

IT Instruction Methodology and Minimum Competency for Accounting Students

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ABSTRACT

Information Systems education has long been recognized as an important aspect of accounting education for prospective accountants, and is even more critical in our rapidly changing environment. Brigham Young University has three courses to provide accounting students in the 150 hour Master of Accountancy program with the necessary IT skills. The final class is a capstone course to provide enhanced IT skills to students immediately before graduation. This course is taught cafeteria style allowing students to select which IT topics to study and to develop skills from a menu of options. In this paper, we explain how the course is structured. Results of a survey of recent graduates are presented which indicates which topics are most helpful in their employment. It also indicates that the course is generally meeting its objectives to better prepare students for their first job. Based on the survey results, areas of improvement are also identified.

Keywords: Teaching Technology, Accounting Education, Accounting Competencies, Distance Education, Virtual Learning

1. INTRODUCTION

Information systems (IS), also referred to as information technology (IT), has long been accepted as an important course in accounting programs (AAA 1970, AICPA 1968; AICPA 2000, Dyer 1999, Siegel 1994). More recently, considerable attention has been given to the Accounting Information Systems (AIS) course that forms a fundamental part of most accounting curriculums. Several studies have been conducted to identify the topics that constitute a common body of knowledge for this AIS course (AAA 1987; Davis and Leitch 1988; Heagy and Rakow 1991) including the learning objectives and possible learning activities (Amini 1993, Borthick 1996). These studies show that the major emphases of the AIS course are the business cycles, controls and auditing, and systems analysis and design. In addition, approximately 82% of them include some type of computer project as an outside-of-class learning activity such as a spreadsheet application or a

general ledger software application. Prior research has focused on the fundamentals of Information Systems as taught in the AIS course. Little research has been conducted on subsequent systems courses or the more advanced IS skills required for accounting students.

The role of the accountant is changing dramatically as the world becomes more technology oriented. The AICPA's Vision Project predicts that information technology will become one of the top five future services provided by CPAs. CPAs are expected to provide a broad range of services in technology application, system analysis, information management, and system security (AICPA 2000, JFMIP 1999). CPAs will not only be required to have a good understanding of the fundamental concepts taught in the typical AIS course, but they must also be proficient with IT tools. A variety of tools are already being used by most CPA firms (Prawitt et al 1997). Requirements for advanced IT skills so that accountants can make business

judgements based on analysis of information appears to be even more critical in the future (Albrecht 2001).

In a study of computing literacy of business students in a regional university, Amini (Amini, 1993) found that most students were not confident of their technology skills when they entered the workforce. The study also concluded that additional learning was required after the students graduated in order for them to have sufficient skills for the workplace. Even though the MIS courses at the university did provide a good beginning, additional opportunities to strengthen IT skills would have been helpful.

What has not been given adequate attention in the literature are the specific IT tools that entry level professionals need to know and the level of proficiency required to be productive members of the firm. Also, alternative teaching methodologies must be explored to accommodate student with varying levels of competency in the use of IT tools and to resolve the limited teaching resources of most educational institutions.

The objectives of this paper are to describe a modular approach to teaching IT tools, describe how the approach has been implemented at Brigham Young University, and provide feedback from students about the desirability of the approach and the minimum level of competency required in a professional environment. In the following section, we describe the approach used to teaching information technology at Brigham Young University. We describe in depth the IS Tools and Applications course and our approach to enhancing students' practical skills in information technology.

2. INFORMATION SYSTEMS TOOLS AND APPLICATIONS

The IS Tools and Applications course builds on two fundamental courses taught to business students. All business students take a Management Information Systems (MIS) course, which provides a broad overview of systems and technology. Accounting students also take the Accounting Information Systems (AIS) course.

In our program, there is almost a two-years lapse from the time students take the MIS and AIS courses in the business core and the completion of the Masters of Accountancy (Macc) degree. During that time there frequently are several new enhancements in the software products that students want to understand. The IS tools class is a capstone course to help students enhance and update the skills they learned earlier in the program and increase their ability with new tools.

The course accommodates students who feel they need more practice in mastering the basics, as well as those

who want to learn more advanced features. By this point in their education, most accounting students have a good foundation in IT concepts and how IT is used in business. In addition, most students have good skills in using basic spreadsheet functions and some skills with other IT tools. However, almost without exception, students have expressed a desire to strengthen their IT skills. Many students still feel they are not adequately prepared in technology for their first job in the accounting profession. Based on this perception we developed the IS Tools and Applications course, which is offered to all graduate level students in the Marriott School C accounting, business management, organizational behavior, and public administration.

The IS Tools and Applications course is primarily skills oriented with extensive "hands-on" assignments. However, since the course is offered to all management graduate students, there is a wide disparity in IT skills of students registering for the course. Some of the Macc students have strong IT skills. Other students, particularly those in majors that have not had as much IT preparation, come into the class with lower levels of knowledge and skills. To solve this problem, the course is designed in a modular fashion with a menu of thirty-six separate modules. Each module is a self-contained unit of instruction with tutorial and competency exercises.

The modules are organized into eight topic areas. The topics currently offered include Operating Systems, Internet and HTML, Database, Presentation, Data Analysis, Programming, Accounting, and finally a miscellaneous topic called Self-Directed. Often advanced students use the self-directed area for special IT skills or even certifications that they would like to obtain during the semester. Each topic has two to six modules. Generally, the modules range in difficulty from beginning to very advanced. The total size of the cafeteria of menu modules is approximately three times the load of a normal three-hour semester long course. Thus each student has a broad range of modules from which to choose.

At the beginning of the semester, students assess their own skills and set personal goals concerning what they want to achieve in the course. Currently this is done somewhat informally. An instruction sheet is provided which shows which modules teach which skills. Using that sheet and in consultation with the instructor, each student develops a program of study for the semester. Within the first week of the class, each student submits a contract, via the Course Syllabus Web Page, identifying his/her goals and the modules he/she will complete. The instructor then reviews the submitted contract with the student to ensure that the selected modules provide a meaningful learning experience. The

cafeteria style with a written contract allows students to structure the class around topics of interest and toward skills they want to strengthen. A frequent problem with a self-paced and a self-study course is that students frequently procrastinate doing the work. A written contract, along with weekly performance goals, helps students keep on track for completion during the required semester time period.

Constraints are established on the number and level of modules a student can select to help ensure a challenging experience. A course requirement specifies that students must identify three of the eight topics in which they will demonstrate advanced competency by completing a real-world project of their own choice. For example, if a student desires to strengthen his database skills, he could choose database as one of his three topics and select up to six modules in the database topic. After a student has completed the selected modules, he/she would build a database for a real world application. The project must include numerous components, listed in the database project requirements, to demonstrate an advanced level of competency.

Since each module is self contained and accompanied by detailed tutorials, there is no lecture in the class. It is in a distance education format because the students are never required to come to class. Since every module is self contained with tutorials, exercises, and grading criteria, students can work at home, or anyplace they have Web access. Tracking student performance and deadlines is accomplished through CourseInfo's Blackboard course administration system. Contact with the professor can all be done via email and chat rooms. All homework is submitted through the digital dropbox and a central repository of all student work is maintained. At any time during the semester, a student can check his/her assignments and grades through the Internet. Students frequently take the course during the summer months from all over the United States while at their summer employment.

We teach the course in a "semester on-line distance education format." By semester on-line, we mean that students must register for the course as any other regular course. The class begins at the start of each semester and all the work must be completed by the end of the semester. Even though there are weekly goals for what should be accomplished, the only firm deadlines are for the completion of each of the three projects. It was found that the project deadlines are sufficient to keep students up to date. As with the development of any skill, frequent (even daily) practice sessions are necessary for optimum learning. Without deadlines, too many students attempted to complete the material towards the end of the semester. Procrastination not only decreases the student's learning, but several

students would invariably fail to complete all the requirements and fail the class.

This course is very popular among the students. Feedback from the students is overwhelmingly positive. Comments such as "I learned a tremendous amount," and "I learned more about developing and using databases than in all my other classes" are not uncommon. Because the course is near the end of the curriculum, students benefit by building on the foundation provided in the earlier courses. Students like the contract approach. They know exactly what they must accomplish and how to earn a good grade. Instead of leaving the university with a feeling of inadequate computer competency, students feel very confident with their level of computer skills.

The format of the course facilitates both instruction and management. The independent modular approach allows components of the course to be easily updated. As students' skill levels increase or as new technology becomes available, new modules are added without having to restructure the entire course. Existing modules are reworked as necessary to keep them current with new software releases and revised textbooks. New modules are added to enhance student capabilities. Recent additions to the class include modules on Visual Basic to respond to the students' desire to be able to program advanced macros in Excel and to understand concepts related to Active-X controls. Other new additions include using Unix operating systems, Active Server Pages on the Internet, Cold Fusion for Internet database development, performing statistical analysis with a statistical package, and working with a large scale accounting package.

3. EVALUATING THE EFFECTIVENESS OF IT EDUCATION

3.1 Background for survey

A questionnaire survey was used to ascertain the opinions of MAcc students on the effectiveness and relevance of our philosophy and approach to teaching IT. Specifically, we wanted to determine:

- Do our graduates consider themselves as prepared as graduates of other programs?
- Are we providing skills education in the right software applications?
- What additional skills education should we provide?

Although our primary interest was in receiving feedback from graduates, we also wanted to test the attitudes of current students to observe how those attitudes compared with those in the workplace. We were able to obtain valid addresses for 132 graduates and 34 current students. This became our target audience. We

received 60 useable responses from graduates in industry (45% response rate) and 11 useable responses from students (39% response rate). The student response rate was lower than expected. The mailing was done at the end of the semester, which is an intensely high-pressure period immediately followed by a period of travel and "escape." Our primary interest was in obtaining feedback from graduates who were already in the workplace. Our interest in the student survey was to provide a qualitative comparison with the graduates. Given these objectives we decided to proceed even with the low student response.

The front side of the questionnaire listed the application software skills that have been included in the tools class. Since the class continually grows and expands, not all topics were available to all graduates. Respondents were asked to evaluate each topic by (1) identifying a

expected to see a high correlation between the skill level question and the preparation question. However, it is possible for respondents to have, for example, a medium

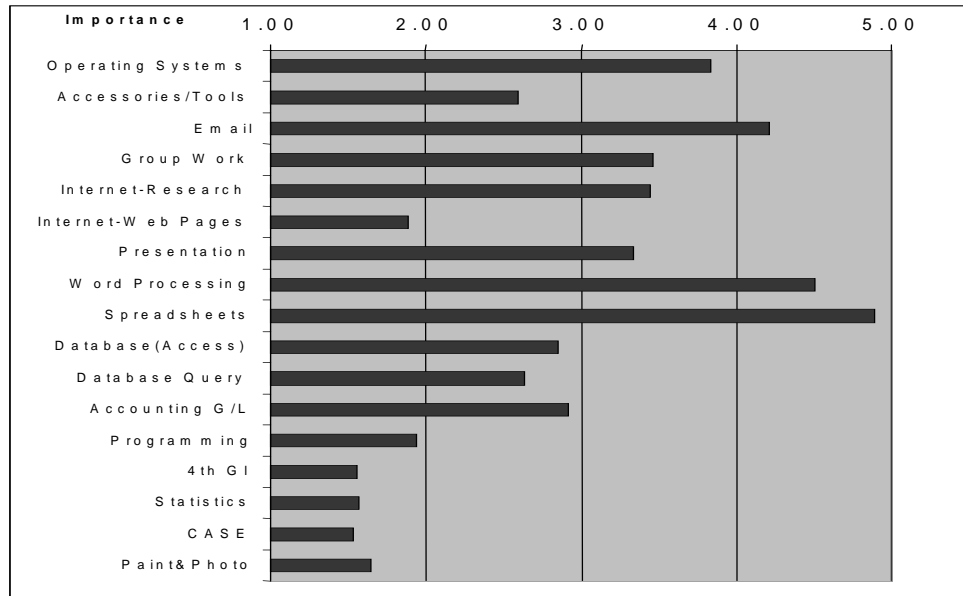
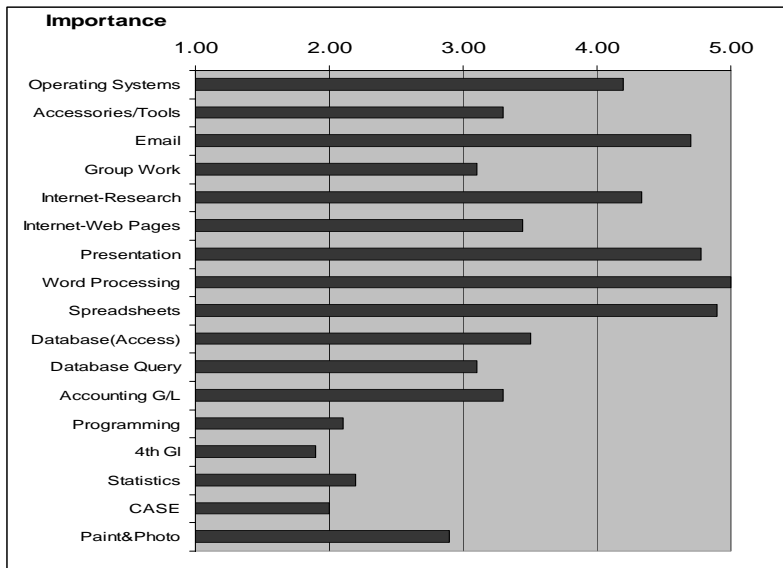


Figure 1. Importance ratings for MAcc students.

skill level, yet still consider themselves adequately prepared.

Page two of the questionnaire included detailed questions to assess respondents' opinions about the program and the tools classes in general. Specifically, page two questions were designed to obtain feedback on specific strengths and weaknesses of the program. We also included three open-ended questions to identify other skills or changes respondents would recommend for the program.



general skill level, (2) rating the importance of the topic, and (3) rating their level of preparation in the topic. We

3.2 Survey Results - Importance of the skills.

Figure 1 reports average responses for the "Importance" of various applications by graduates in the workforce (on a scale of 1 to 5 with 1 as "unnecessary" and 5 as "valuable"). Skills in the 4.0 to 5.0 range are most important in fulfilling job responsibilities. These include email, word processing, and spreadsheets. The second tier, ranging from 3.0 to 4.0, are slightly less valuable and include operating systems, group work, Internet research, and presentations. The third tier,

importance ratings by topics for MAcc graduates.

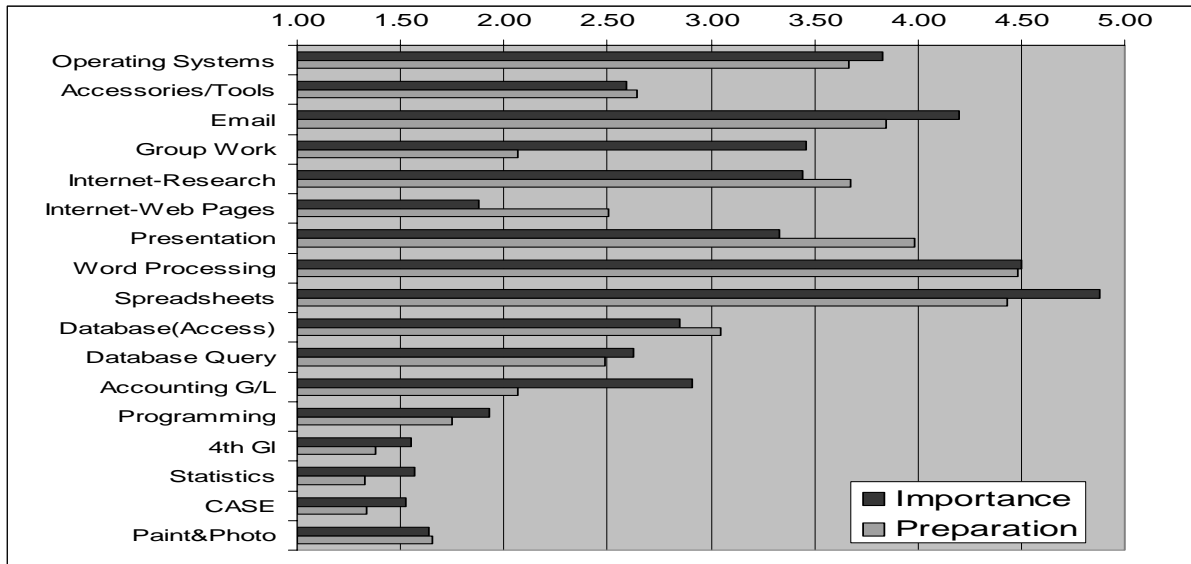
ranging from 2.0 to 3.0, is below the midpoint of the

five-point scale. Skills in this range, on average, are not as valuable in fulfilling job responsibilities. In this category are database access and query, accounting/general ledger packages, and other accessories and tools. The least important category are those below 2.0. On average graduates indicate felt these skills are not very valuable in the workplace. This includes building Web pages, programming, fourth generation language programming, statistical analysis, Computer Assisted Systems Engineering (CASE) and paintshop or photoshop tools.

of college course work where they use presentations and Internet research skills quite extensively. The exception to higher rankings by students is in group work. Since there is not as much need to do collaborative work in school, students did not rank group work nearly as important as the graduates.

3.4 Survey Results - Importance versus Preparation

Respondents were also asked to rate their level of preparation for each skill. This rating used a five point scale, with 1 indicating “poor” preparation and 5



representing “exceptional” preparation.
 Figure 3. Importance versus preparation for graduates.

Figure 2 shows the same information for students at or just leaving the university. Students’ ratings are higher than graduates’ ratings for every skill. Students rated six skills in the 4.0 to 5.0 range B operating systems, email, Internet research, presentations, word processing, and spreadsheets. In the second tier are skills for accessories and tools, group work, Web page development, database access, database query, and accounting packages. The third category, which ranges from 2.0 to 3.0, includes programming, statistics, and paintshop. Those deemed unimportant to future job responsibilities are fourth generation programming and CASE tools.

3.3 Interpretation of Survey Results- Importance

The first thing we notice is that the students’ average rankings are higher than graduates’ rankings in all categories except one. Since the students have little experience in the real world, they probably rank almost everything more important. In category 1 (ranking of 4.0 to 5.0) students included six applications while the graduates had only three. Some of these skills probably seem more important to students because of the nature

Figures 3 and 4 compare differences between the average ratings for “Importance” and “Preparation” for MAcc graduates. Figure 3 shows the comparisons graphically and Figure 4 is a table of the numeric scores and a comparative t-statistic. The table presents the results of a paired students t-test with an alpha = 0.05 to test a null hypothesis that the means are equal. The intent of this comparison is to identify any skills that are rated more important than the preparation they received. The other extreme would also be interesting, i.e., skills that are unimportant but where respondents are well prepared (maybe over-prepared).

As can be seen from the chart, two areas have large differences between the perceived importance and the preparation C Group Work and Accounting General Ledger applications. In these two skills, graduate respondents rated their preparation much lower than they did the skill importance. From the graph, two other skills appear to potentially have a substantial difference in their ratings B Spreadsheets and Email.

On the other end of the spectrum, two skills had

average preparation ratings that were higher than the importance ratings B Internet Web Page development and Presentation.

The statistical calculations shown in Figure 4 confirm some of the results observed on the chart. The t-test for equality of means and an alpha of .05 identify three skills that have statistically significant differences in their average ratings B Group Work, Spreadsheets, and Accounting General Ledger packages. Average ratings for Email did not fail the null hypothesis at the 5% level, although the t-statistic is very close to the critical cutoff value.

Two skill areas in Figure 4 are outside the two tailed t-statistic, but with an average preparation score higher than the importance score. In other words, graduates consider themselves better prepared than the importance warrants in Presentations and Internet Web Page Development.

3.5 Interpretation of Survey Results - Importance versus Preparation

The finding about group work is important for us. Historically, we have not included much training on collaborative systems and the use of workflow or group communication software. However, it is evident that more and more of an accountant's work, especially in accounting firms, is done on a collaborative basis. The finding with regard to general ledger systems is also interesting. Although graduates did not rate the importance of general ledger skills in the top tiers, they still feel their preparation was not commensurate with even the lower level of importance. Within the last year we have taken steps to correct this deficiency by adding modules to teach skills in two separate general ledger systems. Our survey method does not permit us to distinguish between responses from the various classes. Future surveys should identify the year the course was taken to more accurately evaluate changes in course content.

	Skill Level	Importance	Preparation	Difference	two tailed t test	Ho: P=I (5%)
Operating Systems	2.27	3.83	3.67	0.17	1.1502	Yes
Accessories/Tools	1.69	2.59	2.64	-0.05	0.2581	Yes
Email	2.42	4.20	3.85	0.36	1.9372	Yes
Group Work	1.30	3.46	2.07	1.39	6.9200	No- worse
Internet-Research	2.31	3.44	3.68	-0.24	1.2962	Yes
Internet-Web Pages	1.54	1.88	2.51	-0.63	2.7512	No- better
Presentation	2.43	3.33	3.98	-0.65	3.4501	No- better
Word Processing	2.85	4.50	4.48	0.02	0.1337	Yes
Spreadsheets	2.83	4.88	4.43	0.45	4.0901	No- worse
Database(Access)	1.97	2.85	3.05	-0.20	1.2714	Yes
Database Query	1.59	2.63	2.49	0.14	0.9044	Yes
Accounting G/L	1.53	2.91	2.07	0.84	4.4643	No- worse
Programming	1.25	1.93	1.75	0.19	1.1975	Yes

4 th GI	1.16	1.55	1.38	0.17	1.8017	Yes
Statistics	1.13	1.56	1.33	0.24	1.6925	Yes
CASE	1.19	1.53	1.33	0.19	1.8462	Yes
Paint&Photo	1.41	1.64	1.66	-0.02	0.1249	Yes

Figure 4. t-test on equality of Importance versus Preparation for MAcc graduates.

3.5 Interpretation of Survey Results - Importance versus Preparation

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3.6 Survey Results - Graduates' Statements

The second page of the questionnaire tested level of agreement with a set of statements. Respondents were asked to rate each statement on a five point scale ranging from Strongly Disagree to Strongly Agree. The table in Figure 5 shows the percent of answers received for each rating with the mode highlighted, the average rating value, and the standard deviation. The standard deviation provides the measure of dispersion of the respondents' answers. This gives us a feel of the uniformity of the respondents' opinions.

The first two questions tested opinions on the general effectiveness of the AIS portion of the accounting core and the IS Tools and Applications class. The AIS class has an average of 3.4 with the most responses exactly halfway between Agree and Disagree. The IS Tools and Applications course has an average of 4.08 with 4.0 as the mode.

The third, fourth, and fifth questions test respondents' opinions on the importance of IT in their work and their level of preparation. The responses indicate that IT is important and that graduates do feel well prepared. The modes are at the extremes of the scales.

Statements seven through thirteen test opinions about various aspects of respondents IT education at BYU.

The response to statement seven indicates that graduates think that other business management classes in the college should include more use of technology and tools. Responses to statements eight through eleven indicate that students generally feel they received adequate education in the listed topics of data modeling, event driven processing, programming, and equipment. Statement twelve indicates a desire for more network and communication education. Statement thirteen also indicates a felt need for more IT classes in general.

3.7 Interpretations of Survey Results - Graduates' Statement

There are some interesting observations and conclusions from the table. First, graduates consider the capstone IS Tools and Applications class to be considerably effective than the AIS course. This helps us answer one of our on-going question of the need to have this capstone course. It appears that the course provides a

	Graduates	Disagree					Agree	Ave	StDev
		5%	11%	38%	32%	14%			
1	The Accounting Core was effective in teaching IT	5%	11%	38%	32%	14%	3.40	1.04	
2	The Tools Course was effective in teaching IT	3%	3%	15%	43%	35%	4.08	0.97	
3	I feel adequately prepared in my job	5%	3%	10%	37%	45%	4.15	1.07	
4	I am not as prepared as my peers	55%	28%	7%	8%	2%	1.69	1.02	
5	My IS skills are not important in my job	58%	23%	8%	10%	0%	1.63	1.00	
6	I learned most of what I know outside of school	3%	22%	40%	27%	8%	3.21	0.97	
7	More IT should be given in other accounting and BM classes	3%	10%	15%	42%	27%	3.77	1.06	
8	I need more data modeling skills	19%	37%	30%	7%	7%	2.47	1.10	
9	I need more event driven skills	21%	35%	28%	14%	2%	2.49	1.03	
10	I should have taken programming	19%	32%	22%	19%	8%	2.57	1.23	
11	I need more knowledge about equipment	7%	34%	29%	19%	12%	2.92	1.14	
12	I need more knowledge about networks and communication	2%	8%	38%	32%	20%	3.58	0.96	
13	If I could redo my education, I would take more IT classes	7%	20%	27%	29%	17%	3.25	1.18	

Figure 5 Graduate responses to attitudinal questions

a positive contribution to their education.

Most graduates (the highest two cells total 82%) feel adequately prepared for their jobs. In fact they feel strongly about this. They also feel strongly that they are as well or better prepared than their peers. This provides positive feedback on one of the objectives of our IT curriculum C that our students be well prepared.

The statement “My IS skills are NOT an important aspect of my job” had a very strong negative response (85%). In fact it was the only question that had zero responses in the Strongly Agree category. Evidently, no matter what the job, IT is an important component of every graduate’s work. For the majority it is a very strong requirement. The natural conclusion is that the correct direction for accounting education is to continue to provide good IT skills education.

Graduates indicate they learned IT skills primarily through their class-work and not from outside of school activities. They also feel we can do a better job of integrating IT skills with other accounting and business classes. We continue to work on this area.

Finally, we appear to be about right in the level of IT education with a slight bias towards enhancing the IT offerings even more. The average was 3.25, but with a fairly large standard deviation. Most respondents did not think they needed more education in the more technical areas of IT such as programming or hardware. However, they indicate a need for us to strengthen our offerings in networking and data communications.

4. CONCLUSIONS

We have already discussed several detail conclusions but we can draw some general conclusions for both

BYU and accounting programs at other universities. The survey results indicate this additional course has raised both the skill level of accounting graduates and their level of confidence in utilizing information technology in the work place. The additional three credit hour course is a worthwhile investment in a student’s education. Almost universally students feel their IT skills are necessary and important. They also indicate they would like more, not less, IT education, both in this type of class and integrated into their other accounting and business classes. It is hard to test, but we also assume that this additional skill level will assist them to continually advance their IT skills.

Another conclusion inferred from this research is that the structure and presentation of the class is effective. Over the time period tested, the format of the class changed somewhat as we gained experience with this teaching approach. Consequently, we did not directly ask if the format of the class was conducive to learning. However, based on student recommendations over the time period tested and the positive survey results we infer that the current format is workable. When we obtain a larger database of graduated students under the current format we may conduct additional studies.

The final question we always ask is whether the research itself was worthwhile. In our case we discovered both that our philosophy and approach of the IS Tools and Applications course is well accepted and appreciated by MAcc graduates. This provides support for ongoing dedication of teaching resources and student credit hours in the curriculum. We also obtained valuable feedback on areas needing improvement. And finally, we trust that these findings may be helpful for others who are strengthening or looking for ways to strengthen the information technology aspect of their accounting programs.

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