking charge to meet some web development standards or other industry standards.

If faculty do not have the academic credentials to teach web development, are the web faculty not going for continuing education because of a lack of time or money? One of the potential options is to look at compensation for their ongoing training. The trend in research funding is toward projects that can become sustainable on their own, after the research funding has been exhausted. Whatever solutions are proposed, that might be required to be one of the considerations.

Professional Organizations. This study showed that web faculty and non-web faculty support having a web development professional organization, even if they disagree with which one should take the lead. However, their lack of participation in the professional organization was not a surprise. Membership in the W3 is expensive, costing $7,900 USD annually for non-profits organizations in the U.S. that make less then 50 million dollars (W3, 2014b). Organizations outside the U.S. are charged different rates. Even small organizations with ten or fewer employees only get a five thousand dollar discount for the first two years. Individuals cannot join but may participate in working groups as invited experts. Therefore, it was not unexpected to see 6.7% of the participants with memberships in W3. Close behind in the number of memberships was WOW. WOW offers student memberships at a discount ($39) compared to educator ($49) and individual ($69) rates.

Limitations of the Study

The study limitations include sampling limitations, instrumentation and operational issues. Each of these are discussed.

Sampling Limitations. The literature search showed that there were 227 institutions that offered bachelor and associate degrees, or both degrees. The data analysis showed this study represented participants at least 86 of these institutions (Some of the institutions where participants worked was unknown). The survey did not include the large online universities, referred to as the Quad schools in this study in order to get a broader perspective of the views of faculty across institutions and regions. However, given the large numbers of students that graduate from their web degree programs, their views might have an impact on the professionalization process. Therefore, finding out their views and comparing them to the results in this study might help explain why there is not strong support for a bachelor's degree in web development.

The majority (52%) of 2017 names were retrieved from department level related web pages. Of the 2017 potential participants Only 64 (3.2%) were listed in a department or program with the word "web" in the name. Although 86 (37.8%) institutions were studies, there were 141 institutions not represented. It is unknown if this sampling method is providing adequate representation of the population. Furthermore, because the number of graduates and programs was taken from the 2010 IPEDS data set, it is unknown if this list is reflective of the current program offerings. As the number of users and web sites grow, and the demand for web developers grows, perhaps more institutions are offering web development. That could explain why participants did not feel strongly for or against the statement that asked participants if they felt large online

Although the sampling method was random, as Patton (2007) recommends, caution needs to be used when generalizing the results to the population of web development faculty and programs. In this study, the results cannot be generalized to the entire population of web faculty and institutions that offer web development programs (Burns and Grove, 2005). However, the results still tell the story about a field that is emerging as a profession and gaining support.

Instrumentation Limitations. The instrument used was created by Hall (1968) and later modified by Snizek (1972). Snizek did suggest that researchers should throw out half of the original questions. The WDPI consists of a subset of 25 questions based on Hall and Snizek, which was narrowed to 17 questions during the principal component analysis. Some of the questions in the original Hall Professionalism Scale focused on professional activities such as reading professional journals or attending professional meetings at the local level. In today's society, these might be different for some of the newer professions. Information dissemination between colleagues can occur through other media such as webcasts and online conferences. In the past, local level professional meetings may have been important. However with the web and mobile computing, distance does not have to play a major role in communicating with colleagues. This study stayed close to the original questions, to be able to provide some comparisons with other studies. But, in doing that some of the professional behaviors may have been underrepresented.

The instrument was analyzed using principal component analysis to identify items that were reliable, and removed responses which did not reliably reflect the factors being studied. Wimmer (2009) removed 10 items but still continued to have low reliability scores for professional organization as reference and feeling of autonomy but also had a small population (N=44). In this study, eight items were removed and the two lowest reliability sores were feeling of autonomy and sense of calling to the field. Wimmer (2009) suggested that only factor in the professionalization model that was consistently reliable was the belief in self-regulation. In this study, the belief in public service was consistently reliable with belief in self-regulation a close second. The number of items for each factor was three, which was adequate. However, it is time for research to review Snizek's study to determine if this tool continues to be of use across disciplines today.

In addition to revising the instrument to further reflect web development, the scale could be redesigned to match a Likert-type scale providing a greater differentiation of responses (Lumsden, 2007). This could have helped with the statement about the impact of large online programs on the institutions ability to offer programs in web development. Most of the responses were centered close between agree and disagree.

There were some instrument design changes that would improve the survey. Closed-ended questions helpful to rank and categorize the responses (Lumsden, 2007) but adding an "other" option provided for duplication of responses. Using survey tool features that can prevent users from selecting from the list when they add a write in option would be a better solution.

Definitions of terms might have been helpful for faculty. For example, a distinction between adjunct and part-time could have been made or the distinctions in the faculty rank options. The word rank was used in a question to represent the best option for a web development degree, in a ranked order of academic degrees. Using the word "rank" in a question was confusing for some of the participants. That word should be avoided unless the participant ranks the actual items in order.

Future surveys should include accessibility, usability, architecture or universal design in the web course listings. Participants had listed courses on the "other" category that could have been classified in the 16 web courses. Perhaps a more detailed study needs to be completed on the curriculum and the content to gain a more in depth understanding of the core body of knowledge.

Faculty selection of multiple departments was a challenge. Data analysis plan did not intended participants to select multiple combinations of departments. While a better option would be to choose their primary and secondary department, the information gained by this question was valuable. This showed that there was an interdisciplinary aspect to web development. Therefore, survey questions with just one department listed for web development faculty could be flawed in their interpretation of that data. A better option for next time is to have the participant indicate their primary and secondary department as well as their role.

Similarly, there were many non-computer sciences and non-web related majors provided for the faculty degrees. Though informative, the information was not essential to the core research questions. A recommendation would be to list common majors that they can select from, making the data easier to work with as well as process and analyze.

Operational Limitations. People did not know that I wanted them to participate even if they did not teach web development. The welcome letter indicated the survey but the participant did not always understand that their opinion was also important to this survey. In future studies, the welcome letter should include information to specifically let participants know that they were hand selected and that even if they do not have direct knowledge of the subject, their opinion was important and that they could fill out the survey.

The consent form spanned almost two screens in the survey. The consent form was based off a frequently asked questions sample consent form from Western Michigan Universities web site. Much of the information was repetitive in the email invitation and reminders. There were 25 participants who dropped out of the survey at the beginning. Having a shorter consent form might be a better option for online surveys. The first email could have been the email invitation and a second email would have directions to access the survey (Gureau, 2007). However that option was not chosen due to the project time constraints. One option to improve response rates would be to post the survey links to other web sites. As Gurau indicated, these open studies might have issues with getting respondents to the survey.

To shorten the survey the institutional data was derived from the invitation link. This worked well for most of the participants. There was a small number (N=20) where the institutional information was not available because the participant chose to select the web link instead of the email link. An alternative would be to include one question, which simply retrieves the name of the institution, and looks up the institutional ID and characteristics from that information. Confidentiality could still be maintained as the data was not analyzed or reported at the institutional or participant level.

The participants completed the survey much faster than anticipated. A more optimistic time of 15 minutes should have been selected. This might have helped make the participant more interested in completing the survey. Lang (2007) suggested based on his literature search that the web surveys should take less than 15 minutes long to complete.

The survey completed instrument testing with several “test faculty” members as recommended by Lumsden (2007) and no problems were identified. However, as Dillman (2000) suggests, the pretest means different things to different researchers. For this study the purpose was to see if there was any glitches in sending the survey or completing and submitting the survey. A better option would be to test the survey as I would a web program, validating the data entry options and populating the dataset with sample data. I did submit one record with sample data, but a more thorough analysis was warranted. Dillman (2000) supports that the researcher could ask the “test faculty” about potential problems in the survey. One suggestion for calibrating an instrument would be to send out a formal checklist for participants to have with them as they complete the survey. For example, did the “test faculty” have a problem with the wording for any of the questions? None of the problems encountered in the live survey were identified during the survey calibration. I was glad to see that even Dillman has had something silly slip through while developing a survey. Survey design needs to be planned and tested as we do in software application design.

Sending out the survey close to a holiday was a risk. However, the study was able to recruit enough participants to complete the study and perform a reliable principal component analysis and obtain statistically significant results. What I noticed, was that on the Fridays a larger number of responses were returned. Therefore, the recommendation for a follow-up study would be to complete the study earlier in the term if any faculty members are subjects, send out the survey reminders early on Friday.

Recommendations for Future Research

There are some specific areas of interest that should be followed up with additional research. This study helped identify the demographics for faculty who are teaching web development. The analysis of gender and the view of professionalization of web development showed that the average female participants supported the professionalization of web development more than average male participants. However, there is more knowledge that could be gained by further reviewing this data or collecting a new dataset. The data collected in the survey, could be reviewed to look closer at variables that might impact the faculty teaching different types web courses, such as gender, education and role. The list of courses was broken down into introductory and advanced but could also have been broken down by topic, such as programming, graphics, business and marketing. For example, what is the demographics and background for faculty that teach web graphics design? –The study looked at the department where the participants worked, but did not look at the data to see if participants simply voted for their own department to oversee web development. In other words, did the participants want control of web development within their own department? The study did not ask what department web development was offered in. This information was also available, but not part of this study.

The grouping of web-faculty and non-web faculty was based upon the experience of the participants teaching web courses. The selection process could be more refined to incorporate the participants work experience in web roles. The selection of web faculty could be divided into additional groups, by adding a beginning and advanced web faculty grouping. Participants who have only taught three courses were not included as web faculty. In a new classification, they could be added into a ‘beginning’ web faculty in order to see if their responses differed from non-web faculty.

Additional data analysis might provide further useful information about the participants’ views of the professionalization of web development. Any review of existing data would need to be reviewed through the institutional review board. However, given that there are additional suggestions for improvement of the survey tool and questions, a new survey would provide a better opportunity to expand the subject pool. Tools like Survey Monkey provide the ability to design studies that can modify the questions presented to the subject based on their responses. Skip (Lumsden, 2007) questions could be used to build one survey and ask participants different questions. Therefore, a study could be completed to compare the attitudes toward professionalization of web development based on faculty and non-faculty and include web professionals, administrators, corporate leaders, and members of the public and even government leaders. This information could be gathered to provide a more robust picture of how society views the web profession.

One of the justifications for the study was the increase in web security issues such as identity theft that often could be prevented by good web programming techniques (B. Sullivan & Liu, 2011). Recent security threats as described by OWASP (2014) show continued risks associated with web applications. In this study, while many faculty have taught introductory web courses, 67.3% of the participants have never taught a web security course, an advanced web course. Is this because the course is not offered or because the web faculty chose not to teach the course? While we know some web faculty have professional experience in web development, networking and programming, we do not know the extent to which they are trained in web security topics. A follow-up survey would help understand the web faculty experiences with web security and how web faculty approach teaching web security in the classroom.

The data collected form the A List Apart (2011) study does not include details on the breakdown of the academic degree levels or the student's major field of study. Were the web developers computer science majors, business majors or fine art students? A more detailed study coming from students might be able to provide information about what type of curriculum the students are completing. This type of a study might also show is students are taking courses across institution, ongoing education or informal education. At the same time, the A List Apart study reported that there was likely no bias in several areas, such as gender, age and disability. Yet the data shows that the majority of participants are Caucasian, young males that work in the U.S. and are likely not disabled given their weekly workload. So, is asking them about their bias a good way to get at these concepts? A study design similar to this study with some triangulation might be more beneficial to get at these more socially challenging topics. A more detailed study of web developers and employees with other web-related careers might be ore useful. The study could also utilize the WDPI to provide more detailed responses and understand how web developers perceive the professionalization of web development.

There are other aspects of this study that could be followed up with future research. Given that the institutions are offering courses at different academic program levels, the curricula within these programs should be reviewed to determine if there are any updates to the seven models found by Logan (2005). Perhaps a study looking at the syllabi and textbooks, course description and other course details could be reviewed to identify trends and information about how quickly the field is moving, and identify a detailed common set of curricula that is actually being taught in academic programs. While the WOW survey attempts to look at technologies that the faculty 'would like to' teach, future research should look at actual content of what has been offered, and a more thorough review of the course content areas. Perhaps in some programs the concepts are taught in a networking course and in other programs the concepts might be taught in a web development course. A more detailed analysis of the curriculum would provide the web faculty community with information that could help them better plan their curriculum and prepare for changes as technology advances.

Closing

The original conceptual framework for this study, incorporated external factors, characteristics of higher education institutions and individual characteristics of faculty as potential inputs that could impact the structural and attitudinal components of a profession. This study showed how many of these factors had affected the view of faculty toward the professionalization of web development. External factors such as control over entry into practice through the professional organization oversight and a lack of a code of ethics are issues that only the professional organization can resolve. As the participants came from primarily 2-year public institutions it was not surprising that they selected the two-year degree program as the minimum degree for web development. Faculty characteristics such as gender and web faculty status also played a role in the attitudinal views of the participants toward the professionalization of web development.

However, more work in this area could be done to study why these factors impact the views of the participants.

Although the profession benefits include financial rewards, autonomy and prestige (Davis, 2009; Lubell, 1980), the community also benefits through the establishment of standards of practice, code of ethic and regulation of entry into the practice. This study revealed faculty have very little formal education in web development. The extent to which the faculty have professional experience in web application security and web server security remains unknown. It also remains unknown if professionalization can help protect the community at large and improve web application security. Fields such as nursing and engineering have evolved into professions, which regulate entry into practice, provide standards of practice, accredit academic institutions and provide a code of ethics which protect the community at large. Other professions such as victim services continue to remain as semi-professions (Underwood & Wallace, 1999).

A faculty-led organization should be created to help 1) provide higher education faculty the ongoing faculty development they need and document their professional development activities, 2) provide recommendations for a 'best-practices' curricula, 3) provide educational and resources for developing that curriculum as well as review existing materials from other web sites, publishers and content producers, 4) monitor the profession and provide objective data on the profession to government and educational bodies, 5) create vendor and certification-neutral standards of practice, 6) oversight of educational programs in higher education and certifications, 7) building support for articulation across institutions, 8) provide peer-based support to review academic programs and make recommendations, and 9) act as an advocate for the profession.

This study showed indications that the web field met some of the requirements of a profession such as the establishment of professional organizations and certifications. The process of professionalization of web development had moved forward with the development of university degree programs. However, this study also demonstrated that the number of web development programs and graduates are concentrated within a small number of institutions and that participants continued to prefer an associate's degree as the minimum level of education for web development. While the literature showed a growing number of courses and unique knowledge within the field, without faculty support the process may not be completed. Faculty are needed for both establishment of academic programs, development of curricula, creation of scholarly research and leadership roles within professional organizations. Before this study, there were no studies that had examined the attitudes of the professionalization of web development among web faculty. This study helped to identify web faculty and their characteristics, the characteristics of their institutions and their views towards the professionalization of web development. This study has shown that web development is an emerging profession but may not reach it's fullest potential without the help of faculty, the community and members of the professional organizations. The web field must go through the process to create a code of ethics and a professional organization that has not only a supportive role, but also oversight of the care of the profession by working with the academic institutions.

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Appendix A

Selected Occupations Undergoing the Process of Professionalization

Field	Authors	Theoretical Models Referenced	Significance or Conclusions
Computing Science (CS)	Finerman (1975) Stahl (2006) Wyld (1977)	Finerman designed his own standards with social and technical;	CS is an applied science because CS lacked a foundation for professional practice; lacks required formal education and no barriers to enter the profession. Wyld considers if computer workers are professionals in the United Kingdom.
Dietetics	Morssink (2002)		Developed a qualitative instrument.
Engineering	Davis (2009); Rochester (2001)		Applied a Socratic approach; Splintered into subfields.
Health Education	Coyle (2004)		Used a dephi method to identify a core body of knowledge in health education.
Information Technology	Dark, Ekstrom, and Lunt (2005)		IT2005 was developed to identify curriculum for the information technology.
Information Technology: Hackers	Auray and Kaminsky (2007)	Wilensky (1964)	Looked at four professional routes and the divided identity of hackers.
Journalism	Aldridge and Evetts (2003)	Tunstall (1971) Greenwood (1957)	No common core knowledge or specialized skill and lack of a code of ethics.
Librarians	Abbott (1998)		Technology has changed the profession; Initially merged with information science and management information systems.

Field	Authors	Theoretical Models Referenced	Significance or Conclusions
Medical Records	Webster (1999)	Multiple theorists	Professional organization, a formal degree based education and body of knowledge.
Medicine	Flexner (1915) Ahluwalia (2007) Warren et al. (1998)	Multiple theorists	Focus on what characteristics were present; External factors may cause de-professionalization in traditional professions and move in reverse on the dynamic continuum.
Nurse Practitioners	Marchione and Garland (1997)	Friedson (1970, 1977)	Nursing needs to establish their autonomy.
Nurse Midwives	Hampton and Hampton (2004)	Hall (1968)	Used the Hall survey as modified by Snizek (1972) with additional questions on demographics, and internal and external focus on the reward structures in the workplace.
Nursing	Flexner (1915) Covert (1917) Bixlers (1945) Hoffart and Woods (1996) Truesdall (1985) Hallam (2002) Yam (2004) Wynd (2003) Linstone and Turoff (2011) Melosh (1989)	Vaillot (1962) Wilensky (1957) Goode (1960) Friedson (1970) Etzioni (1969, 1970) Parsons (1951) Hall (1968)	Originally a vocation, nursing evolved into a profession; Nursing is not secondary to the physician; Perception of nurses on professionalization; Works independently in some environments; Prestige impacted by public image; Differences in the perceptions of professionalization by nurses; No relationship between the certification and the belief in self-regulation dimension; Many resisted professionalization; Some gender and cultural perceptions were issues identified.

Field	Authors	Theoretical Models Referenced	Significance or Conclusions
Pharmacy Students	Chisholm, Cobb, Duke, McDuffie and Kennedy (2006)	Revised scale by Snizek (1972).	Created Professionalism Instrument (PPI); Showed no difference between the graduate students and first year students on perception of professionalization.
Physical Therapy	Swisher Robertson and Ja		Selected Occupations Undergoing the Process of Professionalization
Police	Poole (1979)	Revised scale by Snizek (1972).	Added cynicism to the scale; All five professionalism dimensions were significantly related to level of cynicism toward the organization.
Project Management	Rose (2004)	Freidson (1970)	Members may not view themselves as a profession.
Social Work	Murray (1954) Hughes (1966) Abdulmohsen (1991)	Flexner (1915) Carr-Saunders (1960) Wilensky (1964) Greenwood (1966)	Semi-Profession; Later defined as a professional service; Movement to organize membership and professional organization; Will not see monetary rewards like other professions.
Structural Engineering	Schmidt (2008)		Need for public recognition, structural engineering to be compensated as professionals.
Therapeutic Recreation	Navar (1979)	Hall (1968)	Revised occupational inventory; Identify issues with geographical boundaries.
Victim Services	Underwood and Wallace (1999, 2002)	Houle (1987)	Classified the field as an emerging profession; Need to establish a core body of knowledge, expert skills and lifelong learning, clearly identify the mission, purpose, identify and the boundaries of the profession.

Field	Authors	Theoretical Models Referenced	Significance or Conclusions
Vocational Agriculture Instructors in Secondary Education	Bezek (1987) Lawver and Lee (1990)	Snizek (1972)	Instructors and superintendents agreed on their perceptions of professionalism regardless of the enrollment size; Members could be distinguished from non-members by the degree of professionalism.

Appendix B

Original Hall Professionalism Inventory Scale

1. I systematically read the professional journals.
2. Other professions are actually more vital to society than mine.
3. A person who violates professional standards should be judged by his professional peers.
4. A person enters this profession because he likes the work.
5. I make my own decisions in regard to what is to be done in my work.
6. I regularly attend professional meetings at the local level.
7. I think that my profession, more than any other, is essential for society.
8. My fellow professionals have a pretty good idea about each other's competence.
9. People in this profession have a real "calling" for their work.
10. It is easier when someone else takes responsibility for decision making.
11. I enjoy seeing my colleagues because of the ideas that are exchanged.
12. The importance of my profession is sometimes over stressed.
13. There really aren't any penalties for the person who violates professional standards.
14. The dedication of people in this field is most gratifying.
15. I don't have much opportunity to exercise my own judgment.
16. I believe that the professional organizations) should be supported
17. Some other occupations are actually more important to society than is mine.
18. A problem in this profession is that no one really knows what his colleagues are doing.
19. Professional training itself helps assure that people maintain their high ideals.
20. I know that my own judgment on a matter is the final judgment.
21. The most stimulating periods are those spent with colleagues.
22. Not enough people realize the importance of this profession for society.
23. A basic problem for the profession is the intrusion of standards other than those which are truly professional.
24. It is encouraging to see the high level of idealism which is maintained by people in this field.
25. The fact that someone checks your decisions makes this work easier.
26. The professional organization doesn't really do too much for the average member.
27. More occupations should strive to make a real contribution to society the way my own does.
28. Violators of professional standards face fairly severe penalties.
29. Although many people talk about their high ideals, very few are really motivated by them.

Appendix B-continued

30. When problems arise at work, there is little opportunity to use your own intellect.
31. The real test of how good a person is in his field is the layman's opinion of him.
32. Any weakening of the profession would be harmful for society.
33. We really have no way of judging each other's competence.
34. It is hard to get people to be enthusiastic about their work in this field.
35. There is little autonomy in this work.
36. Although I would like to, I really don't read the journals too often.
37. The benefits this profession gives to individuals and society are underestimated.
38. The professional organization is really powerless in terms of enforcing rules.
39. Most people would stay in the profession even if their incomes were reduced.
40. My own decisions are subject to review.
41. Most of my own friends are not fellow professionals.
42. It is impossible to say that any occupation is more important than any other.
43. There is not much opportunity to judge how another person does his work.
44. Most of the real rewards of my work can't be seen by an outsider.
45. I am my own boss in almost every work-related situation.
46. The profession doesn't really encourage continued training.
47. If ever an occupation is indispensable, it is this one.
48. My colleagues pretty well know how well we all do in our work.
49. There are very few people who don't really believe in their work.
50. Most of my decisions are reviewed by other people.

Note: The questions recommended to be kept by Snizek (1972) were 1, 2, 5, 6, 7, 8, 9, 12, 14, 15, 16, 17, 18, 24, 26, 33, 36, 39, 40, 43, 45, 47, 48, 49 and 50 leaving five questions measuring each dimension. This scale was first published in Snizek, W. E. (1972). Hall's Professionalism Scale: An Empirical Reassessment. American Sociological Review, 37(1), pp. 109-114. (Republished with permission of W.E. Snizek and Dr. Hall. See Appendix U).

Appendix C

Selected Studies Based on Hall's (1968) Professional Inventory Scales

	Notes		M*					SD or α **				
Study		r	1 PO	2 PS	3 SR	4 SC	5 AT	1 PO	2 PS	3 SR	4 SC	5 AT
Hall (1968)	Alpha 10 items 5 items	.86 .843						.674 .686	.676 .742	.694 .731	.711 .703	.776 .760
Snizek (1972)	Alpha 10 items 5 items	.799 .783						.620 .621	.656 .640	.596 .699	.455 .583	.730 .738
Shafer, Park, & Liao (2002)			3.09	3.73	3.62	3.64	3.03	.77	.64	.53	.53	.61
Carlan and McMullan (2009)	Women subjects		3.35	4.07	3.53	3.54	3.14	.61	.64	.64	.64	.61
Carlan and McMullan (2009)	Men subjects		3.38	4.15	3.53	3.57	3.18	.62	.53	.58	.62	.61
Wimmer (2009)	Alpha; Physicians							.380	.695	.819	.698	.571
Chan (2005)		.66/.71	3.43	3.26	3.39	3.13	3.38	.60	.51	.73	.65	0.66
Morrow and Goetz (1988)	S.D. and Alpha	3.13/0.35 0.75	3.37	2.63	3.75	3.02	2.85	0.63 0.69	0.69 0.70	0.54 0.75	0.48 0.49	0.65 0.66
Regolil and Poole (1980)	Rural Dept		13.42	10.73	9.57	11.46	13.78	2.77 0.88	3.07 0.87	2.03 090	2.18 0.84	2.42 0.84
Regolil and Poole (1980)	Urban Dept		13.85	11.92	9.49	11.72	13.99	2.93 0.86	3.66 0.88	2.59 0.92	2.70 0.86	2.84 0.88
Wynd (2003)	Mean and SD	83.37/9.2	15.4	18.37	13.14	15.36	13.28	3.56	2.95	2.59	2.39	2.68
Wynd & Gotschall, 2000	Cronbach Alpha	.84						.82	.79	.79	.80	.81

Note: * The mean scores are the actual average score for each factor, or reported as the total average for teach factor. ** Some authors choose to report standard deviations (SD) and others Chronbach's alpha (α). Some chose to report scores for subgroups and others for the entire sample. This study reported means, standard deviation and alpha for subgroups and the entire sample.

Appendix D

Program Award Levels

Award Level	Award Level ID	Official Title
>1	1	Award of less than 1 academic year
1 - 2	2	Award of at least 1 but less than 2 academic years
AD	3	Associate's degree
BS	5	Bachelor's degree
2 - 4	4	Award of at least 2 but less than 4 academic years
PBS	6	Post Baccalaureate Degree (BS)
MS	7	Masters Degree (MS)
Doc	17	Award of at least 2 but less than 4 academic years
PMS		Post Master's Certificate

Note. These titles are based on the summary NCES IPEDS 2010 data set. The last column represents the level of the award indicated in the first column. The ID column represents a numeric value for the award level in the data set. It is important to add that the government sets the codes within NCES IPEDS data set. Institutions may not always choose the right code for the program. For example Lake Superior State University has a web concentration within a bachelor degree program for computer networking. The CIP code refers to a different CIP program code and award level code. This coding system may make it difficult for institutions to market their programs, and to correctly identify institutions in research.

Appendix E

Institutions that Awarded Ten or More Associate or Bachelor Degrees in Web Development in 2010

Unit ID	Institution Name	State	>1	1 to 2	AD	2 to 4	BS	Total Awards All Levels	Total Awards AD BS	Award Level
215415	Pittsburgh Technical Institute	PA			60			60	60	AD
190521	CUNY Borough of Manhattan Community College	NY			54			54	54	AD
138309	Rasmussen College-Florida	FL			53			53	53	AD
197285	The College of Westchester	NY			48			48	48	AD
228680	Texas State Technical College	TX		0	35			35	35	AD
216825	Westmoreland County Community College	PA	5		25			30	25	AD
204486	University of Northwestern Ohio	OH		9	21			30	21	AD
205841	Stark State College of Technology	OH		1	16			17	16	AD
212878	Harrisburg Area Community College-Harrisburg	PA		1	15			16	15	AD
139986	Southern Crescent Technical College	GA	1		15			16	15	AD
234951	Clover Park Technical College	WA		4	14	3		21	14	AD
447421	Eagle Gate College-Layton	UT		2	14			16	14	AD
174756	St Cloud Technical and Community College	MN			14			14	14	AD
170541	Kalamazoo Valley Community College	MI			13	0		13	13	AD
251075	Kaplan Career Institute-Harrisburg	PA	26		13			39	13	AD
236708	Spokane Falls Community College	WA	27	14	13			54	13	AD
245342	Vatterott College-Berkeley	MO		0	13			13	13	AD
184180	County College of Morris	NJ			12			12	12	AD
140012	Gwinnett Technical College	GA	21		12	5		38	12	AD
236258	Peninsula College	WA	15		12			27	12	AD
239488	Northeast Wisconsin Technical College	WI			11			11	11	AD
440110	Anthem Institute and Colleges	TN		228	10			238	10	AD
140331	Chattahoochee Technical College	GA	10		10	1		21	10	AD
142559	College of Southern Idaho	ID		1	10			11	10	AD
134112	Florida Technical College	FL			10			10	10	AD
425986	Mildred Elley	MA		1	10			11	10	AD

Appendix E-continued

Unit ID	Institution Name	State	>1	1 to 2	AD	2 to 4	BS	Total Awards All Levels	Total Awards AD BS	Award Level
209746	Portland Community College	OR	17	8	10			35	10	AD
227766	Richland College	TX		11	10			21	10	AD
409829	Sanford-Brown College-St Peters	MO			10			10	10	AD
236638	Skagit Valley College	WA	12	4	10			26	10	AD
230737	Utah Valley University	UT			9		55	64	64	BOTH
456296	International Academy of Design and Technology-Online	FL			53		2	55	55	BOTH
421832	Living Arts College	NC	16	5	16		0	37	16	BOTH
134811	AI Miami International University of Art and Design	FL			6		8	14	14	BOTH
131113	Wilmington University	DE			8		6	14	14	BOTH
231165	Vermont Technical College	VT			6		5	11	11	BOTH
142328	Lewis-Clark State College	ID		0	2		0	2	2	BOTH
443687	Westwood College-Chicago Loop	IL					52	52	52	BS
212054	Drexel University	PA					41	41	41	BS
202806	Franklin University	OH					28	28	28	BS
130226	Quinnipiac University	CT					28	28	28	BS
178624	Northwest Missouri State University	MO					27	27	27	BS
199111	University of North Carolina at Asheville	NC					26	26	26	BS
240480	University of Wisconsin-Stevens Point	WI					26	26	26	BS
414708	Baker College Center for Graduate Studies	MI					25	25	25	BS
110714	University of California-Santa Cruz	CA					25	25	25	BS
212106	Duquesne University	PA					20	20	20	BS
204185	University of Mount Union	OH					11	11	11	BS
160755	Tulane University of Louisiana	LA					10	10	10	BS

Note: There were 8853 degrees awarded and 1552 programs in the NCES IPEDS data. Some institutions have multiple Unit IDs. This table contains total degrees awarded extracted from the data set for institutions that offered associate or bachelor degree programs in web development and had more than ten students awarded a degree. The available award level column indicates if the institution offers the associate degree, bachelor degree, or both degrees, or neither degree. There are 26 institutions in this table, that awarded either more than ten degrees in web development at the associates degree or bachelors degree level or offered both academic degree programs.

Appendix F

Modified Professionalism Inventory Scale for Web Development

WDPI Faculty Attitudinal Scales, Part I

The number in parenthesis is the question number in the Hall study.

1. ~~I~~ *Web developers* systematically read the professional journals. (1, PO)
2. Other professions are actually more vital to society than ~~mine~~ *web development*. (2, PS)
3. ~~I~~ *Web developers* make ~~my~~ *their* own decisions in regard to what is to be done in ~~my~~ *their* work. (5, AT)
4. ~~I~~ *Web developers* regularly attend professional meetings at the local level. (6, PO)
5. I think that ~~my~~ *the web development* profession, more than any other, is essential for society. (7, PS)
6. ~~My fellow~~ *Web development* professionals have a pretty good idea about ~~each other's competence~~ *the competence of other web developers*. (8, SR)
7. People in ~~this~~ *the web development* profession have a real "calling' for their work. (9, SC)
8. The importance of ~~my~~ *the web development* profession is sometimes over stressed. (12, PS)
9. I believe that the *web development* professional organizations(s) should be supported. (16, PO)
10. Some other occupations are actually more important to society than ~~is mine~~ *web development*. (17, PS)
11. A problem in ~~this~~ *the web development* profession is that no one really knows what ~~his colleagues~~ *other web development professionals* are doing. (18, SR)
12. It is encouraging to see the high level of idealism which is maintained by people in the ~~this~~ *web development* field. (24)
13. The *web development* professional organization doesn't really do too much for the average member. (26, PO)
14. ~~We~~ *Web developers* really have no way of judging ~~each other's competence~~ *the competence of other web developers*. (33, SR)
15. The dedication of people in ~~this field~~ web development is most gratifying. (14, SC)
16. ~~I~~ *Web developers* don't have much opportunity to exercise ~~my~~ *their* own ~~judgement~~ *judgment*. (15, AT)
17. Although ~~I~~ *they* would like to, ~~I~~ *web developers* really don't read the journals too often. (36, PO)
18. Most people would stay in the *web development* profession even if their incomes were reduced. (39, SC)

Appendix F-continued

19. ~~My own~~ *In this kind of work, a web developer's* decisions are subject to review. (40, AT)
20. There is not much opportunity to judge how other ~~person does their~~ *web developers do* their work. (43, SR)
21. ~~I am my~~ *Web developers are their* own boss in almost every work-related situation. (45, AT)
22. ~~My colleagues~~ *Web developers* ~~pretty well~~ know how well ~~we all~~ *other Web developers* do in ~~our~~ their work. (48, SR)
23. If ever an occupation ~~is~~ *were* indispensable, it is this one. (47, PS)
24. There are very few ~~people~~ *web developers* who don't really believe in their work. (49, SC)
25. Most of ~~my~~ *a web developers* decisions are reviewed by other people. (50, AT)

Note: Modifications from the Hall's (1968) survey are indicated with strikethroughs and italics. The number in parenthesis indicates the corresponding question on the Snizek tool. PO = Professional organization as peer reference group. PS = Belief in service to public. SR = Belief in self-regulation. SC = Sense of calling to field. AT = Feeling of autonomy. This scale was first published in Snizek, W. E. (1972). Hall's Professionalism Scale: An Empirical Reassessment. American Sociological Review, 37(1), pp. 109-114. (Republished with permission of W.E. Snizek).

Table F1

Question Mapping

Short Title	***Survey Questions***	***Survey Questions***	***Hall's Questions***
I. Use of the professional organization as a major referent	PO1, PO2, PO3, PO4, PO5	1, 4, 9, 13, 17	1, 6, 16, 26, 36
II. Belief in public service	PS1, PS2, PS3, PS4, PS5	2, 5, 8,10, 23	2, 7, 12, 17, 47
III. Belief in self regulation	SR1, SR2, SR3, SR4, SR5	6, 11, 14, 20, 22	8, 18, 33, 43, 48
IV. Sense of calling to the field	SC1, SC2, SC3, SC4, SC5	7, 15, 12, 18, 24	9, 14, 24, 39, 49
V. Feeling of autonomy	AT1, AT2, AT3, AT4, AT5	3, 16, 19, 21, 25	5, 15, 40, 45, 50

Note: PO = Professional organization as peer reference group. PS = Belief in service to public. SR = Belief in self-regulation. SC = Sense of calling to field. AT = Feeling of autonomy.

Appendix F-continued

***Please indicate how well you agree or disagree with the following statements:**

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. A web developer regularly reads the professional journals.					
2. Other occupations are actually more vital to society than web development.					
3. Web developers make their own decisions in regard to what is to be done in their work.					
4. Web developers regularly attend professional meetings at the local level.					
5. I think that this profession, more than any other, is essential for society.					
6. My fellow web development professionals have a pretty good idea about each other's competence.					
7. People in this profession have a real "calling" for their work.					
8. The importance of the this profession is sometimes overstressed.					
9. I believe that the professional web development organizations(s) should be supported.					
10. Some other occupations are actually more important to society than web development.					
11. A problem in the web development profession is that no one really knows what one's fellow professionals are doing.					
12. It is encouraging to see the high level of idealism which is maintained by people in the web development field.					
13. The web development professional organization doesn't really do too much for the 'rank-in-file' member					
14. Web developers really have no way of judging each other's competence.					
15. I find the dedication of people in this field is most gratifying.					
16. Web developers don't have much opportunity to exercise their own judgement.					
17. Although they would like to, web developers really don't read the journals very thoroughly,.					
18. Most people would stay in the web development profession even if their incomes were reduced.					
19. In this kind of work, a person's decisions are subject to review.					
20. There is not much opportunity to judge how other web developers do their work					
21. I am my own boss in almost every work-related situation.					
22. Persons who violate professional standards should be judged by their professional peers.					
23. If ever an occupation were indispensable, it is this one					
24. There are very few practitioners who really believe in their work.					
25. I know that my own judgement on most matters is final judgement.					

Figure F1. Web Development Professionalism Inventory (WDPI Part 1)

Appendix G

WESTERN MICHIGAN UNIVERSITY

Human Subjects Institutional Review Board

Date: November 26, 2013

To: Andrea Beach, Principal Investigator
Kathleen Kalata, Student Investigator for dissertation

From: Amy Naugle, Ph.D., Chair Amy Naugle

Re: HSIRB Project Number 13-11-23

This letter will serve as confirmation that your research project titled "Connecting the Disciplinary Dots: Faculty Attitudes toward the Professionalization of Web Development" has been **approved** under the **exempt** category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note: This research may **only** be conducted exactly in the form it was approved. You must seek specific board approval for any changes in this project (e.g., ***you must request a post approval change to enroll subjects beyond the number stated in your application under "Number of subjects you want to complete the study***)." Failure to obtain approval for changes will result in a protocol deviation. In addition, if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

Reapproval of the project is required if it extends beyond the termination date stated below.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: November 26, 2014

251 W. Walwood Hall, Kalamazoo, MI 49008-5456
PHONE: (269) 387-8293 FAX: (269) 387-8276

Appendix H

Crosswalk for Web Development Professionalism Inventory

The beginning crosswalk for the last three sections of the WDPI, sorted based on the survey questions for part 2 (structural components), 3 (faculty role), and 4 (faculty demographics). Additional variables were added in the data set and are described within the data set. Multiple fields needed to be recoded and are renamed with the word "encoded' appended to the variable name.

Part	Survey Question	Variables
2	1. Please complete the following sentence. The minimum degree for a web developer should be a _______________.	MINDEGREE
	2. Please select one of the responses. Choose the professional organization which best represents the collection of web developers within the United States.	PREFPORG
	3. Please indicate which department should have oversight of all web development curricula.	OVERSIGHT
	4. Please indicate how well you agree or disagree with the following statements: Web Development should be a required knowledge area within Computing Curricula 2013.	REQUIRED
	5. Please indicate how well you agree or disagree with the following statement: Faculty have a difficult time keeping pace with the new technologies in web development.	SPEEDLITE
	6. Large online educational institutions do impact our ability to offer web development programs.	ONLINE
	7. Please rank the methods that provides the best preparation for an entry level web developers.	PREPARE
	8. Please indicate how well you agree or disagree with the following statements: Computer Science is a Profession.	CSPROFF
	9. Please indicate how well you agree or disagree with the following statements: Web development is a profession.	WEBPROFF
	10. Please indicate how well you agree or disagree with the following statements: The web development professional organization should have a code of ethics.	ETHICS

Appendix H-continued

Part	Survey Question	Variables
3	11. What is your current job role?	JOBROLE
	12. What is your current faculty rank?	FACRQANK
	13. Which is the primary department that you work in?	DEPART
	14. Which of the following categories best describes your employment status?	STATUS
	15. Please select one of the responses. Select any of the professional organization which you are a current member.	MEMPORG
	16. How many years have you been teaching in higher education?	TEACHING
	17. What web professional certifications have you earned?	CERTIFICAT
	18. About how long did you work in the following fields? (#) • Computer Networking • Computer Programming • Web Developer • Web Designer • Web Administrator • Other - Please Specify	ROLE (#)
	19. How many times have you taught the following web-related courses? (#) • Creating Web Pages with HTML • Creating Web Pages Web Editors • Client-side Programming • Introduction to the Internet • Mobile Applications • Web Server Programming • Web Graphics Design • Web Database Programming • Web Multimedia and Animation • Web Security • Web Server Management • Web Video • Other - Please Specify	COURSE (#)

Appendix H-continued

Part	Survey Question	Variables
4	20. What is your age in years?	AGE
	21. What is your gender?	GENDER
	22. What is your race? Mark one or more.	RACE
	23. What is the highest level of school you have completed or the highest degree you have received?	EDUCATION
	24. What was your major?	
	Certificate	CERTDEGR
	Associates Degree	ASSODEGR
	Bachelors Degree	BACHDEGR
	Masters Degree	MASTDEGR
	Doctorate Degree	DOCTDEGR
	Other - Specify	OTHRDEGR

Appendix I

Web Development Professionalism Inventory (Parts 2 – 4)

***Please complete the following sentence. The minimum degree for a web developer should be a(n) ____________.**

- ◯ 1 year certificate
- ◯ 2-4 year certificate
- ◯ Post baccalaureate certificate
- ◯ Associate degree
- ◯ Bachelor degree
- ◯ Masters degree
- ◯ Doctoral degree

***Please select one of the responses. Choose the professional organization which best represents the collection of web developers within the United States.**

- ◯ WebProfessionals.org (WOW)
- ◯ Association for Computing Machinery (ACM)
- ◯ Institute of Electrical and Electronics Engineers (IEEE)
- ◯ Institute of Electrical and Electronics Engineers (IEEE) Computer Society
- ◯ Association for Computing Machinery (ACM)
- ◯ Association for Computing Machinery Special Interest Group on Hypertext and the Web (ACM SIGWEB)
- ◯ International Webmasters Association (IWA)
- ◯ W3 Consortium
- ◯ Certified Internet Webmasters
- ◯ Other - Please specify: ____________

***Please indicate which department should have oversight of all web development curricula.**

- ◯ Graphic Arts
- ◯ Business
- ◯ Marketing
- ◯ Computer Science
- ◯ Computer Information Systems
- ◯ Information Technology
- ◯ Other - Please specify: ____________

Appendix I-continued

***Please rank the methods that provide the best preparation for an entry-level web developer.**

- Creating a Portfolio
- Obtaining a Certificate from a Non-Academic Setting
- Obtaining a Certificate from an Academic Setting
- Completing an Associate's Degree
- Completing a Bachelor's Degree Program
- Completing an Master's Degree Program

***Please indicate how well you agree or disagree with the following statements:**

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Web Development should be a required knowledge area within Computing Curricula 2013.	○	○	○	○	○
Faculty have a difficult time keeping pace with the new technologies in web development.	○	○	○	○	○
Large online educational institutions do affect our ability to offer web development programs.	○	○	○	○	○
Computer Science is a profession.	○	○	○	○	○
Web development is a profession.	○	○	○	○	○
The web development professional organization should have a code of ethics.	○	○	○	○	○

***What is your current job role?**

- Instructor
- Faculty
- Administrator
- Other - Please specify:

Appendix I-continued

***What is your current faculty rank?**

- Adjunct Faculty
- Instructor
- Assistant Professor
- Associate Professor
- Full Professor
- Professor Emeritas
- Other - Please specify:

***Which department do you work in?**

- Art or Fine Arts
- Business
- Computer Information Systems
- Computer Networking
- Computer Science
- Graphic Design
- Information Systems
- Information Technology
- Management Information Systems
- Web Design
- Web Development
- World Wide Web
- Other - Please specify:

***Which of the following categories best describes your employment status?**

- Not working
- Adjunct
- Part-Time
- Full-Time

***How many years have you been teaching in higher education?**

How many years have you been teaching in higher education?

Appendix I-continued

About how long in years did you work in the following fields?

Computer Networking

Computer Programming

Web Developer

Web Designer

Web Administrator

Other

Please select one or more of the responses. Select any of the professional organization, which you are a current member.

- [ ] Association for Computing Machinery (ACM)
- [ ] Association for Computing Machinery - Special Interest Group on Hypertext and the Web (ACM-SIGWEB)
- [ ] Certified Internet Webmasters (CIW)
- [ ] Institute of Electrical and Electronics Engineers (IEEE)
- [ ] Institute of Electrical and Electronics Engineers - Computer Society (IEEE-CS)
- [ ] International Webmasters Association (IWA)
- [ ] WebProfessionals.org (World Organization of Webmasters)
- [ ] W3 Consortium
- [ ] Other - Please specify:

What web professional certifications have you earned?

1.

2.

3.

4.

5.

Appendix I-continued

***How many times have you taught the following web-related courses?**

	Never	1-2 times	3-4 times	5-6 times	More than 7 times
Client-side Programming	○	○	○	○	○
Creating Web Pages with HTML	○	○	○	○	○
Creating Web Pages Web Editors	○	○	○	○	○
E-Commerce or E-Business	○	○	○	○	○
Introduction to the Internet	○	○	○	○	○
Mobile Applications	○	○	○	○	○
Social Networking	○	○	○	○	○
Web-based Communications	○	○	○	○	○
Web-based Marketing	○	○	○	○	○
Web Database Programming	○	○	○	○	○
Web Graphics Design	○	○	○	○	○
Web Graphics Marketing	○	○	○	○	○
Web Multimedia and Animation	○	○	○	○	○
Web Security	○	○	○	○	○
Web Server Management	○	○	○	○	○
Web Server Programming	○	○	○	○	○

If you teach a topic that was not represented in the previous question, please list the course topic or title.

Course 1: __________

Course 2: __________

Course 3: __________

Course 4: __________

How many times you have taught the courses listed in the previous question?

	Never	1-2 times	3-4 times	5-6 times	More than 7 times
Course 1:	○	○	○	○	○
Course 2:	○	○	○	○	○
Course 3:	○	○	○	○	○
Course 4:	○	○	○	○	○

Appendix I-continued

Please provide some basic demographic information about you.

***What is your age in years?**

***What is your gender?**

- ◯ Female
- ◯ Male

***What is your race?**

- ◯ White
- ◯ Black or African American
- ◯ Asian
- ◯ Native Hawaiian or Other Pacific Islander
- ◯ American Indian or Alaska Native
- ◯ Other

***What is the highest level of school you have completed or the highest degree you have achieved?**

- ◯ Some college but no degree
- ◯ Associate degree
- ◯ Bachelor degree
- ◯ Master's degree
- ◯ Doctoral degree

***What was your major?**

Certificate	
Associates Degree	
Bachelors Degree	
Masters Degree	
Doctorate Degree	

Appendix J

Response Rates for Studies Using the Hall or Snizek Professional Inventory Scales

Study	*Population*	*Potential Subjects*	*Responses*	*Response Rate*
Shafer, Park, & Liao (2002)	Certified management accountants	1000	319	32%
Wimmer (2009)	Physicians	100	45	44%
Carlan & McMullan (2009)	Police about Policewomen	Unknown	1000	Unknown
Chan (2005)	Building and construction workers	7,200	510	7%
Hampton & Hampton (2002)	Certified Nurse Midwives	2000	543	33%
Heil (2003)	Florida Agency Administrators assigned into two groups.	999	727	73%
Lusch & O'Brien (2007)	Practitioner members of American Marketing Association	1500	821	54.7%
Morrow & Goetz (1988)	Accountants	513	325	63%
Regolil & Poole (1980)	Rural police officers (urban police officers)	79 (88)	71 (74)	90% (86%)
Swailes (2003)	Accountants and chemists	2000	633	31.3%
Wynd (2003)	Registered Nurses in Ohio	1850	774	42%
Miller & Fry (1976)	Small police departments and district attorney office	151	136	90%
Snizek (1972)	Engineers, physicists and chemists	Unknown	566	Unknown
Hall (1968)	Eleven occupational groups	542	328	61%

Note: In some cases, such as Carlan and McMullan (2009) the researchers used the snowball method and targeted departments, and therefore the total number of subjects is unknown at each department.

Appendix K

Institutional Representation in the Study

Institution Number	Frequency	Percent (N=208)	Valid Percent (N=170)
1	13	6.3	7.6
2	7	3.4	4.1
3	7	3.4	4.1
4	5	2.4	2.9
5	5	2.4	2.9
6	5	2.4	2.9
7	5	2.4	2.9
8	5	2.4	2.9
9	4	1.9	2.4
10	3	1.4	1.8
11	3	1.4	1.8
12	3	1.4	1.8
13	3	1.4	1.8
14	3	1.4	1.8
15	3	1.4	1.8
16	3	1.4	1.8
17	3	1.4	1.8
18	3	1.4	1.8
19	3	1.4	1.8
20	2	1	1.2
21	2	1	1.2
22	2	1	1.2
23	2	1	1.2
24	2	1	1.2
25	2	1	1.2
26	2	1	1.2
27	2	1	1.2
28	2	1	1.2
29	2	1	1.2
30	2	1	1.2
31	2	1	1.2
32	2	1	1.2
33	2	1	1.2
34	2	1	1.2
35	2	1	1.2
36	2	1	1.2
Individual Responses	50	24	29.4
No response	38	18.3	22.4

Note: The top institutions represented in this study had 13 participants or 7.6%. There were 50 institutions with only one response. Institutional identification was removed from the list to protect identity of the subjects.

Appendix L

Institutional Representation by State

State	Frequency	Percent (N=208)	Valid Percent (N=170)
California	18	8.7	8.7
Washington	17	8.2	8.2
Arizona	16	7.7	7.7
Pennsylvania	13	6.3	6.3
Michigan	11	5.3	5.3
Illinois	10	4.8	4.8
Georgia	8	3.8	3.8
Wisconsin	8	3.8	3.8
Oregon	7	3.4	3.4
Florida	5	2.4	2.4
Ohio	5	2.4	2.4
South Dakota	5	2.4	2.4
Utah	5	2.4	2.4
Iowa	4	1.9	1.9
Nevada	4	1.9	1.9
Idaho	3	1.4	1.4
Maryland	3	1.4	1.4
Texas	3	1.4	1.4
Vermont	3	1.4	1.4
Arkansas	2	1	1
Connecticut	2	1	1
Louisiana	2	1	1
Montana	2	1	1
Colorado	1	0.5	0.5
Delaware	1	0.5	0.5
Indiana	1	0.5	0.5
Kentucky	1	0.5	0.5
Massachusetts	1	0.5	0.5
Minnesota	1	0.5	0.5
Missouri	1	0.5	0.5
North Carolina	1	0.5	0.5
North Dakota	1	0.5	0.5
New Hampshire	1	0.5	0.5
New Jersey	1	0.5	0.5
New York	1	0.5	0.5
Tennessee	1	0.5	0.5
Wyoming	1	0.5	0.5
No response	38	18.3	18.3

Note: The data was obtained from the STATE field in the 2010 IPEDs dataset. The STABBR was renamed STATE in the survey dataset.

Appendix M

Number of Institutions By Geographic Region

	Web Institutions (N=227)		Survey Institutions (N=86)		Participants (N=208)	
Region	N	%	N	%	N	%
Great Lakes	47	20.7	16	18.6	35	20.6
Far West	44	19.4	24	27.9	46	27.1
Southeast	37	16.3	11	12.8	20	11.8
Mid East	27	11.9	10	11.6	19	11.2
Plains	24	10.6	8	9.3	12	7.1
Rocky Mountains	18	7.9	8	9.3	12	7.1
Southwest	17	7.5	5	5.8	19	11.2
New England	11	4.8	4	4.7	7	4.1
Outlying areas	2	0.9	0	0.0		
US Service Schools	0	0	0	0.0		

Note: The data was obtained from the OBREG field in the 2010 IPEDs dataset

Appendix N

Representation by Public or Private Institutions

Type of Institution	Web Institutions (N=227)		Survey Institutions (N=86)		Participants (N=208)	
	N	%	N	%	N	%
Public	162	71.4	65	75.6	129	62.0
Private not-for-profit	34	15.0	19	22.1	35	16.8
Private for-profit	31	13.7	2	2.3	6	2.9
No response					38	18.3

Note: The data was obtained from the CONTROL field in the IPEDs dataset. The CONTROL variable was renamed PUBLIC in the survey dataset.

Appendix O

Representation by Institutional Level

Level of Institution	Web Institutions (N=227) N	%	Participants (N=86) N	%
Four or more years	74	36	67	32
At least 2 but less than 4 years	152	73	103	50
Less than 2 years *	1	0		
No Response			38	18.0

Note: Less than 2 years is below the associate degree level. Data taken from the ICLEVEL variable.

Appendix P

Representation by Institutional Control

Sector	Total Institutions (N=227)		Participants Represented (N=208)	
	N	Percentage	N	Percentage
Public, 4-year or above	22	10	27	13
Private not-for-profit, 4-year or above	33	15	35	17
Private for-profit, 4-year or above	19	8	5	2
Public, 2-year	140	62	102	49
Private for-profit, 2-year	11	5	1	1
Private not-for-profit, 2-year	1	0	0	0
Private for-profit, less-than 2-year	1	0	0	0
No Response			38	18

Note: The data was obtained from the STATUS field in the 2010 IPEDs dataset.

Appendix Q

Representation by Institutional Size based on Yearly Enrollment

	Total Institutions (N=227)		Participants Represented (N=86)		
Yearly Enrollment	N	%	N	%	Valid Percent
Under 1,000	24	11%	7	3.4	4.1
1,000 - 4,999	87	38%	37	17.8	21.8
5,000 - 9,999	55	24%	51	24.5	30
10,000 - 19,999	44	19%	36	17.3	21.2
20,000 and above	17	7%	39	18.8	22.9
No Response			38	18.3	
Total	227	100%	208	100	

Note: The data was obtained from the INSTSIZE field in the 2010 IPEDs dataset. INSTSIZE was renamed SIZE in the survey dataset.

Appendix R

Correlations between the Age of the Participants and Number of Times Teaching Web Courses

Number of Times Participant Taught Each Web Courses	Number of times Teaching Web Courses (N= 188)		Correlation with Participant Age (N=191)	
	M	SD	r	p
Introductory Web Courses				
Client-side Programming	2.32	1.656	.109	0.137
Creating Web Pages with HTML	2.87	1.809	.150*	0.041
Creating Web Pages Web Editors	2.45	1.741	.185*	0.011
E-Commerce or E-Business	1.82	1.403	.211**	0.004
Introduction to the Internet	2.74	1.806	.248**	0.001
Web Graphics Design	2.16	1.647	.023	0.753
Web Multimedia and Animation	1.96	1.489	.059	0.426
Advanced Web Courses				
Mobile Applications	1.51	1.011	.06	0.417
Social Networking	1.43	1.008	.126	0.087
Web-based Communications	1.65	1.259	.091	0.218
Web-based Marketing	1.44	1.09	.052	0.48
Web Database Programming	2.05	1.521	.12	0.104
Web Graphics Marketing	1.39	0.988	.036	0.626
Web Security	1.59	1.183	.046	0.531
Web Server Management	1.57	1.215	-.08	0.277
Web Server Programming	1.93	1.502	.083	0.258

Note: ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

Appendix S

Bivariate Correlations between the Number of Times Teaching Web Courses (N=188) and Participant Years of Experience in Professional Roles (N=183)

Professional Roles / Web Courses	Computer Networking r	Computer Networking p	Computer Programming r	Computer Programming p	Other Roles r	Other Roles p
Introductory Web Courses						
Client-side Programming	0.099	0.187	.270**	0.000	-.228**	0.002
Creating Web Pages with HTML	0.028	0.709	0.091	0.222	-.162*	0.029
Creating Web Pages Web Editors	0.112	0.135	0.02	0.784	-0.091	0.225
E-Commerce or E-Business	0.087	0.245	.170*	0.022	-0.135	0.071
Introduction to the Internet	0.096	0.201	0.099	0.186	-0.08	0.282
Web Graphics Design	-0.051	0.497	-.170*	0.022	0.049	0.51
Web Multimedia and Animation	0.016	0.835	-0.082	0.275	-0.026	0.728
Advanced Web Courses						
Mobile Applications	0.055	0.465	0.13	0.08	-0.073	0.329
Social Networking	.163*	0.028	-0.001	0.985	-0.113	0.131
Web-based Communications	.160*	0.032	-0.027	0.716	0.005	0.952
Web-based Marketing	.182*	0.014	-0.002	0.983	-0.086	0.252
Web Database Programming	.159*	0.033	.354**	0.000	-.198**	0.008
Web Graphics Marketing	0.096	0.198	-0.017	0.824	0.037	0.616
Web Security	.440**	0.000	.206**	0.005	-0.127	0.088
Web Server Management	.404**	0.000	0.01	0.896	-0.079	0.293
Web Server Programming	.173*	0.02	.346**	0.000	-.216**	0.003

Note: ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

Appendix T

Principal Component Analysis

Principal component analysis was used to identify factors that represent the concepts previously identified in Hall's (1968) Professionalism Scale. There are multiple variations of factor analysis including confirmatory factor analysis (CFA) and principal component analysis (PCA) methods (Field, 2009). In this study, principal component analysis (PCA) was completed to identify factors of professionalization. PCA differs from CFA in that PCA requires that the variance is accounted by all of the factors. With PCA, one requirement for is that each variable must correlate with at least one extracted component known as a factor. This study used PCA in order to identify common factors and to be able to compare those results with other professionalization studies that used similar methodologies.

Identification of Factors with a Scree Plot

Unrotated factor analysis method returned eight factors with eigenvalues greater than one. The Kaiser criteria recommends inclusion of factors where eigenvalues are greater than 1.0 because they represent a substantial amount of the total variation.

Field (2009) points out the inclusion or removal of components should not be based primarily on the Catell's (1966) scree plot or Kaiser's (1960) criteria. Although the slope changes more dramatically at 8, the eigenvalue is barely over one and therefore five factors became the better fit for this study. The point of inflection changes with 5 components in the Scree plot determined by visual inspection where the slope of the curve changes dramatically, and the values are greater than one.

Appendix T-continued

Eight factors that had eigenvalues greater than one explained 61.631% of the total variance (see T1).

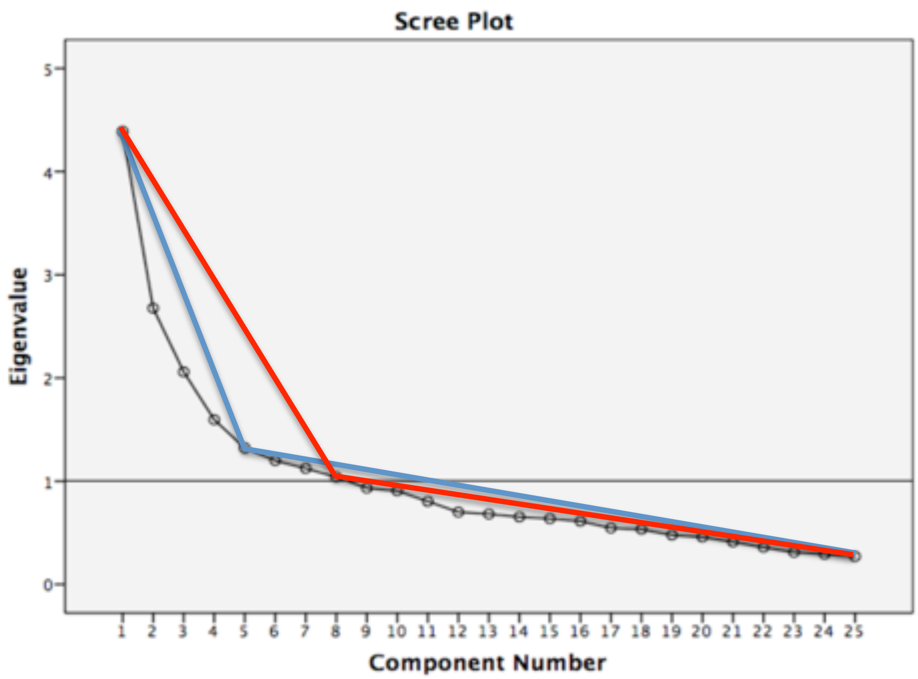

Figure T1. Scree plot for identifying the number of factors

Verifying Adequacy of the Data for Principal Component Analysis

Preliminary tests are completed to determine if the factor analysis would be valid on any particular dataset. However, with SPSS, the preliminary analysis and data analysis was collected in one step. The review of the adequacy of the data for principal component analysis was completed before the data analysis was reviewed. Several tests were used to determine if the data with five factors was adequate for principal component analysis.

Appendix T-continued

Bartlett's Test of Sphericity. Bartlett's Test of Sphericity was performed to determine if the variables would only be correlated with themselves and not correlated with each other. Bartlett's Test of Sphericity (χ^2=1,302.913, df=300, P<.000) was significant which indicated that the correlation matrix is not an identity matrix and therefore the data was adequate for factor analysis.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) was used to determine if the number of participants was sufficient for the number of variables being studied. Field (2009) explains that KMO values based on Kaiser (1974) indicate whether the patterns of the correlations are close, and therefore, the analysis is more likely to provide reliable results.

While Dixon (2005) recommends KMO levels above .80, both George and Mallery (2006) and Field support a KMO levels of .60 to indicate that data are adequate. The results of the KMO was 0.74 indicating that the sample size was adequate for the number of variables being studied.

Field (2009) recommends the individual values on the diagonal elements of the anti-image correlation matrix which represent the KMO for each variable, have a value of .5 or greater and off-diagonal correlations to be low values. The highest off-diagonal value represents the partial correlation between pairs of variables.

Appendix T-continued

The individual KMO values which indicate that the correlations on individual variables are above .5 except for variable 22 where the statistic is .434. The highest off-diagonal value for variable 22 was -.168 and that represented the partial correlation between variables 9 and 22. For simplicity, only the anti-image correlation statistic is shown for each variable (see Table T1).

Table T1

Measuring Sampling Adequacy using the Anti-image Correlations for Each Variable

Variable	Anti-Image Correlation
1	.697
2	.756
3	.514
4	.721
5	.733
6	.695
7	.700
8	.778
9	.830
10	.753
11	.767
12	.792
13	.801
14	.761
15	.764
16	.780
17	.772
18	.820
19	.723
20	.808
21	.530
22	.434[a]
23	.842
24	.754
25	.510

Note: a Only variable 22 had an r value less than five.

Appendix T-continued

Determinant of the factor analysis. The next test was to determine if the variables had extreme high correlations. If variables are too highly correlated, then the may not provide meaningful differences within and between groups being surveyed. Field (2009) states that multicollinearity is more problematic for confirmatory factor analysis than principal component analysis. In PCA, every item is correlated with at least one factor. It can happen that one factor is defined by one item.

The data analysis showed the determinant of the factor analysis was .001, greater than the recommended threshold of .00001, indicating that multicollinearity was not significant in this study. None of the communalities of the principal component extraction was greater than .7 and the average was .482. Therefore, the data in this study was adequate for factor analysis.

Paired Pearson correlation coefficients. The correlation matrix shows the Pearson correlation coefficient between all of the variables paired with each other variable.

No correlations were greater than .9 indicated that there was no multicollinearity between pairs of variables. Each variable was perfectly correlated with itself, but not perfectly correlated with other variables, supporting that the correlations matrix was not an identify matrix and therefore, there were correlations between variable (see Figure T2).

Appendix T-continued

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	1	-.055	-.075	.437	.13	.01	.064	-.016	.245	.164	.078	.224	.17	.113	.223	.116	.337	.081	-.216	.129	-.116	-.001	.071	.272	-.085
2	-.055	1	-.042	.103	.51	.143	.17	.473	.116	.557	-.016	.059	.085	.048	.215	.061	.016	.159	.087	.013	-.081	.043	.349	-.037	.058
3	-.075	-.042	1	.033	.115	.124	.128	.012	.026	-.021	.083	.066	-.093	.048	.037	.2	-.072	.023	.158	.095	.164	.051	-.036	-.02	.337
4	.437	.103	.033	1	.107	-.018	.136	.16	.232	.249	.124	.168	.147	.052	.236	.039	.308	.066	-.08	.101	-.1	.004	.085	.166	-.107
5	.13	.51	.115	.107	1	.206	.302	.439	.343	.518	-.048	.186	.132	.13	.189	.069	.011	.128	.012	.011	-.038	.059	.365	-.03	.147
6	.01	.143	.124	-.018	.206	1	.355	.186	.277	.041	.315	.079	.096	.412	.263	.213	.089	.262	-.039	.274	.144	-.022	.069	.057	-.073
7	.064	.17	.128	.136	.302	.355	1	.136	.221	.135	.065	.169	-.033	.059	.325	.143	.022	.249	-.056	.056	.057	.059	.171	.209	.052
8	-.016	.473	.012	.16	.439	.186	.136	1	.305	.32	.182	.133	.164	.225	.282	.084	.13	.148	.015	.109	.029	.091	.341	.068	.068
9	.245	.116	.026	.232	.343	.277	.221	.305	1	.192	.166	.293	.233	.309	.392	.126	.132	.208	-.146	.182	-.01	.172	.17	.2	-.071
10	.164	.557	-.021	.249	.518	.041	.135	.32	.192	1	.064	.111	.212	.014	.259	.1	.174	.112	.107	-.024	-.132	.036	.366	.033	0
11	.078	-.016	.083	.124	-.048	.315	.065	.182	.166	.064	1	.042	.311	.403	.229	.18	.285	.127	-.12	.43	.109	-.046	-.081	.204	-.117
12	.224	.059	.066	.168	.186	.079	.169	.133	.293	.111	.042	1	.182	.076	.469	.149	.099	.144	-.051	.095	.077	.001	.188	.163	.161
13	.17	.085	-.093	.147	.132	.096	-.033	.164	.233	.212	.311	.182	1	.365	.276	.163	.281	.141	-.106	.292	-.027	.035	.037	.128	-.039
14	.113	.048	.048	.052	.13	.412	.059	.225	.309	.014	.403	.076	.365	1	.119	.32	.179	.133	-.23	.565	.002	-.002	-.07	.269	-.05
15	.223	.215	.037	.236	.189	.263	.325	.282	.392	.259	.229	.469	.276	.119	1	.265	.114	.253	-.048	.159	.099	.032	.243	.217	.1
16	.116	.061	.2	.039	.069	.213	.143	.084	.126	.1	.18	.149	.163	.32	.265	1	.104	.081	-.129	.33	.022	.043	-.024	.321	.031
17	.337	.016	-.072	.308	.011	.089	.022	.13	.132	.174	.285	.099	.281	.179	.114	.104	1	.117	-.032	.226	-.125	-.001	-.004	.156	-.181
18	.081	.159	.023	.066	.128	.262	.249	.148	.208	.112	.127	.144	.141	.133	.253	.081	.117	1	.022	.026	.121	-.035	.157	.091	.056
19	-.216	.087	.158	-.08	.012	-.039	-.056	.015	-.146	.107	-.12	-.051	-.106	-.23	-.048	-.129	-.032	.022	1	-.263	.037	-.036	-.014	-.287	.148
20	.129	.013	.095	.101	.011	.274	.056	.109	.182	-.024	.43	.095	.292	.565	.159	.33	.226	.026	-.263	1	-.004	-.003	-.106	.274	-.021
21	-.116	-.081	.164	-.1	-.038	.144	.057	.029	-.01	-.132	.109	.077	-.027	.002	.099	.022	-.125	.121	.037	-.004	1	-.013	-.02	.032	.447
22	-.001	.043	.051	.004	.059	-.022	.059	.091	.172	.036	-.046	.001	.035	-.002	.032	.043	-.001	-.035	-.036	-.003	-.013	1	.093	.048	-.106
23	.071	.349	-.036	.085	.365	.069	.171	.341	.17	.366	-.081	.188	.037	-.07	.243	-.024	-.004	.157	-.014	-.106	-.02	.093	1	.028	.023
24	.272	-.037	-.02	.166	-.03	.057	.209	.068	.2	.033	.204	.163	.128	.269	.217	.321	.156	.091	-.287	.274	.032	.048	.028	1	-.084
25	-.085	.058	.337	-.107	.147	-.073	.052	.068	-.071	0	-.117	.161	-.039	-.05	.1	.031	-.181	.056	.148	-.021	.447	-.106	.023	-.084	1

Figure T2. Paired Pearson correlation coefficients

Using Principal Component Analysis to Identify a Five-Factor Solution

Consistent with approach described by Field (2009), the data was rerun using five factors to identify the principal components using principal component analysis (PCA). Five factors also fit the model previously identified by Hall (1968). Five factors emerged from the principal component analysis. Various recommended tests were run to determine the adequacy of the data for PCA, and that the results supported adequacy.

Appendix T-continued

According to the UCLA Statistical Consulting Group (2014) "variables with high values are well represented in the common factor space, while variables with low values are not well represented." In other words, the selection of factors should be based on having some correlations, but not too high of correlations.

Results of the principal component analysis. The component matrix original factor loaded on five factors for each of the variables in the Web Development Professionalism Inventory.

The rotated component matrix contains the original factor loadings, and correlations between each variable and the factors. The extraction method was principal component analysis with Varimax rotation with Kaiser Normalization where rotation converged in 7 iterations.

The only factor that did not load with a value greater than .3 was variable 18. Variable 18 asked participants if they agreed, "Most people would stay in the web development profession even if their incomes were reduced." Variable 18 loaded on all five factors, but less than .3 in each factor. Variable 22 only loaded on one factor with a value of .329. While most of the variables loaded on a single factor where the value was greater than .4, items 3 and 17 loaded on two factors (see Table T2). Only items with factors loading >.30 are shown in the table.

Appendix T-continued

Table T2

Rotated Component Matrix Using All Items from the WDPI

Item		Rotated Factor Loadings (*N*=208) 1	2	3	4	5
2	Other occupations are actually more vital to society than web development.	.803				
5	I think that this profession, more than any other, is essential for society.	.749				
10	Some other occupations are actually more important to society than web development.	.736				
8	The importance of this profession is sometimes overstressed.	.667				
23	If ever an occupation were indispensable, it is this one	.575				
14	Web developers really have no way of judging each other's competence.		.797			
20	There is not much opportunity to judge how other web developers do their work.		.753			
11	A problem in the web development profession is that no one really knows what one's fellow professionals are doing.		.715			
6	My fellow web development professionals have a pretty good idea about each other's competence.		.509			.369
13	The web development professional organization doesn't really do too much for the 'rank-in-file' member		.503	.351		
16	Web developers don't have much opportunity to exercise their own judgement.		.43			
1	A web developer regularly reads the professional journals.			.74		
4	Web developers regularly attend professional meetings at the local level.			.681		
17	Although they would like to, web developers really don't read the journals very thoroughly.		.359	.53		
12	It is encouraging to see the high level of idealism which is maintained by people in the web development field.			.496	.346	
15	I find the dedication of people in this field is most gratifying.	.3		.433	.301	.376
25	I know that my own judgement on most matters is final judgement.				.786	
21	I am my own boss in almost every work-related situation.				.673	
3	Web developers make their own decisions in regard to what is to be done in their work.				.578	
7	People in this profession have a real "calling' for their work.					.608
24	There are very few practitioners who really believe in their work.			.326		.471
9	I believe that the professional web development organizations(s) should be supported.					.464
19	In this kind of work, a person's decisions are subject to review.					-.459
22	Persons who violate professional standards should be judged by their professional peers.					.329
18	Most people would stay in the web development profession even if their incomes were reduced.					

Appendix T-continued

Removing Items from the Analysis. The factor loading and scale reliability scores were used to determine which items to remove from the analysis. Field (2009) asserts the number of items on the survey impacts Chronbach's alpha. While alpha values greater than 7 is desirable, George and Mallery (2003) reported alpha values between 6 and 7 may demonstrate internal consistency within the scales. The scale reliability analysis was rerun for each factor. The 'Cronbach's Alpha if Item is Deleted' values were reviewed to determine if there would be an impact on the overall alpha if any of the items were removed from the scale. If items were removed, the analysis was rerun. All data had item-total correlations greater than 3 unless indicted below.

Scale reliability. The scale reliability was analyzed using Chronbach's alpha. Field (2009) reviewed studies that used Chronbach's alpha to verify reliability of the items within the subscales and reported that a Chronbach's alpha of at least .7 or .8 would indicate scale reliability with .8 being a good value for alpha. The total reliability was .752. Each of the five factors was analyzed using Chronbach's alpha. Individual items with poor reliability (3, 16, 19 and 22), or could not load satisfactorily on the appropriate factors (12 and 24) were removed from the analysis Items were removed because they continued to. Chan (2005) reported the reliability with new ranges from .57 to 0.74 and overall at .71.

Appendix T-continued

The overall scale reliability was adequate ($\alpha = .770$). Removal of other items would not drastically increase the overall scale reliability and the structure of the factor analysis was reviewed again for overall reliability. However, items continued to be misaligned with the factors identified by Hall (1968).

After multiple rounds of removing items, because they continued to not load satisfactorily on the appropriate factors, an adequate solution was discovered. Eight items were removed, which left three items for each of the factors except for belief in public service that continued to load all five original items.

Comparing factors loadings with the results from Hall and Snizek. Table 104 shows the original factor loadings after rotation for this study compared to the data from the Hall (1968) and Snizek (1972) studies. The factor loadings for several items were not the highest for the factor listed. Rather, they loaded higher on other factors, which is not desirable. For comparison, the original factor loading for each item is provided (see Table T3).

Item 22 and 25 on the WPI map directly to a question on Hall, in the same original factors, but not to the same question on Snizek. In the later analysis item 22 was removed due to poor reliability but 25 was retained. Item 15 loaded on 4 factors with the highest on SC (see Table 3).

Appendix T-continued

Table T3

Comparison of original factor loading from the WDPI, Hall and Snizek surveys

Item	Question #	WDPI Survey	Hall's Data	Snizek's Data
Factor 1: Belief in public service				
PS1	2	.803	.68	-.66
PS2	5	.749	.55	-.5
PS3	8	.667	.47	-.53
PS4	10	.736	.7	-.64
PS5	23	.575	.63	-.31
Factor 2: Belief in self regulation				
SR1	6	.509	-.57	.31
SR2	11	.715	-.45	.56
SR3	14	.797	-.68	.64
SR4	20	.753	-.67	.59
SR5	22	-.065*	-.6	.47
Factor 3: Use of the professional organization as a major referent				
PO1	1	.74	.56	-.42
PO2	4	.681	.58	-.24
PO3	9	.275	.55	-.16
PO4	13	.351	.52	-.44
PO5	17	.53	.04	-.07
Factor 4: Sense of calling to the field				
SC1	7	.608	.5	.53
SC2	15	.376**	.45	.55
SC3	12	.295	.42	.68
SC4	18	.235	.23	.3
SC5	24	.471	.29	.39
Factor 5: Feeling of autonomy				
AT1	3	.578	.71	-.69
AT2	16	.168	.64	-.61
AT3	19	.296	.55	-.57
AT4	21	.673	.71	-.73
AT5	25	.786	.66	-.7

Appendix T-continued

Organization of Extracted Factors Using Five Attitudinal Components of Professionalization. The factor loadings were organized based on the mapping to the Hall (1968) Professionalism Inventory Scale. Clearly, two factors were identified as distinct factors. The first factor in this study represented the belief in a public service tenant described by Hall and the second factor represented the belief in self-regulation. Item 6, which had loaded on the second factor, also loaded partially on the fifth factor (.369). It was not a surprise that item 22 did not load in the second factor, but only loaded on fifth factor (.329) because this item was not included in the best-fit that Snizek (1972) recommended. There may be some overlap in the concepts of self-regulation and belief in public service.

Like Wimmer (2009), the other three components in this study realigned into different combination of items than the Hall or Snizek components as shown in Table 102. Both Chan (2005) and Wimmer (2009) experienced similar results, and needed to remove several items from the analysis.

The third factor in this study mapped closest to Hall's component the use of the professional organization as a major referent with items 1, 4 and 13 and 17 aligned. However, item 17 also aligned partially with the second factor (.359) and item 13 actually aligned more with the second factor (.503) than the third factor (351). Item 13 asked participants if they agreed, "The web development professional organization doesn't really do too much for the 'rank-in-file' member."

Appendix T-continued

The belief in self-regulation and the use of the professional organization as a major referent may have overlap in how they are measured by this item. As explained earlier, for web development, there was no unifying professional organization selected by the majority of participants. Therefore, the tendency to include this conceptually with the self-regulation may be more plausible. Item 9 asked participants if they agreed, "I believe that the professional web development organizations(s) should be supported." Again, this factor did not have a high factor loading on factor three (0.275) but instead loaded on factor five (.464).

The fourth factor in this study mapped closest to Hall's component the feeling of autonomy with items 3, 21 and 25 loading. Item 3 asked participants if they agreed, "Web developers make their own decisions in regard to what is to be done in their work." The item loaded more on factor three (.74) than factor four (.578). Item 16 did not load on factor four (.168) but instead loaded on factor two (.43) and item 19 also did not load on factor four (2.96) but loaded on factor five (-.459).

The fifth factor in this study mapped closest to Hall's component the sense of calling to the field with items 7, 15 and 24 loading. Item 15 loaded on higher on factor three (.433) and the item also loaded on factor four (.301). Item 24 loaded on the third factor (.326). Items 12 (.295) and 18 (.235) did not have adequate loadings on factor five. However item 12 loaded on factor three (.496) and factor four (.346). Item 18 asked participants if they agree, "Most people would stay in the web development profession even if their incomes were reduced."

Appendix T-continued

Item 18 did not have any factor loadings more than .3 on any of the other factors but it did have very low factor loadings on each of the five factors. Table T4 shows the eigenvalues and the variance explained by the five factors in this study. The variance from the five factors explained 48.172% of the variance.

Table T4

Summary of Eigenvalues, Percentage of Variance Explained and Cumulative Percentage of Variance

	Factors				
Measure	1	2	3	4	5
Eigenvalues	4.39	2.676	2.059	1.596	1.322
Percentage of Variance Explained	12.199	11.634	8.99	7.818	7.531
Cumulative % Variance	12.199	23.833	32.823	40.641	48.172

Scale Reliability. Before the questions were removed from the analysis, the scale reliability was analyzed using Chronbach's alpha. Field (2009) reviewed studies that used Chronbach's alpha to verify reliability of the items within the subscales and reported that a Chronbach's alpha of at least .7 or .8 would indicate scale reliability with .8 being a good value for alpha. The total reliability was .752. Each of the five factors was analyzed using Chronbach's alpha.

Factor 1 Reliability: Belief in Public Service. The first factor, belief in public service maintained high reliability (α=.783). There would be no change in the overall alpha if any of the items were deleted. Therefore, no items were deleted from the scale.

Appendix T-continued

Factor 2 Reliability: Belief in Self-Regulation. Item 22 (-.025) item-total correlation was less than .3 and the overall alpha (α=.610). Removing item 22 increased reliability (α=.725).

Factor 3 Reliability: Use of the Professional Organization as a Major Referent. Item 22 (-.293) item-total correlation was less than .3 and the overall alpha (α=.632). Deleting items 9 (.611) and item 13 (.620) would not contribute to altering the scale reliability and therefore they were not deleted. Removing of these items would drop the scale reliability slightly (α=.629). Therefore, these questions were not removed.

Factor 4 Reliability: Feeling of Autonomy. The item-total correlation for 16 (.055), 19 (.086) and 21 (.284) was less than .3 and the overall alpha was (α=.458). Removing item 16 (.521) and item 19 (.500) increased overall reliability (α=.571). After the reliability analysis was rerun, the item-total correlation for item 3 was less then .3 (284) with a higher alpha (.610) if the question was removed. The tradeoff was that there are only two items that measure this construct.

Factor 5 Reliability: Sense of Calling to the Field. The item-total correlation for 18 (.253) and 24 (.217) was less than .3 and the overall alpha (α=.586). Removing any items would not improve scale reliability but would have resulted in a decrease in reliability (α=.494).

Appendix T-continued

The Final Factor Analysis. Items 3, 16, 19 and 22 were removed to improve scale reliability. However, factor five continued to have low reliability even if items were removed from the analysis. The overall scale reliability was adequate (α=.770). Removal of other items would not drastically increase the overall scale reliability and the structure of the factor analysis was reviewed again for overall reliability. However, items continued to be misaligned with the factors identified by Hall (1968). Items 12 and 24 were also removed because they continued to not load satisfactorily on the appropriate factors. After multiple rounds of removing items, because they continued to not load satisfactorily on the appropriate factors, an adequate solution was discovered. Eight items were removed, which left three items for each of the factors except for belief in public service that continued to load all five original items. The items removed from the final factor analysis were 6, 9, 12, 13, 16, 19, 22 and 24.

Verifying Factor Analysis Structure After Reliability Analysis. A principal component analysis with orthogonal rotation (varimax) was conducted on the modified items to determine if there were differences in the factor loadings from the previous analysis. The KMO measure verified the sampling adequacy for the analysis, KMO = .701. KMO measures were above the acceptable limit of .5 (Field, 2009) except for item 25 (.474). The determinant of the factor analysis was .018, greater than the recommended threshold of .00001, indicating that multicollinearity was not significant in this analysis.

Appendix T-continued

Bartlett's Test of Sphericity χ^{C} (136) = 807.418, p < .001, was significant and therefore indicated correlations between items were sufficiently large for PCA. The five components were retained in the final analysis had eigenvalues over Kaiser's criterion of 1 and in combination explained 58.560% of the variance. The most variance was explained by the belief in public service factor.

Individual Scale Reliability. The overall reliability of the new 17-item scale was .699. Although slight increases in overall reliability could be gained from removing items 3, 21 and 25, two factors would have less than three items. Therefore, no additional items were removed (see Table T5).

Table T5

Summary of Item Counts per Factor, Means, Standard Deviations, Eigenvalues, Percentage of Variance Explained, Cumulative Percentage of Variance and Chronbach's Alpha for the Five Factors

Factors	N	X	SD	Eigenvalues	% of Variance	α
1 PS Belief in public service	5	12.9	3.62	3.345	16.223	.783
2 SR Belief in self regulation	3	10.48	2.002	2.257	12.453	.722
3 PO Use of the professional organization as a major referent	3	9.57	1.91	1.885	10.733	.629
4 SC Sense of calling to the field	3	9.84	1.63	1.372	9.758	.526
5 AT Feeling of autonomy	3	8.03	1.932	1.096	9.392	.571

Note: The five factors had a cumulative variance of 58.560%. Strongly disagree = 1 and Strongly agree = 5.

Wimmer (2009) removed 10 items but still continued to have low reliability scores for professional organization as reference and feeling of autonomy. In this study, the two lowest reliability sores were feeling of autonomy and sense of calling to the field.

Appendix T-continued

Wimmer (2009) suggested that only factor in the professionalization model that was consistently reliable was the belief in self-regulation. In this study, the belief in public service was consistently reliable with belief in self-regulation a close second.

Higher overall scores were harder to interpret because there were five items in belief in public service factor, resulting in a total possible score of 25 while the other factors total possible score was 15. The average of the first factor was 12.9 out of 25 or .52 and the second factor was 10.48 out of 15 or .70. Therefore the highest scores were for Factor 2 (.70), Factor 4 (.66), Factor 3 (.64), Factor 5 (.54) and lastly Factor 1 (.52). The lowest scores were in feeling of autonomy and belief in public service. The mean below is the mean of the sum scores for the factor.

Item variance and factor correlations. Field (2009) described communality as the amount of variance that is retained in the variable, after the factors are extracted. The items that retained the most variance after factor extraction were 2, 20 and 25. When the individual reliability scales were reanalyzed no item had a Chronbach's alpha lower than .563. The communality variable should be at least .5 or higher which means that the factor solution explains at least half of the variance for the individual items (Schwab, 2002). The highest item reliabilities were found across four of the factors with items 1, 8, 14, 20 and 25 and the lowest reliabilities were also found across four of the factors with items 7, 12, 17 and 21.

Appendix T-continued

A factor analysis was executed using the direct oblim, oblique rotation with Kaiser Normalization to identify the relationship between individual factors. The component correlation matrix contains the correlation coefficients for each of the factors (see Table T6). The values were highest between belief in pubic service and feeling of autonomy, indicating that these two factors had the strongest factor correlation.

Table T6

Component Correlation Matrix

	Factors	1	2	3	4	5
1	Belief in Public Service	1.000				
2	Belief in Self Regulation	.014	1.000			
3	Use Of The Professional Organization as a Major Referent	.001	.008	1.000		
4	Sense of Calling to the Field	.139	.161	-.118	1.000	
5	Feeling of Autonomy	-.234	-.094	-.108	-.090	1.000

Note: Extraction Method: Principal Component Analysis. Rotation Method: Oblim with Kaiser Normalization.

Appendix U

Communication from Dr. William Snizek and Dr. Richard Hall

Bill Snizek — January 24, 2012 6:54 PM
To: Kathleen Kalata
Re: Doctoral Research in Web Development as a Profession — Inbox - Oakton LSSU 1

Kathleen,
First of all, good luck with your research. I know of no studies that have looked at web design/ computer scientists and their degree of professionalization.
And yes, you certainly have my permission to use my revision of Hall's professionalization scale. The last I hear from Dick Hall he was retiring from SUNY, Albany. If you can't contact Dick, I suggest you contact the ASA in D.C., and ask them about using Dick's scale. When others have done so, permission was given.

Figure U1. Permission from Dr. Snizek for use of his revision of the Hall survey tool originally published in Snizek, W. E. (1972). Hall's Professionalism Scale: An Empirical Reassessment. American Sociological Review, 37(1), pp. 109-114.

Bill Snizek — May 16, 2014 10:33 AM
To: Kathleen Kalata
Re: Permission to reprint your survey. — Inbox - LSSU Gmail 1

Good evening.

Would you kindly allow me to publish the survey tool from your article within my dissertation?

Snizek, W. E. (1972). Hall's Professionalism Scale: An Empirical Reassessment. American Sociological Review, 37(1), pp. 109-114.

Your article was cited in the dissertation and given full credit in the manuscript.

For your convenience, please simply reply and provide your signature on of the page to indicate your permission for my use of the above-mentioned material. By signing below, you give ProQuest Information and Learning (UMI) the right to supply copies of this material on demand as part of my doctoral dissertation from Western Michigan University.

Signature _W.E.Snizek_________________________ Date 16 May 2014

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Electronic signature is acceptable. You can also fax this page to 816-817-1441.

See More

Lake Superior State University
906-635-2747
kkalata@lssu.edu

--
William E. Snizek
Alumni Distinguished Professor Emeritus of Sociology
Virginia Tech

Figure U2. Permission from Dr. Snizek for reprinting his revision of the Hall survey tool

Appendix U-continued

Pamela S. Tolbert May 16, 2014 10:25 AM
To: Kathleen Kalata
RE: Richard Hall Inbox - LSSU Gmail 4

Dear Kathleen,

I have been assigned responsibility for giving permission to use Dr. Hall's scale, and you are welcome to use it. Just be sure to give the proper citation to him in your work.
Best,
Pam

Pamela S. Tolbert
Lois S. Gray Professor of Industrial Relations and Social Sciences
Department of Organizational Behavior

Figure U3. Permission to use the Hall survey tool, originally published in Hall, R. H. (1968). Professionalization and Bureaucratization. American Sociological Review, 33(1), 92-104