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Graduate and Employer Perceptions Regarding Job Preparedness Skills of Design Technology Graduates

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GRADUATE AND EMPLOYER PERCEPTIONS REGARDING JOB PREPAREDNESS SKILLS OF DESIGN TECHNOLOGY GRADUATES

by

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This dissertation, submitted by Bonnie Higgins in partial fulfillment of the requirements for the Degree of Doctor of Philosophy from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

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This dissertation meets the standards for appearance, conforms to the style and format requirements of the Graduate School of the University of North Dakota, and is hereby approved.

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Title	Graduate and Employer Perceptions Regarding Job Preparedness Skills of Design Technology Graduates
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ABSTRACT

The purpose of this study was to investigate graduate and employer perceptions in regard to the job preparedness level of graduates from a design technology program at a single midwestern university in five skill category areas: (a) general work habits and skills, (b) communication skills, (c) technical skills, (d) graphic communication skills, and (e) project management skills.

This study was conducted as evaluation research and implemented an internal formative evaluation conducted through the administration of surveys to two distinct groups. Fifty-nine (27.4%) program graduates from 2001-2006 completed and returned the 19-item survey, while twenty-seven (67.5%) employers of program graduates completed and returned the 15-item survey. This sample of employers may not have employed more than a small percentage of the graduates from 2001-2006.

The responses of graduates and employers revealed definite strengths and weaknesses of graduates in the job skill categories, along with areas that were modestly rated, but still need improvement. Through the examination of graduate and employer perception data, the following strengths in job preparedness skills of program graduates were identified: (a) the ability to work in teams and (b) the ability to follow a project to completion. The remaining job skill items under study in this research were rated with moderate scores, revealing the need for improvement in those areas. The following

weaknesses in job preparedness skills of program graduates were also identified through this study: (a) the ability to work with clients, (b) the ability to communicate with clients, (c) skills in sketching, (d) knowledge regarding issues of salary and benefits offered in the industry, (e) the ability to determine project estimates, and (f) skills in utilizing project management software.

CHAPTER I

INTRODUCTION

The challenges facing higher education in the twenty-first century are vast. The growing demand for accountability, increasing costs of a college education, and the implementation of distance and alternative types of course delivery, are all contributing to questions. Are students receiving a quality education? Are students prepared for employment after graduation? Do graduates possess the skills that employers' desire?

Universities attempt to ensure positive answers to these questions through a variety of avenues, including formal accreditation at the institutional and programmatic levels as well as informal internal evaluation. Program evaluation is vital in determining if students are receiving a quality education with adequate preparation for careers in their field.

Evaluation takes place every day at institutions of higher education with administrators and educators making decisions regarding student performance and achievement at a variety of levels. Evaluation can be defined and described with numerous terms including appraising, analyzing, determining value of, critiquing, grading, judging, and reviewing, to name a few (Boulmetis & Dutwin, 2005; Patton, 2000; Stufflebeam, 2001). Because of the wide range of definitions and applications for evaluation, it is important to establish the type of evaluation theory on which this study

will be based. The framework of program evaluation embraced by the researcher was that of Fitzpatrick, Sanders, and Worthen (2004), who identify three important stages in the evaluation process: "1) determining standards for judging quality and deciding whether those standards should be relative or absolute, 2) collecting relevant information, and 3) applying the standards to determine value, quality, utility, effectiveness, or significance" (p. 5). For this study, the standards by which quality was identified were determined by the program's objectives and industry-related accrediting bodies' standards. The primary purpose of this formative evaluation was to determine the effectiveness of a particular program and to use the results for program improvement.

Program Under Study

The Bemidji State University (BSU) Department of Technological Studies is a diverse department and includes the following programs: (a) Career and Technical Education, (b) Design Technology, (c) Industrial Technology, and (d) Technology Management, with each program offering several specializations. The focus of this study was to evaluate the effectiveness of the Design Technology (DT) program through survey instruments on employer and graduate perceptions. The program has evolved from a program of traditional technical illustration/graphic design to the current state. DT is a unique applied program that integrates design, illustration, and technology through an interdisciplinary approach with courses taught by Visual Arts and Technological Studies.

Through this interdisciplinary approach, students may choose one or more of four specializations: (a) digital design for print delivery, (b) digital design for electronic delivery, (c) exhibit design, and (d) model design. With this degree, students seek

employment in a variety of roles in the design field including: Art Director, Production Artist, Exhibit Designer, Graphic Designer, Multimedia Specialist, Pre-press Production, Web Page Design/Development, and Model Builder.

Standards for measuring the efficacy of Design Education have changed tremendously over the last several years. Changing technological, economic, and social demands have altered the criteria by which the preparedness of design program graduates is measured (Davis, 2005). Exclusively teaching the functionality of the latest software would be a useless exercise since the skills and knowledge would be outdated as soon as they were mastered. Design education programs need to determine the appropriate balance of technology instruction to other curricular demands such as communication skills and the knowledge and ability to apply visual composition. In addition to rapidly changing technology, economic and societal concerns have required design programs to expand and shift to meet the needs of the global industry. This study evaluated BSU's DT program based on industry trends and standards. These benchmarks were determined from the professional standards of two accrediting bodies pertinent to the design field, in addition to the DT program objectives, which are analyzed each year by an advisory board comprised of designers currently employed in the field.

A Brief History of Design Education

The American industrial revolution brought about changes in the economic development of businesses across the country while supplying new technologies and a more efficient means for cost-effective printing and paper production. Because of these new technologies and a need for communicating and selling the yields of mass-

production, graphic designers began to provide a great service to businesses trying to market their products (McCoy, 2005). Forward-thinking businessmen, manufacturers, and artists of the time realized the unique opportunities of artistic design for industry and began The Rhode Island School of Design (RISD) in 1877 (Austin, 1997). The design curriculum focused on the education of product and industrial designers. In the early nineteen hundreds, RISD became a nationally accredited, degree-granting institution of higher education.

After World War II, the American economy cultivated even a greater need for design through advertising and packaging, as most postsecondary schools were teaching some form of design, including advertising design, illustration, photography and industrial design (McCoy, 1997). The majority of graphic designers were not educated in established design programs, but were by-products of private college and university fine art programs who went on to learn the design communication knowledge and skills necessary through apprenticeships and on-the-job training.

It was not until 1950 that Yale established the first postsecondary educational program in graphic design, which later gained regional and national accreditation (Kelly, 1994). Yale's efforts were instrumental in establishing graphic design as a field of study and a profession, as several of the program's graduates went on to greatly influence design program curriculum and teaching at institutions across the nation, including the Minneapolis School of Art (Kelly, 1989).

McCoy (2005) describes graphic design as an "adolescent profession," since it was not until the late 1950's and early 1960's that graphic design earned professional

status in society, separate from illustration and advertising. People began to recognize graphic needs outside of advertising. Just over the past few decades, design programs have established themselves as disciplines and majors, which are uniquely different than the traditional fine arts degree, by focusing specifically on design history, processes and theories.

With the advent of computers in the latter 20th Century, the traditional design industry has grown to include a broad spectrum of visual communication specialists (e.g., web designers, multi-media designers, animators, and exhibit designers). The design industry will continue to expand as technology further develops in areas such as time-based media, virtual reality, 3-dimensional (3D) projection and those technologies yet to be developed. These and other changes to the profession repeatedly force design educators to examine their pedagogy in efforts to provide students with relevant skills and knowledge.

A History of Design Technology at Bemidji State University

Visionary faculty members used an entrepreneur-like approach to develop the DT Program at BSU. One such faculty member was Dr. Kermit Anderson. Anderson was hired at BSU in 1968 after completing his PhD in Industrial Technology at Texas A&M, with minors in engineering graphics and curriculum construction. At the time Anderson was hired, there was no existing design program in the Industrial Technology Department at BSU. In the early 1970's, Anderson and his colleagues enlisted the expertise of Art Department faculty, Keith Malmquist and Bill Kelly, and began discussing the possibility of developing a joint program between the Art and Industrial Technology Departments

that would marry art and technology into a unique two-year design-related degree. After curriculum passed for the two-year degree in Technical Illustration, Anderson, Malmquist and Kelly began pursuing approval for a four-year degree program (K. Anderson, personal communication, June 7, 2007). In 1974, a Bachelor's of Science in Technical Illustration was officially offered at BSU.

In 1985, the Technical Illustration degree was changed to the broader degree of Graphic Design. This interdisciplinary curriculum continued to expand as more specializations were added to the program. Anderson and BSU Professor Art Hedlund collaborated to develop a specialization in Dimensional Illustration, what is known today as Model Building (K. Anderson, personal communication, June 7, 2007). The Model Building program is one of a few in the nation and is well respected in the profession (Association of Professional Model Makers, 2006).

In addition to the Model Building specialization, another unique program developed under the leadership of Anderson, was Exhibit Design. The Exhibit Design specialization focuses on the design of trade show exhibits, museum and educational exhibits, point-of-purchase displays, and retail environments. By 1992, there were six specializations that students could earn as part of the Graphic Design degree including: Technical Illustration, Model Building/Design, Editorial Illustration, Print Production, Exhibit Design, and Computer Graphics (BSU Undergraduate Catalog, 1992-1994). As the design industry evolved during this time period, so also did the design program at BSU. Technology and software applications were becoming increasingly powerful and continued to shape design education and the industry. Along with the sustained influence

of technology on design the program changed in 2002 once again from Graphic Design to Design Technology and was comprised of the following four specializations: Digital Design/Print, Digital Design/Electronic, Exhibit Design, and Model Design. This curricular structure is still in existence today, yet faculty members are constantly considering curricular improvements to meet the ever-changing needs of graduates and the profession.

Pedagogical Issues in Design Education

Time Versus Content

Today, design education programs across the country are faced with several issues as they attempt to prepare students to enter the profession. The single largest issue of undergraduate design programs is that there simply is not enough time to teach everything necessary for students to graduate with the knowledge and skills of a well-rounded designer. In the article, "What This Country Needs Is a Good Five-Year Design Program," Heller (2004) states that there is insufficient time in the typical four-year undergraduate program to prepare students to function in the complex twenty-first century design field.

The ever-broadening design industry increases the demand put on design education programs to continually monitor and adjust curriculum to not only prepare students for today's design profession, but to continue to serve the students as the future of the field evolves and shifts. Students attending four-year colleges and universities will spend approximately two to three years of their education in their major courses, as general education requirements exhaust the remaining one to two years. Through the

programmatic coursework, design educators are expected to deliver a wide range of design expertise during this limited number of credit hours.

Heller (2005) argues that mastery, not competency, is required by the profession, yet educators are struggling to determine the best way to equip designers with this vast amount of entry-level capabilities. In addition to the concern of thoroughly teaching the required content in a limited amount of time, the question of technology's role in design education is also a subject under scrutiny.

Balancing Technology in Design Education

There is a definite spectrum of programmatic beliefs regarding technology's place in design programs across the country. On one end are those programs that elude technology entirely; on the other end, are programs that concentrate on technology; and in the middle, are programs that fall between the extremes. Programs also question whether technical skills should be taught in design courses or outside of class through workshops and seminars, leaving class time open for concept development, theory, research, collaboration and critiques (Mages, Murrell, & Speer, 2006). This broad gamut of technological importance in the curriculum summarizes the issue of determining the correct balance between technology skills and design knowledge.

Several topics fuel the debate of whether or not to increase or decrease the curricular commitment to instruction regarding specific software applications. Continual financial obligations (e.g., cost of computers, technical support, maintenance and software upgrades) affect the level of technology in design programs. Some administrations are willing and able to commit the funds necessary to provide students

with the most up-to-date technologies, while others are not (American Institute of Graphic Arts and National Association of Schools of Art and Design, n.d.).

Philosophical reasons also dictate design educators' stance on the importance of teaching software specifics during class. Arguments against technology's place in the curriculum include the fact that software skills will be obsolete in one to two years. Companies like Adobe, Apple and Autodesk release updates to their software applications every six months to a year. For this reason, it is vital that students develop self-reliance in technology, rather than instructor dependency, and that they understand and are able to cope with technology's ever-changing nature (Tselentis, 2006).

Design educators (Longhauser, 2005; Tselentis, 2006) are concerned about growing trends where people use computers to shorten the conceptual process involved in developing an idea. They merely create a final piece on the computer, without the rich ideation that accompanies research, questioning, and experimenting that results in effective form (visually pleasing composition) and function (the expected action of the audience). Lupton (2005) and Garland (2005) caution design educators about the dangers of falling slaves to the computer and allowing students' ideas to be dictated by their level of software knowledge.

Just as there are philosophies that underscore the negative effects of technology on a design program, there are also several arguments for the benefits of technology's role in design education. Students are excited about technology, hungry for technical knowledge, and expect to gain the training as part of their education (Lupton, 2005). Not only do the students wish to gain software insight, but also the design industry demands that students

have an effective and efficient usability level as employers simply lack the time to train graduates when they are hired. Design educators admit that both technology and traditional design skills are vital to a designer's success. Murell and Mages (2006) state that "Technology literacy is undeniably part of design practice; students need a highly literate understanding of both hand-skills and technology to successfully execute their ideas" (p. 9).

Technology's litigious role in the education of a designer has administrators of design programs wrestling with the idea of a perfect balance of technology and design knowledge. Design educators do agree that technology is a tool that assists in achieving solutions to communication problems, but in the process, design content must not be compromised (Heller, 2005; Shell, 2006; Tselentis, 2006). In a briefing paper, published by the American Institute of Graphic Arts (AIGA) and the National Association of Schools of Art and Design (NASAD), recommendations are made regarding the importance of a process that "keeps technological resources current with the demands of the curriculum, responsive to the profession, and consistent with student needs." (AIGA/NASAD, 2007, ¶ 13)

To Specialize or Not?

Should design students specialize in one design discipline? Is it more important for design students to graduate with a deep understanding in a specialized aspect of design, or with a broad, surface knowledge of all aspects of the design field? There are several disciplines in the field of design, such as editorial, corporate, advertising and branding, environmental, interactivity, and several additional specialties (Heller &

Fernandes, 2004). Just as design educators are trying to find the balance of technology in design education, so also are they debating the appropriate balance of specialized knowledge to generalized knowledge.

Today's complex design field often commands the need for specialization. In becoming a Graphic Designer, Heller and Fernandes (2004) state the following:

> This [design] field has many subdisciplines (and sub-subdisciplines) that require bodies of knowledge and intense experience. Graphic design is not, as some people like to say by way of unfair comparison, brain surgery; but then, only brain surgery is really brain surgery. It is however, a specialized practice that has expanded as technologies have developed. (p. 7)

Heller and Fernandes (2004) go on to state that beginning designers would be wise to choose a medium the designer plans to devote the time and energy to acquiring expertise in as a career, yet be fluent in as many other areas as possible.

Some areas of design are not only extremely technical, but also incorporate several layers of knowledge. For example, students interested in pursuing web design and development should hone skills in the aesthetical design of websites; they should also have an in-depth knowledge of information architecture, css, html and java script coding, ecommerce, search engine optimization, web accessibility, Flash, and several other important skills and concepts. As areas of design become increasingly complex, it is nearly impossible for professionals in the field to expect graduates to possess expertise in all disciplines of design.

Design educators and professionals give several reasons why specialization should be avoided in undergraduate design education. In the article, "*Give Back, Grow Forward*" (Haley, 2006), Katherine McCoy argues against specialization when she suggests that specialization narrows your entry-level job options. By focusing on one discipline of design, students may hinder their ability to gain employment in design firms where designers are expected to assist on different aspects of several projects. Another argument by McCoy (Haley, 2006) is that designers, who gain employment in smaller towns versus urban areas, will be expected to possess a broad range of design skills and knowledge.

In addition to McCoy's compelling arguments, Irwin (2004) speaks out against specialization by promoting a broader design education for the good of the profession. He states the following:

> I believe that a more well-rounded and less specialized program of study for traditionally trained designers is important if we are to attain the stature and influence we want and gain the ability to participate in the design of meaningful solutions. (¶ 7)

Irwin (2004, p.1) suggests that designers, who are narrowly trained, are unable to see the connections of "the big picture" thinking and through this reductionist approach to design education, ultimately diminish the stature of the profession.

Some design educators (Churchman, 2004; Irwin, 2004; Swanson, 2005) believe that design education should be more liberal arts-based. There is discussion in the profession that design program graduates are prepared in the foundations of design and technical knowledge, yet lack the ability to think conceptually, conduct necessary

research to solve visual communication problems, and critically think and write. Design educators such as Churchman (2004) and Irwin (2004) advocate a more interdisciplinary approach to design education to provide students with a broader range of knowledge and communication skills. Courses in creative writing, anthropology, and political science contribute to a student's overall perception of the world in which they design. This argument related to specialization or generalization adds more weight to the question of which components create a design program that graduates designers who are innovative and responsive to the field.

Need for the Study

BSU is accredited through the North Central Association (NCA), which provides a structure for institutional evaluation, assures accountability of the use of federal funds, and maintains criteria for quality educational programs for students (North Central Association, 2006). The Department of Technological Studies at BSU participates in the NCA five-year program review by completing a self-study that includes an evaluation of the department based on the standards and criteria established by the NCA Commission on Accreditation and School Improvement. As part of the self-study, a survey is sent to Technological Studies graduates to assess their preparation and level of success in graduate education and/or the world of work. However, due to the diversity of the department, the NCA graduate survey is unable to assess Technological Studies graduates on their job preparedness based on objectives directly related to the individual's program of study. Therefore, DT graduates are not asked specific questions relating to the effectiveness of the DT program in preparing students for future design-related careers.

Purpose of the Study

The purpose of this study was to determine if BSU DT graduates are prepared for jobs in the design industry. The study examined graduate and employer perceptions in regard to graduates' job preparedness in five skill category areas: (a) general work habits and skills, (b) communication skills, (c) technical skills, (d) graphic communication skills, and (e) project management skills. The following research questions were addressed:

1. What are the perceptions of BSU DT graduates regarding their preparedness in the five skill category areas?
   (a) To what extent do BSU DT graduates perceive themselves to be prepared in general work habits and skills?
   (b) To what extent do BSU DT graduates perceive themselves to be prepared in communication skills?
   (c) To what extent do BSU DT graduates perceive themselves to be prepared in technical skills?
   (d) To what extent do BSU DT graduates perceive themselves to be prepared in graphic communication skills?
   (e) To what extent do BSU DT graduates perceive themselves to be prepared in project management skills?
2. According to graduates' perceptions, does the level of job preparedness of BSU DT graduates differ by major specialization?

3. What are the perceptions of employers of BSU DT graduates in regards to the graduates' preparedness in the five skill categories?

   (a) To what extent do employers believe that BSU DT graduates are prepared in general work habits and skills?

   (b) To what extent do employers believe that BSU DT graduates are prepared in communication skills?

   (c) To what extent do employers believe that BSU DT graduates are prepared in technical skills?

   (d) To what extent do employers believe that BSU DT graduates are prepared in graphic communication skills?

   (e) To what extent do employers believe that BSU DT graduates are prepared in project management skills?

Operational Definitions

The following operational definitions are important to this study:

Design Education. Design education refers to the education of graduates who enter careers in design, such as graphic designer, web designer, art director, creative director, exhibit designer, model design, and production artist. These design education programs are often referred to as graphic design, visual communications, design technology, and graphic communications.

Program Evaluation. For this study program evaluation was defined as using justifiable criteria by which to assess the effectiveness of a specific program.

Job Preparedness. For this study program evaluation was defined as possessing the skills necessary for an entry-level position in the design industry. These proficiencies include general work habits and skills, communication skills, technical skills, graphic communication skills, and project management skills.

Technology. Computers, software, scanners, printers and other tools used for designing visual communication solutions.

Delimitations

This research study was limited to:

1. BSU DT graduates from 2001-2006.
2. A purposeful sample of employers of DT graduates (The employers who responded to the survey may not have employed more than a small percentage of the graduate sample).

CHAPTER II

METHODOLOGY

Research Design

To assess the effectiveness of the BSU DT program this study was designed and implemented as evaluation research. This research encompassed an evaluation of the Design Technology (DT) program at Bemidji State University (BSU); which included survey development, a pilot test, survey distribution, and data analysis.

Participants

Subjects for this study included two distinct groups:

1. The 215 BSU DT graduates from 2001-2006
2. A purposeful sample of employers of BSU DT graduates taken from the entire population of BSU DT employers. This sample may not have employed more than a small percentage of the graduates from 2001-2006.

Both groups of participants were asked to complete surveys regarding perceptions of the BSU DT graduates' preparedness in five skill categories.

Instruments

Five separate but related sources were used to define job preparedness in terms of necessary skills required by entry-level designers. BSU DT program objectives, BSU DT faculty, industry professionals, National Association of Schools of Art and Design

(NASAD) common body of knowledge and skills standards for students, irrespective of specialization or emphasis area; additionally, the Accrediting Council for Collegiate Graphic Communications (ACCGC) curriculum standards were all considered during development of survey items. From these sources, five main skill categories were identified:

1. general work habits and skills,
2. communication skills,
3. technical skills,
4. graphic communication skills, and
5. project management skills.

The graduate survey (Appendix A) and employer survey (Appendix B) consisted of items requesting demographic information, employment data, importance of and level of preparation in software applications, and perceptions of preparedness in the five skill categories as mentioned above. Both the graduate and employer surveys were constructed in various formats that included dichotomous choice, fill-in-the-blank, and Likert-type scales.

Pilot Study

A pilot study was conducted for each survey to pretest the instrument, assess the content, and identify any ambiguity of the items. The graduate survey was administered to 25 current senior DT students who were approximately two weeks from graduation. From the feedback, it was determined that items in Question 3 needed to have a response choice of "Does Not Apply."

A pilot study for the employer survey was also conducted with current designers in the industry. Designers were asked to examine the survey and provide feedback regarding content and clarity. Suggestions were given to include specific additional questions in the categories of general work habits and skills and project management skills.

Survey Distribution

Prior to data collection, approval from the Institutional Review Board at the University of North Dakota, and the BSU Human Subjects Committee were obtained. A letter (see Appendix C) and a survey were then mailed to the graduate group introducing the study and asking the recipients to participate. The participants could either complete the mailed survey or go to the supplied web address to complete the online version of the survey. If participants chose to complete the online survey, they were instructed to enter an assigned code for identification to prevent a participant from completing both formats of the survey. After a three-week time period, a reminder notice was sent to those who had not returned a survey.

The employer group was administered surveys at the BSU DT advisory board meeting. This group of employers was identified as an "information-rich" sample due to their commitment to the program and knowledge of the DT program and graduates. This type of purposeful sampling is described as justifiable when statistically generalizing the results is not important, but rather when the purpose is to describe a specific situation (Wiersma & Jurs, 2005). Employers willing to complete the survey were given the instrument, ample time for completion, and assured anonymity through the return of the

surveys to the administrative assistant of the Department of Technological studies. The sample size (n = 19) was not sufficient from this distribution, so additional employers of BSU DT graduates were identified and introductory letters (see Appendix D) and surveys were mailed to them.

Data Analysis

The data collected consisted of quantitative and qualitative data. The quantitative data were analyzed for frequency and percentages, related to the perceptions of graduates and employers with regard to job preparedness levels of BSU DT graduates in general work habits and skills, communication skills, technical skills, graphic communication skills, and project management skills.

Analysis of Variance (ANOVA) was conducted to determine if there were differences in BSU DT graduate job preparedness by major specialization, through assessing the difference among means of the dependent variables (i.e., general work habits and skills, communication skills, technical skills, graphic communication skills and project management skills). A t-test was conducted to see if there were differences in graduates' perceptions in the level of job preparedness of BSU DT graduates. Finally, another t-test was conducted to see if there were differences in graduates' and employers' perceptions in the level of job preparedness of BSU DT graduates. Qualitative data was also collected from the surveys and reported in Chapters III and IV.

CHAPTER III

GRADUATE SURVEY RESULTS

Two hundred fifteen questionnaires were distributed to the 2001-2006 BSU DT graduates. Results were analyzed using traditional descriptive and analytical statistical methods and offered a broad view of graduates' perceptions regarding their job preparedness after the completion of a Baccalaureate degree in DT at BSU.

Purpose of Study

The purpose of this study was to determine if BSU DT graduates are prepared for jobs in the design industry. The study examined graduates' perceptions regarding their job preparedness in the categories of general work habits and skills, communication skills, technical skills, graphic communication skills, and project management skills. The following research questions were addressed:

1. What are the perceptions of BSU DT graduates regarding their preparedness in the five skill category areas?
    (a) To what extent do BSU DT graduates perceive themselves to be prepared in general work habits and skills?
    (b) To what extent do BSU DT graduates perceive themselves to be prepared in communication skills?

(c) To what extent do BSU DT graduates perceive themselves to be prepared in technical skills?

(d) To what extent do BSU DT graduates perceive themselves to be prepared in graphic communication skills?

(e) To what extent do BSU DT graduates perceive themselves to be prepared in project management skills?

2. According to graduates' perceptions, does the level of job preparedness of BSU DT graduates differ by major specialization?

This chapter will include data analysis as it relates to each research question and sub-question, in addition to conclusions drawn by the researcher, who is a BSU DT faculty member. Fitzpatrick, Sanders, and Worthen (2004) state that internal evaluators have more knowledge of the program and are aware of the program's history and, therefore, can have an advantage when assessing the outcomes of an evaluation for formative purposes.

Graduate Survey Outcomes

Of the two hundred fifteen surveys distributed to BSU DT graduates, fifty-nine responded for a 27.4% return rate. Two cases were eliminated because the respondents indicated major specializations different from the four specializations under study. First, demographic data are reported, followed by survey results and conclusions relative to the research questions.

Demographics

The demographics obtained from the survey included information about gender, major specialization, current employment status, relationship of degree to current position, and education status at time of enrollment. In addition, several questions were asked regarding graduate satisfaction level of education and instruction at BSU.

Of the respondents, 44% ($n = 25$) were male and 56% ($n = 32$) were female. Upon enrolling at BSU, 37 (65%) were recent high school graduates, 11 (19%) were transfers from community or technical colleges, 7 (12%) transferred to BSU from another 4-year college or university, and 1 (2%) had been out of school for five or more years.

Respondents were asked to indicate their major specialization(s): digital design/print, digital design/electronic, exhibit design, or model design. Thirty-two indicated a digital design/print specialization alone or in combination with another specialization, 16 indicated an exhibit design specialization alone or in combination with another specialization, 14 indicated a digital design/electronic specialization alone or in combination with another specialization, and 10 indicated model design (see Table 1).

Table 1. Number and Percentage of Graduate Specializations

	Total Participants	
	n	%
Digital Design/Print	32	56.1
Digital Design/Electronic	14	24.6
Exhibit Design	16	28.1
Model Design	10	17.5

Several graduates obtained more than one specialization in their major (see Table 2).

Table 2. Number and Percentage of Graduate Single and Multiple Specializations

	Total Participants	
	n	%
Digital Design/Print Only	19	33.3
Digital Design/Electronic Only	4	7.0
Exhibit Design Only	10	17.5
Model Design Only	10	17.5
Digital Design/Print and Electronic	8	14.0
Digital Design/Print and Exhibit	4	7.0
Digital Design/Electronic and Exhibit	2	3.5

Respondents were asked to indicate their employment status and the extent to which their degree major was related to their current job. Fifty-two (91.2%) indicated full-time employment, four (7.0%) indicated part-time employment, and one respondent (1.8%) indicated unemployment. Results indicated that 59.6% ($n = 34$) of the respondents work in jobs highly related to their degree major, 17.5% ($n = 10$) work in jobs moderately related to their degree major, 10.5% ($n = 6$) work in jobs slightly related to their degree major, and 12.3% ($n = 7$) work in jobs not related to their degree major. Of the seven respondents who indicated their current jobs were not related to their degree major, two indicated they were employed in a related career, but have since left the field; two indicated they were forced to settle for an unrelated career because of immediate financial pressures; one indicated he/she pursued a related career, but was not willing or able to relocate geographically to obtain a position; one indicated he/she left the field due to a

repetitive motion injury; and one indicated he/she wanted a related career, but was not successful in obtaining one.

The demographics of BSU DT graduates show that the majority of graduates were recent high school graduates when they enrolled in the BSU DT program, while fewer graduates were transfers from two-year or four-year colleges or universities. This finding indicates that recruitment efforts at the high school level have been successful and should continue to be a focal point, while more resources may need to be designated in the efforts to increase enrollment through the recruitment of graduates from community and technical colleges.

The results also indicate that the majority of graduates earned specializations in digital design/print, while there were fewer graduates who earned specializations in digital design/electronic and model design. The U.S. Bureau of Labor Statistics Occupational Outlook handbook (2006 – 2007) predicts, "Individuals with a bachelor's degree and knowledge of computer design software, particularly those with Web site design and animation experience, will have the best opportunities" (p. 262). Due to the fact that the job outlook for graduates with skills in web design and animation is promising, the BSU DT faculty should consider the possibility of further promoting the digital design/electronic specialization to new students and to students currently in the program. The low number of graduates in the model design specialization is expected and reflective of the fact that students have several enrollment options for model building/design programs at both Northwest Technical College, a technical college located nearby in Bemidji, and BSU.

With regard to employment status of BSU DT graduates, job placement is relatively successful in that only 12.3% of the graduates did not earn employment in design-related careers, and only one of those graduates stated they wanted a design career and was not able to obtain one. However, this is an area for improvement and the BSU DT faculty should examine the services provided by the program and the university to assist students in identifying job opportunities and obtaining careers in their field.

Research Question One

General Work Habits and Skills

Research Question 1a. To what extent do BSU DT graduates perceive themselves to be prepared in general work habits and skills?

Respondents were asked to indicate their perceptions regarding preparedness in the category of general work habits and skills (see Table 3). The scale was as follows: very prepared, somewhat prepared, and not well prepared. Responses show that 50% or more respondents gave "very prepared" ratings in the ability to accept constructive criticism (71.9%, $n = 41$), the ability to work independently (71.9%, $n = 41$), the ability to work in teams (66.7%, $n = 38$), the willingness to work beyond "normal" working hours (63.2%, $n = 36$), the ability to meet deadlines (61.4%, $n = 35$), and the ability to make decisions when necessary (50.9%, $n = 29$). Responses also show that the rating, "not well prepared," yielded single digit percentages in all areas except in the ability to work with clients (29.8%, $n = 17$), and ability to work with matters concerning diversity (19.3%, $n = 11$).

Table 3. Graduate Perceptions of Their Preparedness in General Work Habits and Skills (1 = Not Well Prepared, 2 = Somewhat Prepared, 3 = Very Prepared)

Ratings / Item	1		2		3	
	n	%	*n*	%	*n*	%
The ability to work in teams	1	1.8	18	31.6	38	66.7
Being motivated for success	3	5.3	29	50.9	25	43.9
The ability to meet deadlines	1	1.8	21	36.8	35	61.4
The ability to accept constructive criticism	1	1.8	15	26.3	41	71.9
The ability to solve problems	2	3.5	27	47.4	28	49.1
To have confidence in your abilities	5	8.8	29	50.9	23	40.4
The ability to make decisions when necessary	1	1.8	27	47.4	29	50.9
The ability to work independently	0	0.0	16	28.1	41	71.9
The ability to be organized	3	5.3	30	52.6	24	42.1
The ability to work with clients	17	29.8	28	49.1	12	21.1
The willingness to work beyond "normal" working hours	1	1.8	20	35.1	36	63.2
Ability to work with matters concerning diversity	11	19.3	22	38.6	24	42.1

In general, the majority of responses in the category of general work habits and skills were of moderate to high ratings. The highest ratings in general work habits and skills were in the ability to accept constructive criticism and the ability to work independently. These high ratings in the ability to accept constructive criticism stem from students engaging in multiple critiques of their work and work of their peers in nearly every course in the program. The critique process is seen as a valuable learning tool by BSU DT faculty. High ratings in the ability to work independently may be a reflection of

learning opportunities in which students are expected to individually generate ideas and solutions for graphic communication problems.

Those areas in need of improvement were the ability to work with clients and the ability to work with matters concerning diversity. Faculty should consider ways to provide more opportunities for students to work on projects with clients. These experiences should include working on "real-world" projects with actual clients or at minimum a simulation of this process. This is already done to some extent in the DT program through the internship and senior project courses; however, nearly one-third of graduates felt they were not well prepared with the necessary skills. BSU DT faculty should also examine why nearly one-fifth of the graduates indicated they were not well prepared in the ability to work with matters concerning diversity. Areas of investigation should include diversity education and experiences at the programmatic and university levels.

Communication Skills

Research Question 1b. To what extent do BSU DT graduates perceive themselves to be prepared in communication skills?

Respondents were asked to indicate their perceptions regarding preparedness in the category of Communication skills. The scale was as follows: very prepared, somewhat prepared, and not well prepared. Responses show that 50% or more respondents gave "very prepared" ratings in the ability to communicate verbally with peers (68.4%, $n = 39$), listening skills (64.9%, $n = 37$), the willingness to ask for clarification when necessary (61.4%, $n = 35$), the ability to give constructive feedback to others (61.4%, $n = 35$) and

the ability to speak to groups (57.9%, $n = 33$). Responses also show that the rating of "not well prepared" were single digit percentages except in the ability to communicate verbally with clients (15.8%, $n = 9$), the ability to write clearly (10.5%, $n = 32$), and the ability to use proper grammar (10.5%, $n = 32$). See Table 4.

Table 4. Graduate Perceptions of Their Preparedness in Communication Skills (1 = Not Well Prepared, 2 = Somewhat Prepared, 3 = Very Prepared)

Ratings / Item	1		2		3	
	n	%	*n*	%	*n*	%
The ability to communicate verbally with peers	0	0.0	18	31.6	39	68.4
The ability to communicate verbally with clients	9	15.8	30	52.6	18	31.6
The ability to write clearly	6	10.5	32	56.1	19	33.3
The ability to use proper grammar	6	10.5	33	57.9	18	31.6
The willingness to ask for clarification when necessary	1	1.8	21	36.8	35	61.4
Listening skills	0	0.0	20	35.1	37	64.9
The ability to speak to groups	2	3.5	22	38.6	33	57.9
The ability to give constructive feedback to others	3	5.3	19	33.3	35	61.4

In the category of communication skills, the highest percentages of graduates rated themselves as very prepared in the ability to communicate verbally with peers, listening skills and the ability to give constructive feedback to others. This indicates that graduates feel confident in verbal communication and listening skills, except as it relates to communicating with clients.

The largest percentage of graduates rating themselves not well prepared was in the ability to communicate verbally with clients. Just as a high percentage of graduates rated themselves as not well prepared in the ability to work with clients (general work habits and skills), graduates also perceived themselves as not well prepared in their ability to communicate verbally with clients. This underscores the previous conclusion that graduates need more opportunities to work directly with clients on developing solutions for design problems. Approximately one-tenth of the graduates rated themselves as not well prepared in the ability to write clearly and the ability to use proper grammar. BSU DT faculty should examine the role of writing and grammar in the design curriculum and the extent to which the university liberal education courses are providing opportunities for students to develop these skills.

Technical Skills

Research Question 1c. To what extent do BSU DT graduates perceive themselves to be prepared in technical skills?

Respondents were asked to indicate their perceptions regarding level of preparedness in the category of technical skills. The scale was as follows: very prepared, somewhat prepared, and not well prepared. Responses showed that 50% or more respondents gave "very prepared" ratings in skills in basic computer operation (66.7%, n = 38), the ability to manage computer files (56.1%, n = 32) and skills in digital imaging (55.4%, n = 31). Responses also show that the rating of "not well prepared" yielded single digit percentages except in the ability to prepare images for the intended output

(23.2%, $n = 13$), the ability to use drawing software (14.0%, $n = 8$), skills in digital imaging (10.7%, $n = 6$) and skills in sketching (10.5%, $n = 6$) (see Table 5).

Table 5. Graduate Perceptions of Their Preparedness in Technical Skills (1 = Not Well Prepared, 2 = Somewhat Prepared, 3 = Very Prepared)

Ratings / Item	1		2		3	
	n	%	*n*	%	*n*	%
Skills in basic computer operation	1	1.8	18	31.6	38	66.7
Skills in sketching	6	10.5	24	42.1	27	47.4
The ability to render with artistic medium	5	8.8	28	49.1	24	42.1
Skills in digital imaging	6	10.7	19	33.9	31	55.4
The ability to use drawing software	8	14.0	21	36.8	28	49.1
The ability to prepare images for the intended output	13	23.2	24	42.9	19	33.9
The ability to manage computer files	4	7.0	21	36.8	32	56.1

In the category of technical skills, approximately two-thirds of the graduates perceived themselves as very prepared with skills in basic computer operation and more than half rated themselves as very prepared in the ability to manage computer files. This indicates that the majority of students are gaining the basic computer knowledge and skills necessary for careers in the design field.

The highest percentage of graduates rated themselves as not well prepared in the ability to prepare images for the intended output. This suggests, for example, that graduates with specializations in digital design/print are not well prepared in their ability

to correctly prepare computer files to be sent to professional printing. Fourteen percent of the graduates also rated themselves as not well prepared in the ability to use drawing software. This finding indicates that faculty should examine if there is a need for more effective instruction and application of drawing software such as Adobe Illustrator, AutoCad, or Solidworks.

Graphic Communication Skills

Research Question 1d. To what extent do BSU DT graduates perceive themselves to be prepared in graphic communication skills?

Respondents were asked to indicate their perceptions regarding level of preparedness in the category of graphic communication skills. The scale was as follows: very prepared, somewhat prepared, and not well prepared. Responses show that 50% or more respondents gave "very prepared" ratings in skills in the ability to utilize an ideation process (61.4%, $n = 35$), the ability to apply elements and principles of design (59.6%, $n = 34$), the ability to conceptualize (59.6%, $n = 34$), the ability to use negative space (57.9%, $n = 33$), the ability to apply typography theory (57.4%, $n = 31$), the ability to apply color theory (54.4%, $n = 31$), and the ability to conduct research necessary for assigned projects (52.6%, $n = 30$). Responses also show that the rating of "not well prepared" were single digit percentages except in knowledge regarding issues of salary and benefits offered in the industry (49.1%, $n = 28$), the ability to effectively work on assignments with topics unknown or uninteresting to yourself (15.8%, $n = 9$) and the ability to conduct research necessary for assigned projects (14.0%, $n = 8$) (see Table 6).

Table 6. Graduate Perceptions of Their Preparedness in Graphic Communication Skills (1 = Not Well Prepared, 2 = Somewhat Prepared, 3 = Very Prepared)

Item \ Ratings	1		2		3	
	n	%	*n*	%	*n*	%
Ability to apply elements and principles of design	2	3.5	21	36.8	34	59.6
Ability to apply color theory	1	1.8	25	43.9	31	54.4
Ability to apply typography theory	3	5.6	20	37.0	31	57.4
Ability to use negative space	3	5.3	21	36.8	33	57.9
Ability to conceptualize	3	5.3	20	35.1	34	59.6
Ability to utilize an ideation process	2	3.5	20	35.1	35	61.4
Ability to conduct research necessary for assigned projects	8	14.0	19	33.3	30	52.6
Knowledge regarding issues of salary and benefits offered in the industry	28	49.1	22	38.6	7	12.3
Ability to effectively work on assignments with topics unknown or uninteresting to yourself	9	15.8	26	45.6	22	38.6

In the category of graphic communication skills, more than one-half of the graduates rated themselves as very prepared in color theory, typography theory, ability to use negative space, ability to conceptualize, and the ability to utilize an ideation process. This finding indicates the program is effectively preparing students in the foundations of design.

Almost one-half of all graduates who responded rated themselves as not well prepared in knowledge regarding issues of salary and benefits offered in the industry. This

finding indicates a great need for more instruction regarding the salary ranges for employees who are hired in design-related careers. Faculty should discuss the most appropriate method and sequence for informing students of current salary and benefits for designers.

Other results from the graphic communication skills category that BSU DT faculty should consider are the ability to conduct research necessary for assigned projects and the ability to effectively work on assignments with topics unknown or uninteresting to themselves, since approximately 15% of the respondents rated themselves as not well prepared in these skills.

Project Management Skills

Research Question 1e. To what extent do BSU DT graduates perceive themselves to be prepared in project management skills?

Respondents were asked to indicate their perceptions regarding preparedness in the category of project management skills. The scale was as follows: very prepared, somewhat prepared, and not well prepared. Responses show that 50% or more respondents gave "very prepared" ratings in the ability to follow a project to completion (75.4%, $n = 43$), skills in the ability to simultaneously manage elements of a project (61.4%, $n = 35$), the ability to manage time relating to a project (56.1%, $n = 32$), and the ability to prioritize when working on multiple projects with multiple deadlines (50.9%, $n = 29$). Responses also reveal that the rating of "not well prepared" were single digit percentages except in skills in utilizing project management software (54.4%, $n = 31$), the ability to determine project estimates (45.6%, $n = 26$), the ability to adjust project plans

when needed (17.5%, n =1 0), the ability to construct project schedules (12.3%, n = 7), the ability to prioritize when working on multiple projects with multiple deadlines (12.3%, n = 7) and the ability to assess project progress (10.5%, n = 6) (see Table 7).

Table 7. Graduate Perceptions of Their Preparedness in Project Management Skills (1 = Not Well Prepared, 2 = Somewhat Prepared, 3 = Very Prepared)

Ratings / Item	1		2		3	
	n	%	n	%	n	%
Ability to simultaneously manage elements of a project	1	1.8	21	36.8	35	61.4
Ability to mange time relating to a project	0	0.0	25	43.9	32	56.1
Ability to construct project schedules	7	12.3	26	45.6	24	42.1
Ability to determine project estimates	26	45.6	21	36.8	10	17.5
Ability to assess project progress	6	10.5	29	50.9	22	38.6
Ability to adjust the project plan when needed	10	17.5	26	45.6	21	36.8
Ability to follow a project to completion	1	1.8	13	22.8	43	75.4
Skills in utilizing project management software	31	54.4	18	31.6	8	14.0
Ability to prioritize projects when working on multiple projects with multiple deadlines	7	12.3	21	36.8	29	50.9

In project management skills, a high percentage of graduates perceived themselves as very prepared in the ability to follow a project to completion, ability to simultaneously manage elements of a project, and the ability to manage time relating to a project. These

results indicate that BSU DT graduates are gaining skills necessary to work on multiple projects at one time and the ability to complete them on time, vital skills for those employed in design-related fields.

There are two noteworthy areas in project management skills that BSU DT faculty should examine, the first one is project management software skills and second is the ability to determine project estimates. More than half of the graduates indicated they were not well prepared with skills in utilizing project management software, while only 14% indicated they were very prepared. BSU DT faculty will need to determine what role software skills in project management should fulfill in the curriculum.

Nearly half of the graduates indicated they were not well prepared in the ability to determine project estimates. This skill could be developed through students working with clients on "real world" design problems, a reoccurring theme in the data results, or through a simulation of this process.

Research Question Two

According to graduates' perceptions, does the level of job preparedness of BSU DT graduates differ by major specialization?

To answer the above research question, an ANOVA was used to determine if there were significant differences in job preparedness of graduates by major specialization. The Bonferonni post hoc test was used to determine between which groups a significant difference occurred when applicable. The results for each variable in the five skill categories are summarized in the paragraphs and tables to follow.

General Work Habits and Skills

A one-way ANOVA revealed that there were significant differences by specialization in the ability to meet deadlines $F(3,38) = 3.37$, $p = .028$. Post hoc tests revealed that there were significant differences between graduates with exhibit design specialization ($M = 2.90$, $SD = .316$) and graduates with model design specialization ($M = 2.20$, $SD = .422$) on the ability to meet deadlines (see Table 8).

Table 8. Significance Levels of Perceptions of Graduates on Their Preparedness in General Work Habits and Skills, by Specialization ($N = 42$)

	Digital Design		Exhibit Design	Model Design	*F* Values	*p*
	Print *M*	Electronic *M*	*M*	*M*		
The ability to work in teams	2.63	2.33	2.80	2.60	.63	.598
Being motivated for success	2.47	2.00	2.20	2.50	1.05	.380
The ability to meet deadlines	2.58	2.33	2.90	2.20	3.37	.028
The ability to accept constructive criticism	2.68	3.00	2.60	2.70	.44	.724
The ability to solve problems	2.42	2.00	2.60	2.50	.82	.492
To have confidence in your abilities	2.37	2.33	2.20	2.40	.18	.908
The ability to make decisions when necessary	2.47	2.33	2.50	2.50	.07	.973
The ability to work independently	2.84	2.33	2.70	2.60	1.45	.245
The ability to be organized	2.32	2.67	2.20	2.30	.51	.676
The ability to work with clients	2.00	1.67	1.60	2.00	.81	.499
The willingness to work beyond "normal" working hours	2.63	3.00	2.70	2.70	.52	.670
Ability to work with matters concerning diversity	2.16	1.67	2.20	2.40	.70	.557

However, these differences are of minor importance since both the model design graduates and exhibit design graduates rated their preparedness levels in the somewhat prepared range.

Communication Skills

A one-way ANOVA revealed that there were no significant differences by specialization of any of the communication skills variables (see Table 9).

Table 9. Significance Levels of Perceptions of Graduates on Their Preparedness in Communication Skills, by Specialization ($N = 42$).

	Digital Design		Exhibit Design	Model Design	F Values	p
	Print M	Electronic M	M	M		
The ability to communicate verbally with peers	2.74	2.33	2.60	2.69	.68	.569
The ability to communicate verbally with clients	2.21	1.67	2.10	2.10	.50	.682
The ability to write clearly	2.26	2.33	2.20	2.20	.06	.983
The ability to use proper grammar	2.16	2.00	2.20	2.10	.10	.961
The willingness to ask for clarification when necessary	2.68	2.33	2.70	2.50	.59	.623
Listening skills	2.63	2.33	2.70	2.70	.48	.695
The ability to speak to groups	2.63	2.67	2.50	2.60	.12	.948
The ability to give constructive feedback to others	2.58	2.67	2.70	2.50	.18	.912

Technical Skills

A one-way ANOVA revealed that there were significant differences by specialization in skills in digital imaging $F(3,37) = 5.44$, $p = .003$. Post hoc tests revealed

that there were significant differences between graduates with model design specialization ($M = 1.80$, $SD = .632$) and graduates with digital design/electronic specialization ($M = 3.00$, $SD = .000$), digital design/print specialization ($M = 2.58$, $SD = .607$), and exhibit design specialization ($M = 2.56$, $SD = .527$) on skills in digital imaging (see Table 10). Graduates with a specialization in model design rated themselves much lower in skills in digital imaging. This result is predictable, because digital photography

Table 10. Significance Levels of Perceptions of Graduates on Their Preparedness in Technical Skills, by Specialization ($N = 42$)

	Digital Design		Exhibit Design	Model Design	F Values	p
	Print M	Electronic M	M	M		
Skills in basic computer operation	2.79	2.33	2.60	2.60	1.04	.386
Skills in sketching	2.47	2.33	2.20	2.50	.45	.722
The ability to render with artistic medium	2.47	2.33	2.20	2.10	.98	.414
Skills in digital imaging	2.58	3.00	2.56	1.80	5.4	.003
The ability to use drawing software	2.53	2.00	2.60	1.90	2.5	.071
The ability to prepare images for the intended output	2.16	2.00	2.00	1.89	.31	.818
The ability to manage computer files	2.42	2.67	2.40	2.70	.75	.527

and image manipulation are not skills model designers need to master; however, they are extremely important skills for those specializing in digital design/print, digital design/electronic and exhibit design.

Graphic Communication Skills

Multiple comparisons revealed significant differences by specialization in three graphic communication variables (see Table 11). A one-way ANOVA revealed that there

Table 11. Significance Levels of Perceptions of Graduates on Their Preparedness in Graphic Communication Skills, by Specialization ($N = 42$)

	Digital Design		Exhibit Design	Model Design	F Values	p
	Print M	Electronics M	M	M		
Ability to apply elements and principles of design	2.79	2.67	2.50	2.00	5.09	.005
Ability to apply color theory	2.63	2.67	2.40	2.30	1.00	.405
Ability to apply typography theory	2.84	2.33	2.44	2.00	5.30	.004
Ability to use negative space	2.74	2.67	2.50	2.20	1.99	.132
Ability to conceptualize	2.58	2.67	2.70	2.40	.39	.760
Ability to utilize an ideation process	2.63	2.33	2.80	2.60	.63	.598
Ability to conduct research necessary for assigned projects	2.42	2.00	2.40	2.40	.31	.819
Knowledge regarding issues of salary and benefits offered in the industry	1.84	1.33	1.10	1.60	3.32	.030
Ability to effectively work on assignments with topics unknown or uninteresting to yourself	2.42	2.00	2.00	2.10	1.11	.356

were significant differences by specialization in the ability to apply elements and principles of design $F(3,38) = 5.09$, $p = .005$. Post hoc tests revealed that there were significant differences between graduates with digital design/print specialization ($M =$

2.79, *SD* = .419) and graduates with model design specialization (*M* = 2.00, *SD* = .667) on the ability to apply elements and principles of design.

The one-way ANOVA also revealed that there were significant differences by specialization in the ability to apply typography theory $F(3,35) = 5.30$, $p = .004$. Post hoc tests revealed significant differences between graduates with digital design/print specialization (*M* = 2.84, *SD* = .375) and graduates with model design specialization (*M* = 2.00, *SD* = .756) on the ability to apply typography theory.

Once again, the results discussed in the previous two paragraphs are predictable, since neither the ability to apply elements and principles of design nor the ability to apply typography theory are skills necessary for model designers to master; however, they are vital for those specializing in digital design/print.

Finally, multiple comparisons revealed significant differences by specialization in knowledge of salary and benefits offered in the industry $F(3,38) = 3.32$, $p = .030$. Post hoc test revealed significant differences between graduates with digital design/print specialization (*M* = 1.84, *SD* = .765) and graduates with exhibit design specialization (*M* = 1.10, *SD* = .316). However, these differences are of minor importance since both the exhibit design graduates and digital design/print graduates rated their preparedness levels as not well prepared, indicating that all graduates need more opportunities to gain knowledge regarding salary and benefits in the industry.

Project Management Skills

A one-way ANOVA revealed that there were significant differences by specialization in the ability to follow a project to completion $F(3,38) = 3.80$, $p = .018$.

Post hoc tests revealed that there were significant differences between graduates with exhibit design specialization ($M = 3.00$, $SD = .000$) and graduates with digital design/electronic specialization ($M = 2.00$, $SD = 1.00$) on the ability to follow a project to completion (see Table 12). However, these differences are of minor importance, since

Table 12. Significance Levels of Perceptions of Graduates on Their Preparedness in Project Management Skills, by Specialization ($N = 42$).

	Digital Design		Exhibit Design	Model Design	F Values	p
	Print M	Electronic M	M	M		
Ability to simultaneously manage elements of a project	2.58	2.33	2.70	2.70	.54	.656
Ability to mange time relating to a project	2.53	2.00	2.60	2.70	1.60	.205
Ability to construct project schedules	2.32	2.00	2.20	2.30	.22	.880
Ability to determine project estimates	1.68	2.00	1.50	1.90	.58	.635
Ability to assess project progress	2.11	2.67	2.30	2.40	.99	.410
Ability to adjust the project plan when needed	2.05	2.00	2.30	2.30	.51	.680
Ability to follow a project to completion	2.74	2.00	3.00	2.70	3.80	.018
Skills in utilizing project management software	1.58	1.00	1.60	1.50	.68	.568
Ability to prioritize projects when working on multiple projects with multiple deadlines	2.37	2.00	2.40	2.40	.28	.841

both the model design graduates and exhibit design graduates rated their preparedness levels from somewhat to very prepared.

A t-test was used to determine if there were significant differences in the level of job preparedness of graduates with one major specialization compared to those with

multiple specializations. The results for each variable in the five skill categories are summarized in the paragraphs and tables to follow.

General Work Habits and Skills

A *t*-test revealed that there were no significant differences between those who graduated with one specialization and those who graduated with multiple specializations in any of the general work habits and skills variables (see Table 13).

Table 13. Significance Levels of Perceptions of Graduates on Their Preparedness in General Work Habits and Skills, by Single and Multiple Specializations ($N = 57$).

	Single Specialization *M*	Multiple Specializations *M*	*t*-test	*p*
The ability to work in teams	2.64	2.67	-.152	.880
Being motivated for success	2.38	2.40	-.106	.916
The ability to meet deadlines	2.55	2.73	-1.169	.247
The ability to accept constructive criticism	2.69	2.73	-.283	.778
The ability to solve problems	2.45	2.47	-.083	.934
To have confidence in your abilities	2.33	2.27	.348	.729
The ability to make decisions when necessary	2.48	2.53	-.350	.728
The ability to work independently	2.71	2.73	-.138	.890
The ability to be organized	2.31	2.53	-1.276	.207
The ability to work with clients	1.88	2.00	-.551	.584
The willingness to work beyond "normal" working hours	2.69	2.40	1.876	.066
Ability to work with matters concerning diversity	2.19	2.33	-.625	.535

Communication Skills

A *t*-test revealed that there were no significant differences between those who graduated with one specialization and those who graduated with multiple specializations in any of the communications skills variables (see Table 14).

Table 14. Significance Levels of Perceptions of Graduates on Their Preparedness in Communication Skills, by Single and Multiple Specializations (N= 57).

	Single Specialization *M*	Multiple Specializations *M*	*t*-test	*p*
The ability to communicate verbally with peers	2.64	2.80	-1.116	.269
The ability to communicate verbally with clients	2.12	2.27	-.723	.473
The ability to write clearly	2.24	2.20	.200	.842
The ability to use proper grammar	2.14	2.40	-1.392	.170
The willingness to ask for clarification when necessary	2.62	2.53	.534	.595
Listening skills	2.64	2.67	-1.63	.871
The ability to speak to groups	2.60	2.40	1.144	.258
The ability to give constructive feedback to others	2.60	2.47	.711	.480

Technical Skills

A *t*-test revealed that there were no significant differences between those who graduated with one specialization and those who graduated with multiple specializations in any of the technical skills variables (see Table 15).

Table 15. Significance Levels of Perceptions of Graduates on Their Preparedness in Technical Skills, by Single and Multiple Specializations (N= 57).

	Single Specialization M	Multiple Specializations M	t-test	p
Skills in basic computer operation	2.67	2.53	.914	.365
Skills in sketching	2.40	2.24	.887	.379
The ability to render with artistic medium	2.31	2.29	.082	.935
Skills in digital imaging	2.36	2.41	-.247	.806
The ability to use drawing software	2.36	2.29	.306	.760
The ability to prepare images for the intended output	2.00	2.12	-.503	.617
The ability to manage computer files	2.50	2.29	1.060	.294

Graphic Communication Skills

A t-test revealed that there were no significant differences between those who graduated with one specialization and those who graduated with multiple specializations in any of the graphic communication skills variables (see Table 16).

Table 16. Significance Levels of Perceptions of Graduates on Their Preparedness in Graphic Communication Skills, by Single and Multiple Specializations (N = 57).

	Single Specialization M	Multiple Specializations M	t-test	p
Ability to apply elements and principles of design	2.52	2.65	-.755	.453
Ability to apply color theory	2.50	2.53	-.189	.851
Ability to apply typography theory	2.54	2.41	.686	.496
Ability to use negative space	2.55	2.47	.445	.658

Table 16 cont. Significance Levels of Perceptions of Graduates on Their Preparedness in Graphic Communication Skills, by Single and Multiple Specializations ($N = 57$).

Ability to conceptualize	2.57	2.47	.585	.561
Ability to utilize an ideation process	2.64	2.35	1.723	.090
Ability to conduct research necessary for assigned projects	2.38	2.29	.407	.686
Knowledge regarding issues of salary and benefits offered in the industry	1.57	1.76	-.971	.336
Ability to effectively work on assignments with topics unknown or uninteresting to yourself	2.21	2.18	.183	.856

Project Management Skills

A *t*-test revealed that there were no significant differences between those who graduated with one specialization and those who graduated with multiple specializations in any of the project management skills variables.

The results of the *t*-tests reported in Table 16 revealed that there was no significant difference in the level of job preparedness of graduates with one major specialization compared to those with multiple specializations. These results are of practical value in that graduates who earn a single specialization are prepared to the same extent in the five basic skill categories (i.e., general work habits and skills, communication skills, technical skills, graphic communication skills, and project management skills) as graduates earning more than one specialization; the only difference

was the specialized curricular content (print, electronic, exhibit and model design) (see Table 17).

Table 17. Significance Levels of Perceptions of Graduates on Their Preparedness in Project Management Skills, by Single and Multiple Specializations ($N = 57$).

	Single Specialization *M*	Multiple Specializations *M*	*t*-test	*p*
Ability to simultaneously manage elements of a project	2.62	2.42	1.282	.205
Ability to mange time relating to a project	2.55	2.53	.125	.901
Ability to construct project schedules	2.26	2.41	-.768	.445
Ability to determine project estimates	1.71	1.71	.039	.969
Ability to assess project progress	2.26	2.35	-.488	.627
Ability to adjust the project plan when needed	2.17	2.29	-.618	.539
Ability to follow a project to completion	2.74	2.71	.229	.820
Skills in utilizing project management software	1.52	1.71	-.873	.386
Ability to prioritize projects when working on multiple projects with multiple deadlines	2.36	2.47	-.564	.575

CHAPTER IV

EMPLOYER SURVEY RESULTS

The primary purpose of this formative evaluation was to determine the effectiveness of a particular program through examination of graduate and employer perceptions and to use the results for program improvement. Forty questionnaires were distributed to employers of Bemidji State University (BSU) Design Technology (DT) graduates. This sample may not have employed more than a small percentage of the graduates from 2001-2006. Results were analyzed using traditional descriptive and analytical statistical methods and offer a broad view of employers' perceptions regarding the job preparedness of BSU DT graduates.

The study also examined employers' perceptions regarding the job preparedness of BSU DT graduates in the categories of general work habits and skills, communication skills, technical skills, graphic communication skills, and project management skills. The following research questions were addressed:

3. What are the perceptions of employers of BSU DT graduates with regard to the graduates' preparedness in the five skill categories?
    (a) To what extent do employers believe that BSU DT graduates are prepared in general work habits and skills?

(b) To what extent do employers believe that BSU DT graduates are prepared in communication skills?

(c) To what extent do employers believe that BSU DT graduates are prepared in technical skills?

(d) To what extent do employers believe that BSU DT graduates are prepared in graphic communication skills?

(e) To what extent do employers believe that BSU DT graduates are prepared in project management skills?

Employer Survey Outcomes

Of the forty surveys distributed to employers of BSU DT graduates, 27 responded for a 67.5% return rate. First, demographic data are reported, followed by survey results and conclusions relative to the research questions.

Demographics

The demographics obtained from the survey included information about the nature, location, and size of the employers' businesses or organizations, in addition to the number of BSU DT graduates the business or organization employed and whether or not they would continue to hire BSU DT graduates given the opportunity.

Respondents were asked to indicate what title best described their business or organization. Of the respondents, 11 indicated design firm, seven indicated exhibit design, four indicated web design/development, four indicated ad agency, four indicated marketing firm, and two indicated business communications. Eleven (40.8%) respondents

stated their business or organization was located in the Minnesota Twin Cities Metro area, 8 (29.6%) in out-state Minnesota, and 8 (29.6%) in states other than Minnesota.

Respondents were asked how many people their business or organization employed in addition to the number of BSU DT graduates they employed. Seven (25.9%) respondents indicated their business/organization employed 1-10 people, one (3.7%) business/organization employed 11-25 people, three (11.1%) employed 26-50 people, seven (25.9%) employed 51-100 people, and nine (33.3%) employed more than 101 people. Five (18.5%) businesses/organizations employed one BSU DT graduate, seven (25.9%) employed two BSU DT graduates, seven (25.9%) employed three BSU DT graduates, and eight (29.6%) indicated they were not sure. When asked if they would continue to hire BSU DT graduates, 24 (88.9%) respondents indicated yes while three (11.1%) were not sure.

When asked to identify the three most important skills for designers to possess, 10 respondents listed computer/software skills, nine listed communications skills, five listed creative skills, four listed conceptual thinking, four listed professionalism and four listed confidence. Respondents were asked to list skills that BSU DT graduates were lacking. Six respondents indicated communication/presentation skills and six indicated computer/software/technology skills.

Research Question Three

General Work Habits and Skills

Research Question 3a. To what extent do employers believe that BSU DT graduates are prepared in general work habits and skills?

Respondents were asked to indicate their perceptions regarding BSU DT graduates' level of preparedness in the category of general work habits and skills. The scale was as follows: very prepared, somewhat prepared, and not well prepared. Responses show that 50% or more respondents gave "very prepared" ratings in the ability to work in teams (55.6%, $n = 15$), willingness to work beyond "normal" working hours (53.8%, $n = 14$) and ability to be organized (51.9%, $n = 14$). Responses also show that the rating of "not well prepared" were all single digit percentages (see Table 18).

Table 18. Employer Perceptions of Graduate Preparedness in General Work Habits and Skills (1 = Not Well Prepared, 2 = Somewhat Prepared, 3 = Very Prepared)

Ratings / Item	1		2		3	
	n	%	*n*	%	*n*	%
The ability to work in teams	0	0	12	44.4	15	55.6
Being motivated for success	1	3.7	13	48.1	13	48.1
The ability to meet deadlines	2	7.4	16	59.3	9	33.3
The ability to accept constructive criticism	2	7.4	12	44.4	13	48.1
The ability to solve problems	1	3.7	15	55.6	11	40.7
To have confidence in your abilities	1	3.7	13	48.1	13	48.1
The ability to make decisions when necessary	1	3.7	21	77.8	5	18.5
The ability to work independently	1	3.7	14	51.9	12	44.4
The ability to be organized	2	7.4	11	40.7	14	51.9
The ability to work with clients	1	4.0	21	84.0	3	12.0

Table 18 cont. Employer Perceptions of Graduate Preparedness in General Work Habits and Skills (1 = Not Well Prepared, 2 = Somewhat Prepared, 3 = Very Prepared)

The willingness to work beyond "normal" working hours	1	3.8	11	42.3	14	53.8
Ability to work with matters concerning diversity	1	3.8	14	53.8	11	42.3

A large percentage of employers indicated that BSU DT graduates were somewhat prepared in the ability to make decisions when necessary and the ability to work with clients; however, in these skills only a small percentage of employers indicated that graduates were very prepared. This finding suggests that there is room for improvement in preparing graduates with skills in making decisions and working with clients.

Communication Skills

Research Question 3b. To what extent do employers believe that BSU DT graduates are prepared in communication skills?

Respondents were asked to indicate their perceptions regarding BSU DT graduates' level of preparedness in the category of communication skills (see Table 19).

Table 19. Employer Perceptions of Graduate Preparedness in Communication Skills (1 = Not Well Prepared, 2 = Somewhat Prepared, 3 = Very Prepared)

Ratings / Item	1		2		3	
	n	%	*n*	%	*n*	%
The ability to communicate verbally with peers	0	0	14	51.9	13	48.1
The ability to communicate verbally with clients	6	24.0	12	48.0	7	28.0
The ability to write clearly	2	7.7	18	69.2	6	23.1
The ability to use proper grammar	1	3.7	18	66.7	8	29.6

Table 19 cont. Employer Perceptions of Graduate Preparedness in Communication Skills (1 = Not Well Prepared, 2 = Somewhat Prepared, 3 = Very Prepared)

The willingness to ask for clarification when necessary	2	7.4	14	51.9	11	40.7
Listening skills	1	3.7	13	48.1	13	48.1
The ability to speak to groups	4	16.0	16	64.0	5	20.0
The ability to give constructive feedback to others	2	8.7	15	65.2	6	26.1

The scale was as follows: very prepared, somewhat prepared, and not well prepared. Responses revealed fewer than 50% respondents gave "very prepared" ratings for all of the items with the highest being 48.1% (n = 13) in the ability to communicate verbally with peers and in listening skills. Responses also reveal that the rating of "not well prepared" were all single digit percentages except in the ability to communicate verbally with clients (24.0%, n = 6) and the ability to speak to groups (16.0%, n = 4).

A high percentage of employers indicated that BSU DT graduates were not well prepared in the ability to communicate verbally with clients and the ability to speak to groups. Once again, this finding revealed that BSU DT graduates needed more experience in working with "real-world" clients and projects. Employers also suggested that DT graduates needed more opportunities to speak to groups of people to develop their public speaking abilities.

The highest percentage of employers' responses indicated that employers perceived BSU DT graduates to be very prepared in the ability to communicate verbally with peers and in listening skills. These results were not outstanding, since 51.9% of

graduates were rated only somewhat prepared in the ability to communicate verbally with peers and 48.1% were rated somewhat prepared in listening skills, suggesting the need for improvement.

Technical Skills

Research Question 3c. To what extent do employers believe that BSU DT graduates are prepared in technical skills?

Respondents were asked to indicate their perceptions regarding BSU DT graduates' level of preparedness in the category of technical skills (see Table 20). The scale was as follows: very prepared, somewhat prepared, and not well prepared. Responses revealed that 50% or more of the respondents gave "very prepared" ratings in skills in basic computer operation (51.9%, $n = 14$). Responses also showed that the rating of "not well prepared" were single digit percentages except in skills in sketching (17.4%, $n = 4$) and the ability to render with artistic medium (15.8%, $n = 3$).

Table 20. Employer Perceptions of Graduate Preparedness in Technical Skills (1 = Not Well Prepared, 2 = Somewhat Prepared, 3 = Very Prepared)

Ratings / Item	1		2		3	
	n	%	*n*	%	*n*	%
Skills in basic computer operation	0	0	13	48.1	14	51.9
Skills in sketching	4	17.4	15	65.2	4	17.4
The ability to render with artistic medium	3	15.8	9	47.4	7	25.9
Skills in digital imaging	1	4.0	13	52.0	11	44.0
The ability to use drawing software	2	7.7	13	50.0	11	42.3

Table 20 cont. Employer Perceptions of Graduate Preparedness in Technical Skills (1 = Not Well Prepared, 2 = Somewhat Prepared, 3 = Very Prepared)

The ability to prepare images for the intended output	2	8.3	13	54.2	9	37.5
The ability to manage computer files	1	3.7	16	59.3	10	37.0

Of all the responses, the highest percentage of employers that rated BSU DT graduates as "not well prepared" did so in the categories of skills in sketching and the ability to render with artistic medium. This finding revealed that the BSU DT faculty should examine whether or not the quantity and quality of the art and design foundations provide sufficient opportunities for DT graduates to develop skills in sketching and rendering necessary for the design field.

In the remainder of the areas, skills in basic computer operation, skills in digital imaging, ability to use drawing software, ability to prepare images for the intended output and the ability to manage computer files, approximately half of the employers stated that the graduates were only somewhat prepared, suggesting the need for improvement in all technical skill areas.

Graphic Communication Skills

Research Question 3d. To what extent do employers believe that BSU DT graduates are prepared in graphic communication skills?

Respondents were asked to indicate their perceptions regarding BSU DT graduates' level of preparedness in the category of graphic communication skills. The

scale was as follows: very prepared, somewhat prepared, and not well prepared. Responses show that 50% (n=11) of respondents gave "very prepared" ratings in ability to apply elements and principles of design, ability to apply color theory, and ability to conceptualize. Responses also show that the rating of "not well prepared" were single digit percentages except in knowledge regarding issues of salary and benefits offered in the industry (45.8%, $n = 11$), ability to apply typography theory (19.0%, $n = 4$), and in the ability to effectively work on assignments with topics unknown or uninteresting to self (16.7%, $n = 4$) (see Table 21).

Table 21. Employer Perceptions of Graduate Preparedness in Graphic Communication Skills (1 = Not Well Prepared, 2 = Somewhat Prepared, 3 = Very Prepared)

Ratings / Item	1		2		3	
	n	%	*n*	%	*n*	%
Ability to apply elements and principles of design	0	0.0	11	50.0	11	50.0
Ability to apply color theory	1	4.5	10	45.5	11	50.0
Ability to apply typography theory	4	19.0	10	47.6	7	33.3
Ability to use negative space	2	9.1	14	63.6	6	27.3
Ability to conceptualize	2	8.3	10	41.7	12	50.0
Ability to utilize an ideation process	1	4.2	13	54.2	10	41.7
Ability to conduct research necessary for assigned projects	0	0.0	13	56.5	10	43.5

Table 21 cont. Employer Perceptions of Graduate Preparedness in Graphic Communication Skills (1 = Not Well Prepared, 2 = Somewhat Prepared, 3 = Very Prepared)

Knowledge regarding issues of salary and benefits offered in the industry	11	45.8	10	41.7	3	12.5
Ability to effectively work on assignments with topics unknown or uninteresting to yourself	4	16.7	18	75.0	2	8.3

Nearly half of the employers of BSU DT graduates indicated that graduates were not well prepared in the knowledge regarding issues of salary and benefits offered in the industry. Approximately 20% of the employers stated that graduates were not very prepared in the ability to apply typography theory, while the graduates rated themselves higher in this skill.

Project Management Skills

Research Question 3e. To what extent do employers believe that BSU DT graduates are prepared in project management skills?

Respondents were asked to indicate their perceptions regarding BSU DT graduates' level of preparedness in the category of project management skills (see Table 22). The scale was as follows: very prepared, somewhat prepared, and not well prepared.

Table 22. Employer Perceptions of Graduate Preparedness in Project Management Skills (1 = Not Well Prepared, 2 = Somewhat Prepared, 3 = Very Prepared)

Ratings / Item	1		2		3	
	n	%	*n*	%	*n*	%
Ability to simultaneously manage elements of a project	2	7.4	17	63.0	8	29.6

Table 22 cont. Employer Perceptions of Graduate Preparedness in Project Management Skills (1 = Not Well Prepared, 2 = Somewhat Prepared, 3 = Very Prepared)

Ability to mange time relating to a project	2	7.4	18	66.7	7	25.9
Ability to construct project schedules	3	11.1	18	66.7	5	18.5
Ability to determine project estimates	11	45.8	12	50.0	1	3.7
Ability to assess project progress	2	7.4	20	74.1	5	18.5
Ability to adjust the project plan when needed	2	7.7	18	69.2	6	23.1
Ability to follow a project to completion	0	0.0	7	25.9	20	74.1
Skills in utilizing project management software	8	42.1	8	42.1	3	15.8
Ability to prioritize projects when working on multiple projects with multiple deadlines	3	11.5	16	61.5	7	26.9

Responses revealed 50% or more of respondents gave "very prepared" ratings in the ability to follow a project to completion (74.1%, $n = 20$). Responses also revealed that the rating of "not well prepared" were single digit percentages except in ability to determine project estimates (45.8%, $n = 11$), skills in utilizing project management software (42.1%, $n = 8$), ability to prioritize projects when working on multiple projects with multiple deadlines (42.1%, $n = 8$) and ability to construct project schedules (11.1%, $n = 3$). Nearly half of the employers rated BSU DT graduates not well prepared in the ability to determine project estimates, and skills in utilizing project management software. Once

again, this indicates that BSU DT faculty need to determine how the program can improve in developing the project management skills of graduates.

A high percentage of employers gave the BSU DT graduates a rating of very prepared in the ability to follow a project to completion. This indicates that the BSU DT program is doing an excellent job of reinforcing the idea that following a project to completion is vital for success in the design industry.

CHAPTER V

CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

In this chapter the researcher will compare and contrast the results of graduate and employer perceptions of the job preparedness level of Bemidji State University (BSU) Design Technology (DT) graduates, draw conclusions, identify implications, and make recommendations.

Graduate and Employer Survey Outcomes

Graduate and employer data were analyzed through *t*-tests to determine if there were significant differences in the perceptions of graduates and the perceptions of employers regarding graduates' level of job preparedness in general work habits and skills, communication skills, technical skills, graphic communication skills, and project management skills. The results for each variable in the five skill categories are summarized in the paragraphs and tables to follow.

General Work Habits and Skills

A *t*-test revealed that there were significant differences between graduates and employer perceptions of graduates' preparedness in the ability to make decisions when necessary, $t\ (84) = 2.49$, $p = .015$, the ability to meet deadlines, $t\ (84) = 2.47$, $p = .015$, and the ability to work independently, $t\ (84) = 2.21$, $p = .030$. For each of the aforementioned variables (i.e., the ability to meet deadlines, the ability to make decisions

when necessary, and the ability to work independently), the graduates perceived themselves to be more prepared than did the employers. However, these differences are of minor importance, since both the graduates and employers rated graduates' preparedness levels were in the somewhat prepared range (see Table 23).

Table 23. Significance Levels of Graduate and Employer Perceptions of Graduates' Job Preparedness in General Work Habits and Skills ($N = 86$)

	Graduates *M*	Employers *M*	*t*-test	*p*
The ability to work in teams	2.61	2.56	.433	.666
Being motivated for success	2.36	2.44	-.635	.527
The ability to meet deadlines	2.58	2.26	2.472	.015
The ability to accept constructive criticism	2.66	2.41	1.899	.061
The ability to solve problems	2.42	2.37	.393	.695
To have confidence in your abilities	2.29	2.44	-1.077	.285
The ability to make decisions when necessary	2.46	2.15	2.489	.015
The ability to work independently	2.68	2.41	2.206	.030
The ability to be organized	2.36	2.44	-.615	.540
The ability to work with clients	1.90	1.93	-.170	.866
The willingness to work beyond "normal" working hours	2.58	2.41	1.162	.249
Ability to work with matters concerning diversity	2.20	2.30	-.533	.595

Communication Skills

Results indicate that both graduates and employers rate graduates' preparedness low in the ability to work with clients. This indicates that graduates need more experience in working with "real-world" clients and projects. A *t*-test revealed that there were significant differences between graduates and employer perceptions of graduates' preparedness in skills in the ability to speak in groups, $t\ (84) = 4.39, p < .000$ and the ability to give constructive feedback to others, $t\ (84) = 4.10, p < .000$ (see Table 24). In each of the above variables, the ability to speak in groups, and the ability to give constructive feedback to others, the graduates perceived themselves to be more prepared than did the employers.

Table 24. Significance Levels of Graduate and Employer Perceptions of Graduates' Job Preparedness in Communication Skills ($N = 86$)

	Graduates *M*	Employers *M*	*t*-test	*p*
The ability to communicate verbally with peers	2.66	2.48	1.585	.117
The ability to communicate verbally with clients	2.12	1.89	1.297	.198
The ability to write clearly	2.20	2.07	.857	.394
The ability to use proper grammar	2.19	2.26	-.523	.602
The willingness to ask for clarification when necessary	2.56	2.33	1.669	.099
Listening skills	2.64	2.44	1.672	.098
The ability to speak to groups	2.54	1.89	4.338	.000
The ability to give constructive feedback to others	2.54	1.85	4.104	.000

Technical Skills

A *t*-test revealed that there were significant differences between graduates' perceptions and employer perceptions of graduates' preparedness in skills in basic computer operation, $t\ (84) = 5.95$, $p < .000$ and skills in sketching, $t\ (84) = 4.00$, $p < .000$ (see Table 25). In each of the above variables, skills in basic computer operation, and skills in sketching, the graduates perceived themselves to be more prepared than did the employers.

Table 25. Significance Levels of Graduate and Employer Perceptions of Graduates' Job Preparedness in Technical Skills ($N = 86$)

	Graduates *M*	Employers *M*	*t*-test	*p*
Skills in basic computer operation	2.63	1.70	5.954	.000
Skills in sketching	2.36	1.56	4.003	.000
The ability to render with artistic medium	2.31	2.52	-1.506	.136
Skills in digital imaging	2.37	2.22	.820	.414
The ability to use drawing software	2.34	2.26	.472	.638
The ability to prepare images for the intended output	2.03	2.04	-.016	.987
The ability to manage computer files	2.44	2.33	.720	.473

Graphic Communication Skills

Results indicate that both graduates and employers rate graduates' preparedness low in knowledge regarding issues of salary and benefits offered in the industry. This

indicates that the BSU DT curriculum should be examined to determine if graduates are receiving ample opportunity to gain knowledge regarding salary and benefits in the design industry.

A *t*-test revealed that there were significant differences between graduates and employer perceptions of graduates' preparedness in ability to use negative space, t (79) = 2.31, p = .023 and ability to apply typography theory, t (75) = 2.19, p = .037 (see Table 26).

Table 26. Significance Levels of Graduate and Employer Perceptions of Graduates' Job Preparedness in Graphic Communication Skills (N= 86)

	Graduates *M*	Employers *M*	*t*-test	*p*
Ability to apply elements and principles of design	2.56	2.50	.430	.668
Ability to apply color theory	2.51	2.45	.390	.698
Ability to apply typography theory	2.50	2.14	2.118	.037
Ability to use negative space	2.53	2.18	2.311	.023
Ability to conceptualize	2.54	2.42	.846	.400
Ability to utilize an ideation process	2.56	2.38	1.291	.200
Ability to conduct research necessary for assigned projects	2.36	2.43	-.471	.639
Knowledge regarding issues of salary and benefits offered in the industry	1.63	1.67	-.235	.815
Ability to effectively work on assignments with topics unknown or uninteresting to yourself	2.20	1.92	1.792	.077

In the variables ability to apply typography theory and the ability to use negative space, the graduates perceived themselves to be more prepared than did the employers. However, these differences are of minor importance, since both the graduates and employers rated graduates' preparedness levels in the somewhat prepared range.

Project Management Skills

Results indicate that both graduates and employers rated graduates' preparedness low in ability to determine project estimates and in skills in utilizing project management software. This indicates that BSU DT graduates need more experiences in determining estimates and using project management software.

Table 27. Significance Levels of Graduate and Employer Perceptions of Graduates' Job Preparedness in Project Management Skills ($N = 86$)

	Graduates *M*	Employers *M*	*t*-test	*p*
Ability to simultaneously manage elements of a project	2.56	2.22	2.549	.013
Ability to manage time relating to a project	2.54	2.19	2.956	.004
Ability to construct project schedules	2.31	2.08	1.507	.136
Ability to determine project estimates	1.71	1.58	.756	.452
Ability to assess project progress	2.29	2.11	1.259	.212
Ability to adjust the project plan when needed	2.20	2.15	.315	.753
Ability to follow a project to completion	2.73	2.74	-.108	.914
Skills in utilizing project management software	1.58	1.74	-.838	.405
Ability to prioritize projects when working on multiple projects with multiple deadlines	2.39	2.15	1.493	.139

A *t*-test revealed that there were significant differences between graduates and employer perceptions of graduates' preparedness in ability to manage time relating to a project, t (84) = 2.96, p = .004 and ability to simultaneously manage elements of a project, t (84) = 2.55, p = .013. In each of the above variables, ability to simultaneously manage elements of a project and ability to manage time relating to a project, the graduates perceived themselves to be more prepared than did the employers. However, these differences are of minor importance since both the graduates and employers rated graduates' preparedness levels in the somewhat prepared range (see Table 27).

Conclusions and Recommendations

The conclusions of this study were based upon an analysis of the data and major findings. In Chapter 3, conclusions were drawn regarding graduate perceptions on the extent to which graduates were prepared in each of the five skill categories, while in Chapter 4, conclusions were drawn regarding employer perceptions.

This section will include conclusions drawn from a comparison of both groups of data. The responses of the BSU DT graduates and employers of BSU DT graduates indicate definite strengths and weaknesses of graduates in the job skill categories, along with areas that were moderately rated, suggesting the need for improvement. The purpose of this internal formative evaluation was to determine the effectiveness of the BSU DT program and to aid in program improvement.

In general, employers rated BSU DT graduates lower in job preparedness skills than did the graduates. This is contrary to the findings of Hoey and Gardner (1999) which revealed that the alumni rated their preparation considerably lower than did the

employers. This may be attributed to the fact that Hoey and Gardner's (1999) employer sample included only employers of the graduate sample. Further research may be needed to determine which methodology is more reliable. In examining the statistical analyses of general work habits and skills, graduates and employers gave low ratings in the graduates' abilities to work with clients while giving strong ratings in the ability to work in teams. Ideally, more opportunities should be provided for students to work with "real-world" clients on projects outside of the university setting. This is not always feasible due to the fact that finding enough clients to work with all BSU DT students is a difficult task; however, more effort is needed in achieving this goal to prepare graduates with the required entry-level skills. If "real-world" clients are not identified, the faculty should determine how simulations of this experience can be implemented in the curriculum for students to develop the necessary skills.

In the category of communication skills, a high percentage of graduates and employers gave ratings of not well prepared in the graduates' abilities to communicate verbally with clients. This result confirms the findings in the previous paragraph and should improve as students are provided more experience in working directly with clients. In the remainder of the communication skills category, there are high percentages in the ratings of "somewhat prepared" and modest percentages of ratings in "very prepared" suggesting improvement is needed in each of these areas (i.e., ability to communicate verbally with peers, ability to write clearly, ability to use proper grammar, the willingness to ask for clarification when necessary, listening skills, the ability to speak to groups, and the ability to give constructive feedback to others).

In the category of technical skills, graduates and employers gave "not well prepared" ratings in skills in sketching. This reveals that the BSU DT faculty should examine whether or not the quantity and quality of the art and design foundations provide sufficient opportunities for DT graduates to develop skills in sketching necessary for the design field. No strengths were identified in this category as a high percentage of graduates and employers rated graduates as "somewhat prepared." This indicates improvement is needed in basic computer operation, ability to render with artistic medium, skills in digital imaging, ability to use drawing software, the ability to prepare images for the intended output and the ability to manage computer files.

In the category of graphic communication skills, knowledge regarding issues of salary and benefits offered in the industry received a high percentage of "not well prepared" ratings. This reveals that graduates are not gaining salary and benefit knowledge as it relates to the design industry in BSU DT courses. Faculty need to examine the extent to which this concept is being taught in the curriculum and determine if it is an appropriate level. In the remainder of the graphic communication skills category, there are modest percentages in the ratings of "somewhat prepared" and "very prepared", suggesting improvement is needed in each of these areas (i.e., ability to apply elements and principles of design, ability to apply color theory, ability to apply typography, ability to use negative space, ability to conceptualize, ability to use an ideation process, ability to conduct research necessary for assigned projects, and ability to effectively work on assignments with topics unknown or uninteresting to themselves.)

In the category of project management skills, high percentages of graduates and employers gave "not well prepared" ratings in ability to determine project estimates and in skills in utilizing project management software. This indicates that determining project estimates is a weakness in the curriculum and must be addressed. Students need to be given opportunities to estimate what a project would cost to bring to completion. For example, what would it cost the client to print the brochure, have the exhibit designed and built or have a website created? Project management software is also an area in which faculty need to consider the quantity and quality of instruction and make necessary modifications. In the category of project management skills, approximately two-thirds of graduates and two-thirds of employers gave "very prepared" ratings in the ability to follow a project to completion. This indicates a program strength in this area.

Limitations

1. Due to the fact that this study was limited to BSU DT, resulting in a small sample size, the results and findings will have limited ability to be generalized.
2. It is recognized that the researcher is a faculty member of the Design Technology program at Bemidji State University. The interpretation of the results may be influenced by the researcher's stake in the program.
3. The employers who responded to the survey may not have employed more than a small percentage of the graduates from 2001-2006.

Implications

Implications for the BSU DT Program

The process and results of this study have several implications for the DT Program at BSU. First, a process and data collection tools were created for evaluating the effectiveness of the program with regard to the level of graduates' job preparedness skills. This research can be repeated on a regular basis to gather current and relevant data to determine the job preparedness level of recent BSU DT graduates. Employer perception data, combined with graduate perception data, make this study more sensitive to the demands of the profession than merely gathering graduate perception data, and strengthens the validity of the results. Banta, Lund, Black, and Oblander (Banta, et al. 1996, as cited in Hoey & Gardner, 1999) concur as they state by surveying alumni and employers the findings rank high in believability and can be valuable for formative and summative evaluations. The process and survey tools may be used to satisfy the requirements of North Central Accreditation (NCA), in lieu of the less thorough survey being utilized currently by the Department of Technological Studies. If the BSU DT program pursues specific program accreditation, this research also establishes a model for programmatic self-evaluation.

Secondly, through this study, BSU DT faculty are provided data regarding graduates' job preparedness level. This information can and should be used to initiate discussion and justify changes to increase the effectiveness of the program.

Finally, the recurring implementation of this internal formative evaluation process may increase the credibility of the program as employers, administrators, and future

students realize the program is continually examining graduates' job preparedness levels and making the appropriate changes and modifications to the curriculum to provide the best opportunities for students and to meet the demands of the profession.

Implications for other Programs in Higher Education

How do design education programs know they are preparing graduates for careers in the field? Some disciplines, such as medicine and law, have standards dictated by professional requirements and exams that require passing marks for the right to practice in the profession. However, design programs do not have professional standard exams and thus have a challenging task in developing the ideal curriculum for those wishing to practice in design-related occupations. Design is a diverse field and some design educators like Gunnar Swanson believe that standardizing design education is a mistake (Swanson, 2000). Swanson (2000) is quoted as stating, "Standardizing graphic design is about like standardizing dance or fishing. It may all go by one name, but it's not the same thing" (p. 5). Swanson (2005) does believe that "A primary task of design education is to find the balance between skills training and a general understanding that will benefit students, the field of graphic design and working professionals" (p. 29). How is the task of developing curriculum, that prepares students for the field and is sensitive to the needs of a profession, accomplished? The researcher of this study believes that the process and tools utilized in this internal formative program evaluation can serve as a model for other design education programs to judge the effectiveness of design-related education programs as well as other programs in higher education.

Reflections

It is the researcher's opinion that the majority of the results of this study were predictable. One surprise to her was that a higher percentage of graduates with an exhibit specialization perceived themselves to be able to follow a project to completion than graduates with a digital design/electronic specialization. This finding will require further study and evaluation.

The researcher has taught in the program for four years and has attended eight portfolio presentations, during which professionals currently working in the industry critique the skills and work of the graduates. From observations made during these experiences, the researcher could expect the results to suggest the graduate strengths and weaknesses identified by this study. The researcher can now share results of this study regarding perceptions of strengths and weaknesses with the other BSU DT faculty and administration, followed by discussions regarding strategies to make program improvements.

Even though there were significant differences in graduate perceptions of their preparedness by specialization, in each case the differences could be attributed to the fact that certain skills and knowledge are more important to one specialization than to another. There were no significant differences in job preparedness between those who graduated with one specialization and those who graduated with multiple specializations. It was reassuring to discover that no matter the specialization, or whether a graduate obtains a single or multiple specializations, graduates are receiving the same high-quality education.

Recommendation for Further Research

In this study a positivist approach to research was conducted with the collection of primarily quantitative data. The researcher recommends a follow-up study implementing a more constructivist approach in which qualitative data would be collected by an external interviewer. Individual or group interviews of current students, graduates, and employers by an external interviewer may provide more honest and in-depth information. Fitzpatrick, Sanders, and Worthen (2004) state, "persons associated with a program are more willing to reveal sensitive information to outsiders than they are to on-site evaluators" (p. 187). Additional data to collect may include student satisfaction levels of specific courses, advising, and support from faculty.

APPENDICES

APPENDIX A

A SURVEY OF BSU DT GRADUATES

The following groups of questions are about your experiences and opinions of the Design Technology program at Bemidji State University.

Q-1 Thinking about **general work habits and skills,** to what extent did the Design Technology program **prepare you** in the following areas:

	To what extent were you prepared... (Please circle one answer per item)		
a. The ability to work in teams.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
b. Being motivated for success.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
c. The ability to meet deadlines.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
d. The ability to accept constructive criticism.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
e. The ability to solve problems.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
f. To have confidence in your abilities.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
g. The ability to make decisions when necessary.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
h. The ability to work independently.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
i. The ability to be organized.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
j. The ability to work with clients.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
k. The willingness to work beyond "normal" working hours.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
l. Ability to work with matters concerning diversity (age, socio-economic class, race, gender, sexual orientation, religion, ability, etc.).....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED

Q-2 To what extent did courses in Design Technology **prepare you** in the following **communication skills**:

	To what extent were you prepared... (Please circle one answer per item)		
a. The ability to communicate verbally with peers	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
b. The ability to communicate verbally with clients....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
c. The ability to write clearly.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
d. The ability to use proper grammar.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
e. The willingness to ask for clarification.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
f. Developing listening skills.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
g. The ability to speak to groups of people.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
h. The ability to give constructive feedback to others..	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED

Q-3 To what extent did courses in Design Technology at Bemidji State University **prepare you** in each of the following **technical skills**:

	To what extent were you prepared... (Please circle one answer per item)			
a. Knowledge of basic computer operation.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
b. Skills in sketching.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
c. The ability to render with artistic medium.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY

d. Skills in digital imaging.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
e. The ability to use computer drawing software.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
f. Skills in image preparation for the intended output.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
g. The ability to manage computer files.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY

Q-4 To what extent did courses in Design Technology **prepare you** in each of the following **graphic communication skills**:

	To what extent were you prepared... (Please circle one answer per item)			
a. Use of elements and principles of design to create visually pleasing compositions.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
b. Ability to apply color theory.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
c. Ability to apply typography theory.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
d. Ability to use negative space.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
e. Ability to conceptualize.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
f. Ability to utilize an ideation process.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
g. Ability to conduct research necessary for assigned projects.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY

h. Knowledge regarding issues of salary and benefits offered in the industry....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
i. Ability to effectively work on assignments with topics unknown or uninteresting to yourself.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY

Q-5 Thinking about **project management skills**, to what extent did the Design Technology program **prepare you** in each of the following areas:

	To what extent were you prepared... (Please circle one answer per item)		
a. The ability to simultaneously manage elements of a project.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
b. The ability to manage time relating to a project.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
c. The ability to construct project schedules.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
d. The ability to determine project estimates.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
e. The ability to assess project progress.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
f. The ability to adjust the project plan when needed..	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
g. The ability to follow a project to completion.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
h. Skills in utilizing project management software.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED
i. Ability to prioritize projects when working on multiple projects with multiple deadlines.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED

Q-6 Several computer software applications relating to design are listed below. On the left, indicate how important knowledge of the listed software application is in your current employment. On the right, tell us how well Bemidji State Design Technology courses prepared you to use each software application.

Importance of Knowledge to position... (Please circle one answer)			...and...	**Your Level of Preparation...** (Please circle one answer)		
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	Adobe Photoshop	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	Adobe Illustrator	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	Adobe InDesign	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	Quark Xpress	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	Dreamweaver	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	Flash	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	Final Cut Pro	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	Adobe Premiere	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	FormZ	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	3D Studio Max	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	Adobe Acrobat	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	AutoCAD	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	MasterCam	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	SolidWorks	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED

Q-6a. Please list any additional software applications important to the job:_____

Lastly, a few questions about yourself to help us with the analysis.

Q-7. What is your gender?

1 MALE
2 FEMALE

Q-8. Please indicate your Design Technology Emphasis or Specialization (Check all that apply):

___DIGITAL DESIGN/PRINT
___DIGITAL DESIGN/ELECTRONIC (MULTIMEDIA)
___EXHIBIT DESIGN
___MODEL DESIGN
___OTHER_____

Q-9. What is your current employment status?

1 FULL-TIME
2 PART-TIME
3 UNEMPLOYED

Q-10. How related is your degree major to your current job?

1 HIGHLY RELATED
2 MODERATELY RELATED
3 SLIGHTLY RELATED
4 NOT RELATED

→ Q-10a. If you are NOT currently in a job related to your degree major, why not? (If you are employed in a related career, skip to Q-11)

1 I HAVE NEVER PURSUED A RELATED CAREER.
2 I PURSUED A RELATED CAREER, BUT WAS NOT WILLING OR ABLE TO RELOCATE GEOGRAPHICALLY TO OBTAIN A POSITION.
3 I WANTED A RELATED CAREER, BUT WAS NOT SUCCESSFUL IN OBTAINING ONE.
4 I AGGRESSIVELY PURSUED A RELATED CAREER, BUT WAS UNABLE TO FIND EMPLOYMENT.
5 I WAS FORCED TO SETTLE FOR AN UNRELATED CAREER BECAUSE OF IMMEDIATE FINANCIAL PRESSURES.
6 I WAS EMPLOYED IN A RELATED CAREER, BUT HAVE SINCE LEFT THE FIELD.
OTHER_____

Q-11. If you **ARE** currently in a job related to your degree, what is the title of your position?_____

Q-12. At the time you enrolled in the Design Technology program at Bemidji State University, were you…

A recent High School Graduate.....	YES	NO
A transfer from a community or technical college.....	YES	NO
A transfer from another 4-year university.....	YES	NO
Out of school for 5+ years.....	YES	NO

Other _____

Q-13. What was your overall college GPA?

1 DON'T REMEMBER
2 2.00 TO 2.49
3 2.50 TO 2.99
4 3.00 TO 3.49
5 3.50 TO 4.0

Q-14. Before beginning the Design Technology program at Bemidji State, how sure were you in your choice of majors?

1 EXTREMELY SURE
2 SOMEWHAT SURE
3 SOMEWHAT UNSURE OF MY CHOICE OF MAJOR
4 EXTREMELY UNSURE OF MY CHOICE OF MAJOR

Q-15. How satisfied were you with your education at Bemidji State University?

1 VERY SATISFIED
2 SOMEWHAT SATISFIED
3 SOMEWHAT UNSATISFIED
4 VERY UNSATISFIED

Q-16. How satisfied were you with the Design Technology program?

1 VERY SATISFIED
2 SOMEWHAT SATISFIED
3 SOMEWHAT UNSATISFIED
4 VERY UNSATISFIED

Q-17. How satisfied were you with the instruction you received at Bemidji State University?

1 VERY SATISFIED
2 SOMEWHAT SATISFIED
3 SOMEWHAT UNSATISFIED
4 VERY UNSATISFIED

Q-18. How satisfied were you with the instruction in your major program courses?

1 VERY SATISFIED
2 SOMEWHAT SATISFIED
3 SOMEWHAT UNSATISFIED
4 VERY UNSATISFIED

Q-19. Did you fulfill your educational goals at Bemidji State University?

1 YES
2 NO

PLEASE EXPLAIN_____

_____

APPENDIX B

A SURVEY OF EMPLOYERS OF BSU DT GRADUATES

Thinking about Design Technology at Bemidji State University and its graduates, please respond to the following groups of questions.

Q-1 Thinking about **general work habits and skills**, to what extent are Bemidji State University Design Technology graduates prepared with the following abilities:

	To what extent are Design Technology Graduates prepared... (Please circle one answer per item)			
a. The ability to work in teams.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
b. Motivation for success.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
c. The ability to meet deadlines.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
d. The ability to accept constructive criticism.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
e. The ability to solve problems.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
f. Confidence in abilities.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
g. The ability to make decisions when necessary.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
h. The ability to work independently.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
i. Organizational skills.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY

j. The ability to work with clients.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
k. The willingness to work beyond "normal" working hours.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
l. Ability to work with matters concerning diversity (age, socio-economic class, race, gender, sexual orientation, religion, ability, etc.)	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY

Q-2 Thinking about **communication skills**, to what extent are Bemidji State University Design Technology graduates prepared with the following abilities:

	To what extent are Design Technology graduates prepared... (Please circle one answer per item)			
a. The ability to communicate verbally with peers.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
b. The ability to communicate verbally with clients.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
c. The ability to write clearly.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
d. The ability to use proper grammar.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
e. The willingness to ask for clarification.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
f. Demonstrate listening skills.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
g. The ability to speak to groups of people.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY

h. The ability to give constructive feedback to others.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY

Q-3 Thinking about **technical skills**, to what extent are Bemidji State University Design Technology graduates prepared with the following knowledge and abilities:

	To what extent are Design Technology graduates prepared... (Please circle one answer per item)			
a. Skills in sketching.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
b. The ability to render with artistic medium.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
c. Knowledge of basic computer operation....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
d. Skills in digital imaging.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
e. The ability to use computer drawing software.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
f. Skills in image preparation for the intended output.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
g. The ability to manage computer files.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY

Q-4 Thinking about **graphic communication skills**, to what extent are Bemidji State University Design Technology graduates prepared with the following knowledge and abilities:

	To what extent are Design Technology graduates prepared... (Please circle one answer per item)			
a. Ability to use the elements and principles of design to create visually pleasing compositions.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
b. Ability to apply color theory.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
c. Ability to apply typography theory.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
d. Use of negative space.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
e. Ability to conceptualize.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
f. Ability to utilize an ideation process.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
g. Ability to conduct research necessary for assigned projects.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
h. Knowledge regarding issue of salary and benefits offered in the industry.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
i. Ability to effectively work on assignments unknown or uninteresting to themselves...	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY

Q- 5 Thinking about **project management skills**, to what extent are Bemidji State University Design Technology graduates prepared with the following knowledge and abilities:

	To what extent are Design Technology graduates prepared... (Please circle one answer per item)			
a. The ability to simultaneously manage elements of a project.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
b. The ability to manage time relating to a project.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
c. The ability to construct project schedules...	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
d. The ability to determine project estimates..	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
e. The ability to assess project progress.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
f. The ability to adjust the project plan when needed.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
g. The ability to follow a project to completion.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
h. Skills in utilizing project management software.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY
i. Ability to prioritize projects when working on multiple projects with multiple deadlines.....	VERY PREPARED	SOMEWHAT PREPARED	NOT WELL PREPARED	DOES NOT APPLY

Q-6 Several computer software applications relating to design are listed below. Indicate on the left how important knowledge of the listed software application is to the position. On the right, indicate to what extent Bemidji State University Design Technology graduates are prepared to use the software.

Importance of Knowledge to position... (Please circle one answer)			**...and...**	**Level of Preparation of BSU DT graduate** (Please circle one answer)			
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	Adobe Photoshop	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED	DOES NOT APPLY
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	Adobe Illustrator	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED	DOES NOT APPLY
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	Adobe InDesign	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED	DOES NOT APPLY
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	Quark Xpress	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED	DOES NOT APPLY
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	Dreamweaver	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED	DOES NOT APPLY
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	Flash	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED	DOES NOT APPLY
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	Final Cut Pro	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED	DOES NOT APPLY
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	Adobe Premiere Pro	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED	DOES NOT APPLY
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	FormZ	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED	DOES NOT APPLY
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	3D Studio Max	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED	DOES NOT APPLY
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	Adobe Acrobat	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED	DOES NOT APPLY
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	AutoCADD	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED	DOES NOT APPLY
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	MasterCam	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED	DOES NOT APPLY
VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT AT ALL	SolidWorks	VERY PREPARED	SOMEWHAT PREPARED	NOT PREPARED	DOES NOT APPLY

Q-6a. Please list any additional software applications important to the job:_____

Lastly, a few questions about yourself to help us with the analysis.

Q-7. How best can you describe your business or organization (check all that apply)?

___DESIGN FIRM
___WEB DESIGN/DEVELOPMENT BUSINESS
___ADVERTISING AGENCY
___MARKETING FIRM
___EXHIBIT DESIGN BUSINESS
___PUBLIC RELATIONS FIRM
___BUSINESS COMMUNICATIONS FIRM
___OTHER_____

Q-8. Where is your business/organization located?

___ MINNESOTA, OUTSTATE
___ MINNESOTA, TWIN CITIES METRO
___ OTHER STATE(S): _____
___ OTHER COUNTRY: _____

Q-9. Including yourself, how many people does your business or organization employ?

1 1-10
2 11-25
3 26-50
4 51-100
5 101+

Q-10. Approximately how many Bemidji State Design Technology graduates does your business or organization currently employ?

1 ONE
2 TWO
3 THREE
4 FOUR
5 FIVE OR MORE
6 NOT SURE

Q-11. Are you the direct supervisor of a Bemidji State Design Technology graduate?

1 YES
2 NO
3 NOT SURE

Q-12. Given the opportunity, would you continue to hire graduates from the Design Technology program at Bemidji State University?

1 YES
2 NO
3 NOT SURE

Q-14. What are the three most important skills for graduates to have to be successful?

1. _____
2. _____
3. _____

Q-15. What skills, if any, are BSU Design Technology graduates lacking?

APPENDIX C

INTRODUCTORY LETTER TO GRADUATES

DATE

Dear Participant:

The Design Technology program at Bemidji State University is seeking to improve the quality of its program and we need your help by completing a survey. The survey will assist us in determining graduates' perceptions regarding the job preparedness in four categories: communication skills, technical skills, graphic communication skills, and project management skills.

There are two options for completing the survey:

1) a paper version is enclosed along with a postage-paid return envelope for return, or

2) an online survey is located at the following web address:
http://www.surveymonkey.com/s.asp?u=986093920547
When you arrive at the site, please enter
the following ID # at the beginning of the survey: **(code entered here)**

This ID# is not to associate your responses to your personal information, but rather a means to send a reminder notice to those who have not completed the survey.

You may also receive an email requesting your participation. We are asking you to complete the survey only once, but are attempting to contact you through different channels.

If you have any questions or would like a summary of the results of the study, contact me via the information listed at the bottom of this letter. Thank you in advance for participating in this study and for completing the survey in a timely manner. We appreciate your commitment to the Design Technology program at Bemidji State University.

Sincerely,

Bonnie Higgins
Assistant Professor of Design Technology
Department of Technological Studies
Bemidji State University, Bemidji, MN 56601
218-755-3790 / bhiggins@bemidjistate.edu

APPENDIX D

INTRODUCTORY LETTER TO EMPLOYERS

DATE

Dear Participant:

The Design Technology program at Bemidji State University is seeking to improve the quality of its program and we need your help by completing a survey. The survey will assist us in determining employers' perceptions regarding the job preparedness of our graduates in four categories: communication skills, technical skills, graphic communication skills, and project management skills.

There are two options for completing the survey:

1) a paper version is enclosed along with a postage-paid return envelope for return, or

2) an online survey is located at the following web address:
http://www.surveymonkey.com/s.asp?u=990523911149
When you arrive at the site, please enter
the following ID # at the beginning of the survey: **(code entered here)**

This ID# is not to associate your responses to your personal information, but rather a means to send a reminder notice to those who have not completed the survey.

You may also receive an email requesting your participation. We are asking you to complete the survey only once, but are attempting to contact you through different channels.

If you have any questions or would like a summary of the results of the study, contact me via the information listed at the bottom of this letter. Thank you in advance for participating in this study and for completing the survey in a timely manner. We appreciate your commitment to the Design Technology program at Bemidji State University.

Sincerely,

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REFERENCES

Accrediting Council for Collegiate Graphic Communications, Inc. (2006). Accreditation Manual for Baccalaureate Degree Programs in Graphic Communications.

American Institute of Graphic Arts Task Force and National Association of Schools of Art and Design Executive Committee. (n. d.). *Technology Thresholds in Graphic Design Programs.* Retrieved July 2, 2007, from http://www.aiga.org/resources/content/3/7/4/2/documents/technology.pdf

Association of Professional Model Makers. (2006). Summary of 2006 International Conference, Innovate: Fabricate. Retrieved June 19, 2007, from http://wrapup.apmm2006.com/Default.aspx?tabid=60

Bemidji State University Undergraduate Catalog. (1992-1994). Bemidji State University: Bemidji, MN (pp. 200-204).

Boulmetis, J., & Dutwin, P. (2005). The ABCs of Evaluation: Timeless Techniques for Program and Project Managers. San Francisco: Jossey-Bass.

Churchman, L. (2004). When a Profession Changes, How Can Curricula Respond? *Proceedings of the AIGA Design Education Conference 2004.* Retrieved June 20, 2007, from http://futurehistory.aiga.org/resources/content/2/2/6/8/documents/l_churchman.pdf

Creswell, J. W. (2005). *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research.* (2nd ed.). Upper Saddle River, NJ: Pearson Education, Inc.

Davis, M. (2005). Raising the Bar for Higher Education. In S. Heller (Ed.), *The Education of a Graphic Designer* (pp. 13-18). New York: Allworth Press.

Fitzpatrick, J. L., Sanders, J. R., & Worthen, B. R. (2004). Program Evaluation: Alternative Approaches and Practical Guidelines. (3rd ed.). Boston, MA: Pearson Education, Inc.

Gall, M. D., Gall, J. P., & Borg, W. R. (2003). *Educational Research: An Introduction* (7th ed.). Boston: Allyn & Bacon.

Garland, K. (2005). Anxious About the Future? In S. Heller (Ed.), *The Education of a Graphic Designer* (pp. 38-40). New York: Allworth Press.

Heller, S. (2005). Introduction. In S. Heller (Ed.), *The Education of a Graphic Designer* (pp. ix-xii). New York: Allworth Press.

Heller, S. (2005). What This Country Needs Is a Good Five-Year Design Program. In S. Heller (Ed.), *The Education of a Graphic Designer* (pp. 13-18). New York: Allworth Press.

Heller, S., & Fernandes, T. (2004). *Becoming a Graphic Designer* (3rd ed.). New Jersey: Wiley & Sons, Inc.

Hoey, J. J. & Gardner, D. C. (1999). Using Surveys of Alumni and Their Employers to Improve an Institution. *New Directions for Institutional Research.* No. 101, Spring 1999.

Irwin, T. (2004). *Specialization and Design.* Retrieved June 20, 2007, from http://www.aiga.org/content.cfm/specialization-and-design_1

Kelly, R.R. (1989, June 23). *The Yale Years.* Keynote address presented at the 1989 Graphic Design Education Association Conference. Manuscript retrieved June 1, 2007, from http://www.rit.edu/~rkelly/html/01_ori/ori_yal1.html.

Kelly, R. R. (1994). *Postwar Graphic Design Education in America.* Retrieved May 31, 2007, from http://www.mcad.edu/home/alumni/kelly/PostwarDesEd.html.

Longhauser, W. (2005). Circling the Desert: The Illusion of Progress. In S. Heller (Ed.), *The Education of a Graphic Designer* (pp. 125-127). New York: Allworth Press.

Lupton, E. (2005). The Re-Skilling of the American Art Student. Retrieved June 6, 2007, from http://www.aiga.org/content.cfm/the-re-skilling-of-the-american-art-student.

Mages, M. A., Murell, F., & Speer, R. (2006). Balancing Act: Whose Responsibility is it when it Comes to Technical Training? *Point: The AIGA Colorado Education Journal, 1*(1), 8-9.

McCoy, K. (1997). *Education and Professionalism or What's Wrong with Graphic Design Education?* Retrieved May 31, 2007, from http://www.higherground.com/mccoy/kmframe.htm

McCoy, K. (2005). Education in an Adolescent Profession. In S. Heller (Ed.), *The Education of a Graphic Designer* (pp. 3-12). New York: Allworth Press.

National Association of Schools of Art and Design. (2007). National Association of Schools of Art and Design Handbook [Electronic Version].

North Central Association (United States). (2007). *Policies and Procedures for Schools Approved for Postsecondary Education* [Electronic Version].

Patton, M. Q. (2000). Overview: Language Matters. *New Directions for Evaluation*, No. 86, 5-16. San Francisco: Jossey-Bass.

Shell, D. (2006). Five Questions for the Pro. *Point: The AIGA Colorado Education Journal, 1*(1), 3.

Stufflebeam, D. L. (2001). Evaluation Models. *New Directions For Evaluation,* No. 89. San Francisco: Jossey-Bass.

Swanson, G. (2005). Graphic Design Education as a Liberal Art: Design and Knowledge in the University and the "Real World." In S. Heller (Ed.), *The Education of a Graphic Designer* (pp. 22-32). New York: Allworth Press.

Tselentis, J. A. (2006). Software Equals Interactive Design Education? Retrieved June 5, 2007, from http://www.aiga.org/content.cfm/software-equals-interactive-design-education#authorbio

The U. S. Bureau of Labor Statistics. (2006-2007). U.S. Bureau of Labor Statistics Occupational Outlook Handbook. Retrieved August 7, 2007, from http://www.bls.gov/oco/ocos090.htm.

Wiersema, W., & Jurs, S. G. (2005). Research Methods in Education: An Introduction (8th ed.). Boston: Pearson Education, Inc.