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Aligning Academic Curricula to Industrial Needs

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ABSTRACT

Information technologies (IT) are developing rapidly and industry leaders depend on the educational system for a qualified workforce. Educators are tasked with the responsibility of designing curricula and practical activities that prepare students for the corporate world. Understanding today's work requirements is essential in achieving this goal. This research investigates how well the Management Information System (MIS) program of a four year institution prepares its graduates for the requirements of the IT industry. Current industry data as well as survey analyses of the work experiences of the MIS alumni were used to identify how prepared they were. More than one-third, (36.7%) of the participants had positions related to managing information, and 3.3% were involved in software development, which has the highest job growth projection. From a list of technical skills, 6% of respondents were involved in cyber security which ranked highest, 88% in hiring priority of IT employers. The results serve as a baseline for improving student learning outcomes.

Keywords: Information systems, technical and soft skills, academic curricula.

1. INTRODUCTION

Post graduate student perceptions and their professional outcomes are important ways for evaluating and ameliorating an academic curriculum. A curriculum is a set of courses, content and sequence of experiences, offered at a University and it often contains a brief description of courses and the elements of teaching them (Ellis, 2004). A study from the Brookings Institution revealed a strong impact of curriculum on students' personal, social and economic outcomes and emphasized the need for constant reassessment and improvement of curricula with regard to current changes in the business environment (Grover, 2009). In a recent study on higher education, Linda Klein mentioned economic and professional progress as major reasons for enrollment in academic programs (Klein, 2012).

Each university designs its own curricula but its ability to produce desired outcomes varies and is subject to constant debate and research, since no curriculum is perfect, and its effectiveness very often depends on the students' academic backgrounds, personal effort and the environmental characteristics in which it is implemented. However, every program is designed in such a way as to give students the best possible preparation and help integrate them into the workforce with minimal difficulty. This research study reassesses the Management Information Systems (MIS) program of a four

year institution with a focus on the skills and requirements of today's job market.

Aligning education to foster professional and workplace development is quite challenging in the field of information technology (IT). This is because the constantly changing IT landscape with advanced computer systems results in highly variable and transient job requirements (Davis & Woodward, 2007). The exponential development of new technologies is bringing new skills like cloud computing, system designers and application development skills to the forefront of the business environment. These new skills are redefining job descriptions today with more and more corporations needing IT services that were nonexistent some years back. In order for curricula to remain relevant, schools have to constantly reassess and redesign the programs to meet today's expectations of change and innovation. The purpose of this research is to investigate the strengths and/or weaknesses of the institution's MIS program by analyzing data on the experiences of its alumni in the context of the present corporate world.

Statement of the Problem

Performance of alumni in the workplace is a strong indicator of the strength and usefulness of the curriculum they experienced. The MIS curriculum of the institution is divided into four major course categories which include two primary courses, two communication courses, four management strategies courses and four technology infrastructure courses, with the last two categories making up its core competences. While the MIS program, like all other curricula, cannot by itself meet all the IT skills and job requirements of all employers, it is vital to investigate the effectiveness of the curriculum in helping students develop their core competencies and thrive in the workplace.

In order to maintain or improve the strength of the institution's MIS program, it is important to answer questions about the alumni ability to get a job expeditiously; the ability of the curriculum to help alumni handle the technical and non-technical skills on the job; their ability to get a job in an expeditious manner; the degree to which the curriculum affected their salary range; and how well any difficulties or weaknesses in the curriculum were addressed.

Statement of the Objectives

An effective evaluation of curriculum is vital to maintaining and improving standards. This research paper reassesses the MIS program by using the feedback of a sample of its alumni presently in the workforce. Feedback will be obtained using a post graduate survey of the alumni. Post graduate surveys are indirect but effective ways of evaluating curricula as they offer graduates the opportunity to comment on content areas of the program based on their experiences. The data collected will be analyzed and compared to current data statistics to identify the strengths and weaknesses of the program. The survey results, along with the students' backgrounds, will be compared to identify any possible causes. The research results will serve as a baseline for improving and redesigning the curriculum to meet real-world requirements.

2. REVIEW OF LITERATURE

Relationship between school and the workplace

There is a close association between education and employment. Regardless of the primary reason for pursuing studies, the notion that it is solely for personal satisfaction is unduly idealistic because the underlying motivation for pursuing studies continues to be the desire to be more competitive in the job market. Education has sometimes been the determining factor for finding a job, keeping a job, or climbing the ladder in a particular field of specialization. It is, therefore, true that preparing students for a future job is a valid university endeavor, and as such academia must tailor curricula to meet the expectations of today's work environment (Klein, 2012).

The role of higher education

There are different views as to the extent to which higher education is responsive to the perceived demands of the workplace or must actively prepare students to meet them. Some affirm that the purpose of university education was never to prepare for a future job, but to impart rare knowledge to those privileged to receive it. This group points out that scholars learn because they like to learn and do so for personal enrichment, not to obtain a job or pursue wealth, and therefore universities should not be considered as an industry for tradable services (Patin, 2012). Proponents of this line of thought also state that certain skills and values cannot be lectured into people, and hence teachers do not prepare people for work; it is something people do for themselves from personal initiatives and experiences. There are also students who believe that internships rather than academic education are the best way to get

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what is required for the work environment (Smith, 1996).

On the other hand, some argue that the age when education served only the purpose of knowledge acquisition is long gone and, in the context of today's changing environment, more can be achieved and should be expected of it. This is because a college degree of some sort is now a prerequisite to enter most professional fields, and so education systems ought to be shifting their focus toward providing students with useful abilities and talents in addition to simply knowing things. Curricula should be designed specifically to teach and prepare students for jobs (Fedder, 2012). Furthermore, studies also indicate that postgraduate qualifications are increasingly listed as job or promotion requirements in the corporate world, strengthening the job related purpose that is explicitly recognized in education (Chun, 2013).

In between these two extremes are those who believe that while higher education, through a well-designed curriculum, can open prospects for jobs, it also depends on other aspects like the academic background and personal efforts of the students as well as the collaborative efforts between the schools and industries in terms of internships. This group suggests that curricula tend to be more effective for students with a similar academic background on admission into the program as compared to those without it. However, they affirm that academic curricula should include training which involves job experiences through internships within the industry (Teichler, 2007).

In her paper on learning outcome guidelines, Jennifer Lindholm argued that any successful academic program had to benefit from an ongoing process of inquiry and reflection that focused on growth, renewal, and continuous improvement. She discussed the outcome assessment feedback loop which focuses on gathering evidence that students can demonstrate proficiencies on the core competencies of the courses they take. Maintaining the flow and coherence within the loop requires combined efforts from the students, faculty and administration. This coherence is vital for the program to effectively enhance student learning outcomes (Lindholm, 2009). Educators can, therefore, acquire and analyze data on the students' performance and use any relevant information to increase the quality of curricula. Figure 1 presents the outcome assessment feedback loop.

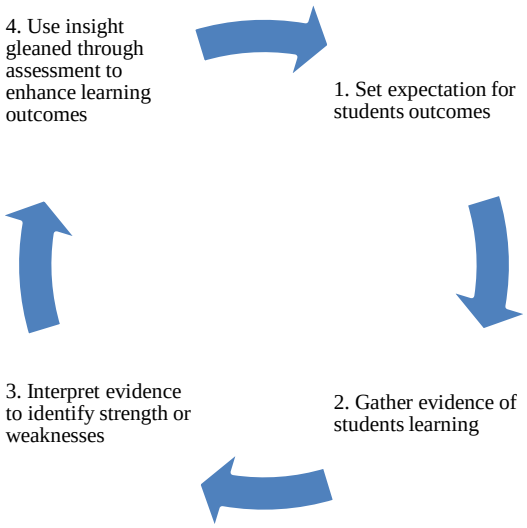

Figure 1: Outcome assessment feedback loop (Lindholm, 2009)

The outcome of education should be positive for the individual and society. Curricula should be designed to foster competences that are relevant for successful professional practices (Smith, 1996). This is even more important for the IT sector which has experienced considerable changes in recent years. IT educators must therefore have updated information about the changing trends and projections in the IT world in order to adapt curricula to the emergence of new knowledge and the present context of the IT job market.

IT Labor Market Statistics and projections

Since 2010 there has been strong employment outlook in the information and communication technology (ICT) sector. The US Bureau of Labor Statistics now predicts an increase of 22% in employment for all computer related occupations from 2010 through 2020 as compared to a 14% increase in all other occupations (US Bureau of Labor Statistics Occupational Outlook Handbook, 2012)

A number of studies have attempted to present statistical data for the IT job market. The US Bureau of Labor Statistics also indicated that IT occupations will outperform all occupations in growth through 2020. Table 1 shows data specifying the percentage growth for the eight major IT occupational categories.

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Table 1: Percentage growth of IT Occupations through 2020

Occupational Categories	Percentage
Software developers, systems	32%
Database administrators	31%
Network and Computer Systems Administrators	28%
Information security analyst, web developers and computer network architects	22%
Computer systems analysts	22%
Computer and information research scientists	19%
Computer support specialists	18%
Computer programmers	13%

Source: US Bureau of Labor Statistics, 2012

Recent studies also revealed a high demand for IT technical and non-technical skills. Table 2, obtained during a survey of 353 IT executives, presents technical skills ranked in order of hiring percentage for 2012.

Table 2: IT Technical Skills in order of hiring percentage for 2012

Technical Skill	Percentage
Cyber security	88%
Data storage/back-up	88%
Updating aging computers software for staff	82%
Network infrastructure	82%
Disaster recovery business continuity planning	81%
Automating business process through technology	73%
Mobility	66%
Web online presence including e-commerce	64%
Collaboration	63%
Telecommunications	62%
Virtualization	61%
Business intelligence/ data analytics and mining	59%
Cloud computing	50%
Social networking technologies	41%
Green IT	38%

Source: US Bureau of Labor Statistics, 2012

The same research provided additional insight on the "soft skills" needed in the IT professions. This data is represented in Table 3.

Table 3: Non-technical "Soft" Skills in order of hiring percentage for 2012

Soft Skill	Percentage
Strong work ethic	71%
Motivation and initiative	67%
Customer service	65%
Flexibility and adaptability	64%
Innovation and creative problem solving	63%
Analytical skills	61%
Teamwork	60%
Verbal and written communication	59%
Project management	47%

Source: CompTIA, 2012

Tables 1-3 and Table 4 (see Appendix) indicate current and future IT trends in terms of skills and occupations as well as median salaries and projected growth through 2020. Such indicators enable educators to design curricula that ensure the development of these skills and meet real world standards. They also help them manage the classroom experience in a way that orients and prepares students for careers that are relevant and needed in the present and future economy.

Related research

In view of these changing trends and projections in the IT industry, academic institutions are reassessing curricula in order to adapt them to the requirements of today. In a recent study carried out at Southern Illinois University, survey questions related to post graduate experiences as well as the Information System curriculum were sent to the university graduates who had gone through a four year undergraduate curriculum. The results showed that almost 85% of the graduates were employed within six months of graduation. Concerning their primary functions in the information systems jobs, the top was networking with 24.6% of respondents while e-commerce had no respondent in that occupation. In terms of tasks performed, the greatest number of graduates provided technical and end-user support with a frequency of 33%. To the question of how well the information systems curriculum prepared them for their job, the graduates responded with a mean of 3.5/5 (Legier et al., 2012).

3. METHODOLOGY

The purpose of this research is to investigate the strengths and/or weaknesses of the MIS program of a four year institution using data on the experiences of a sample of its alumni presently in the workforce. Specifically, it identifies the types of technical and non-technical (soft) skills acquired by the graduates and their perceptions on how well the MIS program prepared them for these tasks. The results were compared with the academic background of the students to identify any possible causes and propose solutions that will serve as bases for evaluating and updating the information systems curricula.

Research Context

The research study was carried out at a four year institution using its Management Information Systems (MIS) graduate program for the investigation. The institution's College of Business and Administration (CBA) provides students with high quality information systems education through the MIS program. The program, which has a diverse demographic and ethnic representation, was started in 1998 and aims at giving students a foundation in the dual functional areas of business and information technologies and enabling graduates of the program to pursue a career in both technical and management areas in public or private organizations.

The MIS curriculum offers a 120 credit hour undergraduate curriculum and a 39 credit hour graduate curriculum which prepares students for analysis, design, development, implementation and management of real world computer based systems. In a bid to maintain and improve standards, this research study used data collected from a sample of the program's alumni to reassess how effective the MIS program is in preparing its graduates for the skills required by employers in the IT industry.

Research Design

To carry out this study a quantitative research analysis method was used in which a number of participants were asked a standard set of questions through a survey. Questions were the same for all participants with a standard range of answers for 10 out of the 11 questions and the last having a comment field for suggestions. The findings were represented as numerical data and interpreted using statistical concepts. The results were compared with secondary data on the educational background of the students to identify any possible causes of inefficiency in the program.

This research was designed as a baseline study for improving the MIS program. It uses the outcome assessment feedback loop approach (Figure 1) to produce a dynamic model that can be updated annually and used to increase the quality of the program. This approach focuses on the extent to which students completing the program can demonstrate proficiencies in the program's core competences (Lindholm, 2009).

Survey questions

1- When did you get your first information systems technology related job?
2- What was the primary focus of your information systems technology job?
3- What type of task do you regularly perform in your job?
4- How well did the MIS curriculum prepare you for your job?
5- What are the non-technical (soft) IT skills critical in your job?
6- How well did the MIS curriculum prepare you for these "soft skills"?
7- Annual entry-level salary range of your information systems technology job?
8- Please indicate your gender.
9- Please indicate your ethnicity.
10- Please indicate your last degree program at the institution.
11- Please provide any suggestions/ comments on how to improve the curriculum.

Sample and data collection

The research study focused on the MIS Masters program, and the participants were a sample of its alumni presently in the workforce. The program chairperson collected the email addresses of the graduates from the student service unit and sent the survey to the alumni via email. The emails included the purpose of the study as well as the survey questionnaires. The participants completed the survey and returned it to the chairperson via email. A reminder was sent by the chairperson two weeks later to ensure responses from a maximum number of participants; of 40 students contacted, 30 responded, giving a 75 percentage response. The chairperson numbered the responses and sent them for analyses.

Statement of the Hypothesis

The impact of curriculum on the student's professional outcome may vary depending on other elements such as the student's academic background on admission into the program, the effort of the student, and the strength of the curriculum itself. There are notions that IT

curricula tend to be more effective for students who had an IT background upon admission as compared to those who did not. In the context of the four year institution with a majority of the students in the MIS program coming from non-IT majors, this could be an aspect to consider in the learning outcomes of the program. This research tests the following assumptions:

H_1: The curriculum enhanced the job performance of the students.

H_2: The curriculum gave the students skills that have high market value in today's IT industry.

H_3: The academic background of the students affected their learning outcomes.

Hypothesis 1 will be tested using specific data on the graduates' work experience as well as perceptions on their level of preparedness for these tasks. The technical and non-technical tasks performed as well as elements like job focus will be compared with the trends in today's IT industry to verify hypothesis 2. The survey results and the academic background of the students will be analyzed to determine if it played a role in the students' learning outcomes to verify Hypothesis 3.

Data Analyses

The survey used the Likert scale to collect data for some of the questions. Data analysis was accomplished by using the arithmetic mean to measure the central tendency of the respondents. Data collected by the program chair from the student service unit of the institution were used to examine the academic background of the participants. SPSS statistics 20.0 and Microsoft Excel 2010 software were used to analyze the data. Modeling tools like Microsoft Visio were used to design a model to enhance student learning outcomes at the institution. The t-Test and Wilcoxon Test were used to analyze the relationship between technical and soft skill preparation as well as the relationship between students' backgrounds and their performance.

4. FINDINGS

Demographics

The research participants included 17 males (57%) and 13 females (43%). Question 9 studied the ethnicity of the 30 respondents with 21 of the respondents identified as black African/ American (70%), 2 as white (6.7%), 4 as Asian (13.3%) and 3 as other (10%).

Time taken to find first job

The time taken to find a job was asked in question 1 to assess the employment history of the participant and also have an insight into their competitiveness in the job market. All the participants responded with 40% saying they were employed prior to graduation, 6% indicating they had an offer prior to graduation, 20% stating they found a job in less than three months, 17% saying they found a job in more than three months and less than six months, and 17% indicating they were employed after 6 months.

The percentage employed prior to graduation indicates that the program had many nontraditional students who were either fully or partially employed while enrolled in the program. The numbers for those who had an offer or were employed less than 3 months after graduation shows that about 25% of the sample were employed relatively quickly and can be indicative of a high market value for this group. However it is worth mentioning here that with a significant percentage of non-resident foreigners in the program, other factors like visa status could influence the length of time taken to find a job.

Salary

Twenty-eight of the respondents provided answers to question 7 which focused on the entry-level salary range of their first information systems job. Of this number, 36.7% indicated they earned less than $40,000, 33.3% said they earned between $40,000 and $50,000 and 23.3% of the graduates made more than $50,000.

Job focus

In question 2 participants were asked to choose their primary job focus from a list of nine primary IT job categories. Each respondent was only allowed to pick one primary job focus. Thirty-six percent (36%) of the respondents identified information management as their job focus. Approximately 14% chose project management. Table 5 provides a complete breakdown of responses to this question by number and percent.

Technical skills

Participants were asked in question 3 to choose what type of job tasks they regularly performed from a list of 20 categories. The respondents

could pick all that applied and 30 participants completed the question. Table 6 (see Appendix) shows the complete breakdown of the responses.

Table 5: Primary Job focus of alumni

Job Focus	Frequency	Percent
Information Management	11	36.7
Project Management	4	13.3
Information security	3	10
Technical / end user support	3	10
Others	3	10
Database	2	6.7
Computer programming	2	6.7
Web / Software development	1	3.3
Networking	1	3.3
Total	30	100

Non-technical "soft skills"

The non-technical soft skills performed by participants were studied in question 5. They were asked to choose from a list of 9 categories. The respondents could pick all that applied and 30 participants completed the question. The most frequently picked were communication (verbal and written) and team work with 22 participants choosing them. The second was analytical skills with 21 participants, while contextual knowledge was least with 10 participants picking it. Table 7 provides the complete breakdown of the responses.

Level of preparedness

Questions 4 and 6 addressed the issue of how well the graduates felt the institution's MIS program prepared them for the technical and non-technical tasks performed at their jobs. All participants answered question 4 while 28 responded to question 6. T-test analyses of the answers in Table 8 (see Appendix) showed a mean of 3.78 for soft skills and 3.7 for technical skills.

The research findings were further expanded and analyzed using secondary data obtained in the literature review to study key issues used to verify the hypothesis, and to identify any causal effects and propose recommendations.

A mean of 3.7/5, representing the graduates' perception of their technical and soft skill preparation, shows that a majority indicated that the program prepared them and enhanced their professional learning outcomes; thus, H_1 is accepted. A cross representation of the distribution between the level of preparation for technical and soft skill requirements shows that more participants felt very well prepared for the soft skills as compared to technical skills. Figure 2 (see Appendix) shows a representation of the two variables.

Table 7: Soft skills performed by graduates

Soft skills	Frequency	Percent
Communication Skills (Verbal and written aptitude)	22	73
Team Work and Collateral	22	73
Analytical Skills	21	70
Strong Work Ethic	18	60
Innovation and Creative Problem Solving	16	53
Customer Service	16	53
Project Management	16	53
Motivation and Initiative	12	40
Contextual Knowledge of Work	10	33

A comparison of the primary job focus of the participants with the trends and projections of IT occupations through 2020 shows to what extent these graduates are involved in high demand jobs as well as the competitiveness of the graduates. Among the eight major IT occupations obtained from the US Bureau of Labor Statistics (see Table 1), the occupation with the highest projected growth is system and software developers with 32%; contrasting this value with data obtained from this research shows that the current level of involvement of the sample studied was the lowest, 3.3% in this occupation. Database administrators with growth projections of 31% had 6.7% of the graduates in this field as shown in Figure 3 (see Appendix).

Comparing the technical and soft skills performed by the alumni to industry data (See

Tables 2 and 3) shows that 6% of the sample studied were currently involved with skills related to cyber security which ranked highest in hiring percentage for IT managers. Cloud computing, which had 50% hiring rate for IT managers, had no participant involved with skills related to this area. Figure 4 (see Appendix) presents the trends in terms of technical skills.

Results showed better trends for soft skills with 60% of the sample studied indicating that highly valued skills like a strong work ethic were critical to their current jobs. Teamwork, another soft skill critical to IT managers also had a majority of participants (73%) involved in it. Figure 5 (see Appendix) shows the trends in terms of soft skills.

Figures 3 and 4 show significant differences between the trends of the MIS alumni and those of the industry in terms of job focus and technical skills. This indicates that more has to be done to enhance the students' market value by enhancing the technical skills required for jobs that have high demand and growth projections in the IT industry. Consequently, H_2 is rejected.

Background information of the respondents revealed that 80% of these participants had non-IT majors on admission. Research results showed that 60% of the participants believed the curriculum prepared them for the skills required in their jobs, an indication that some of those with non-IT backgrounds were part of this group. This means that the curriculum was effective even for students with non-IT backgrounds. Moreover the Wilcoxon test showed a p value of 0.5, indicating that there was no significant relationship between the academic background and performance of the participants. H_3 is, therefore, rejected in this research. Table 9 (see Appendix) shows results of the correlation analyses between academic background and performance.

5. DISCUSSIONS

The research findings reveal that other factors like personal readiness, hard work and the quality of the curriculum, rather than academic background, played a determining factor in the learning outcomes of students in the MIS program. Enhancing student learning outcomes and preparing them for the workplace requires a holistic approach involving contributions from students, faculty and the administration. In order to constantly improve the MIS program in light of the industry requirements, the assessment feedback loop must be applied yearly to get feedback about the students' practical experience (See Figure 1).

Extracurricular value-added activities that add to the students' educational experience are necessary to ensure that graduates of MIS programs stand a better chance of excelling in the job market.

The institution's College of Business and Administration (CBA) has carried out some of these value-added initiatives in recent years. Career oriented events have been organized by a number of organizations within the college. These associations include the Black Executive Exchange Program (BEEP), the Public Administration Association, the National Black MBA Association and the Management Information Systems (MIS) club. These associations not only brought speakers with extensive business and technical experience to talk to and answer questions from students and faculty, but also brought renowned business and governmental organizations like General Electric (GE), McDonalds, and Waffle House.

The CBA has also introduced award ceremonies for graduating seniors as well as the Sigma Beta Delta induction ceremony which rewards academic excellence. In light of the dynamic changes in technology, the MIS department also undertakes a review of its curriculum every year to improve the quality of its program, an effort that contributed to the CBA obtaining AACSB International accreditation, another significant value-added accomplishment that will enhance the competitiveness of its graduates in the job market.

However, in order for the college of business of this institution to fully achieve its assurance of learning outcomes (ALO) goals, a holistic approach that includes the readiness of students, faculty, and the institution should be adopted. Figure 6 (see Appendix) presents a proposed model for achieving this goal.

Proposed model

Alongside the successful completion of all the academic requirements and coursework during the MIS program, students must carry out other extracurricular activities like keeping a clear list of personal and professional goals which specify the student's field of interest. The students must also be willing to attend field trips, conferences and take paid or unpaid internships that are in line with their field of interest. They must be flexible enough to adapt to the time requirements for such events regardless of their present job situation or commitments.

Faculty, on the other hand, must design and implement career oriented curricula. Analytical and project management applications that are critical today would be helpful as well as software programming languages that are currently in high demand like java, .net and mobile development applications. Faculty should ensure that students understand how the knowledge acquired in the school program translates into real world applications in the workplace. The classroom experience should also promote entrepreneurial initiatives and technological innovation and should incorporate interpersonal skills. The curriculum must be regularly revised in the light of employer needs and the current dynamics of the professional environment.

To enhance institutional readiness, the administration should continuously improve its recruitment, teaching and learning strategies in line with their collegiate and institutional objectives. Policies that ensure partial or full funding of events like field trips and conferences will increase the participation of students and improve their learning outcomes. The administration should undertake a more aggressive strategy for employment opportunities.

6. CONCLUSION

Information technologies will continue to evolve in the coming decade, and so will the job requirements of the industry. This study reassessed the MIS program of a four year institution by using the workplace experience of its alumni to identify how well the program prepared them for today's IT requirements. Results showed that 73% of respondents were involved in critical soft skills and only 6% in highly valued technical skills like cyber security. This indicates that more has to be done to give the students highly valued technical skills that meet industry expectations and projections.
Results also showed that the academic background of the participants did not play a major role in the outcome, indicating that an effective curriculum, tailored according to the IT requirements of today, can give students the best possible preparation for the job market regardless of their background. This further underlines the importance of constant research on developments in the industry to improve curricula.

The innovations and new technologies of today have raised the expectations of students who hope to make the most of their academic experience by excelling in the workplace. These expectations range from social satisfaction to financial and professional progress, and are emphasized in every investment that students, educators and stakeholders put into academics. Consequently, it is vital that all stakeholders play their role to ensure that academic programs give the students the adequate potential to thrive in today's technological environment.

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APPENDIX

Table 4: IT occupations and median salaries

Occupation	Salary
Computer and information research scientists	$100660
Software developers	$90530
Computer systems analysts	$77740
Information security analyst, web developers and computer network architects	$75660
Database administrators	$73490
Computer programmers	$71380
Network and computer systems administrators	$69160
Computer support specialists	$46260

Source: US Bureau of labor statistics occupational outlook handbook, 2012

Table 6: Task performed by graduates

Task Performed	Frequency	Percent
Managing Information	19	63
Automating business Processes (Managing Accounts, customization)	16	52
Maintaining Databases	11	33
Web presence (Creating/ monitoring Web pages, Developing e-commerce apps)	10	32
Providing technical/end user support	9	30
Other type of task perform regularly at your job	9	30
Virtualization (Analyzing systems/ Developing and redesigning systems)	8	26
Installing Software	7	23
Networks (Maintaining/ trouble shooting networks, Setting up LANs)	7	23
Installing/Maintaining Computer Devices	4	13
Writing Computer programs	4	13
Monitoring online security Systems	2	6
Configuring/Maintaining WANs	0	0

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Table 8: t-Test for technical and soft skills

t-Test: Two-Sample Assuming Unequal Variances	*Soft*	*Technical*
Mean	3.78	3.7
Variance	0.69	0.56
Observations	28	30
Hypothesized Mean Difference	0	
df	54	
t Stat	0.4	
P(T<=t) one-tail	0.34	
t Critical one-tail	1.67	
P(T<=t) two-tail	0.68	
t Critical two-tail	2.0	

Table 9: Wilcoxon Test for academic background and performance of graduates

Wilcoxon Two-Sample Test	
Statistic (S)	22.5000
Normal Approximation	
Z	0.0000
One-Sided Pr < Z	0.5000
Two-Sided Pr > |Z|	1.0000
t Approximation	
One-Sided Pr < Z	0.5000
Two-Sided Pr > |Z|	1.0000
Exact Test	
One-Sided Pr <= S	0.5275
Two-Sided Pr >= |S - Mean|	1.0000

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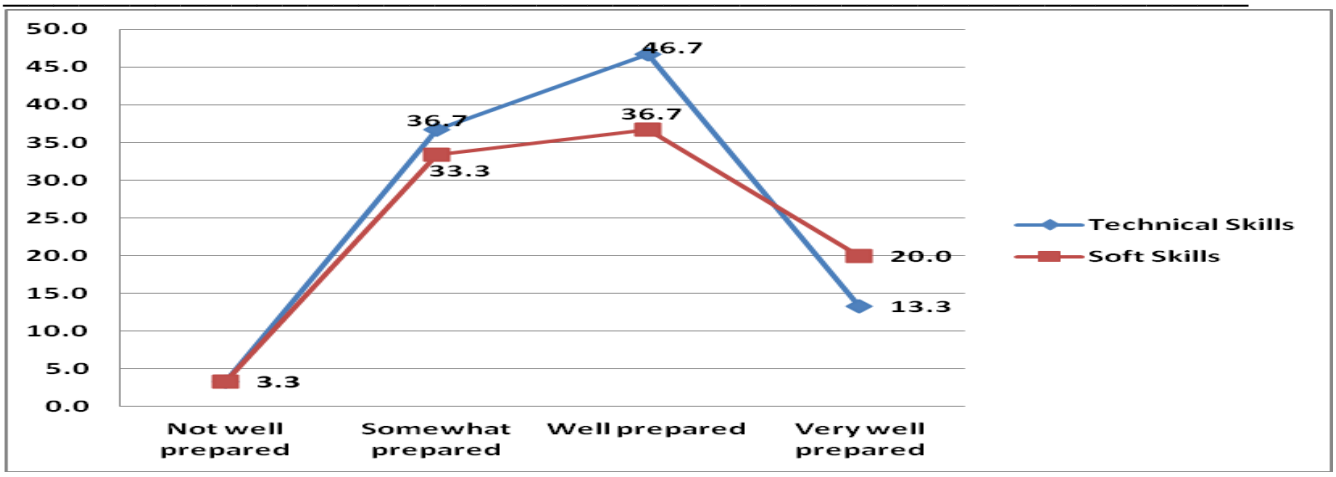

Figure 2: Level of preparedness of MIS alumni for technical and soft skills

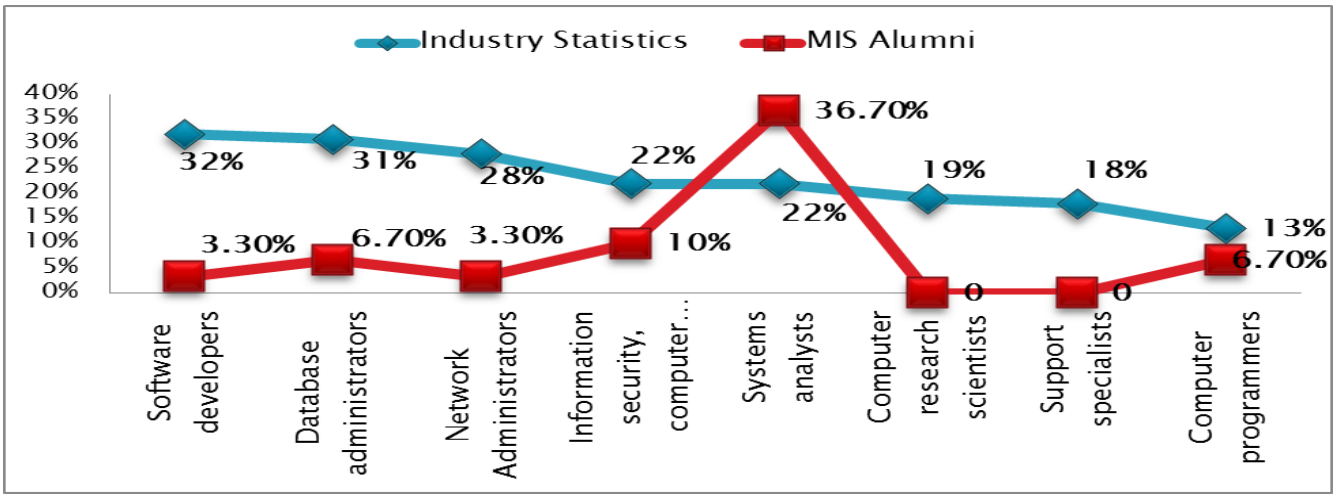

Figure 3: Industry trends vs MIS alumni trends in terms of Job focus

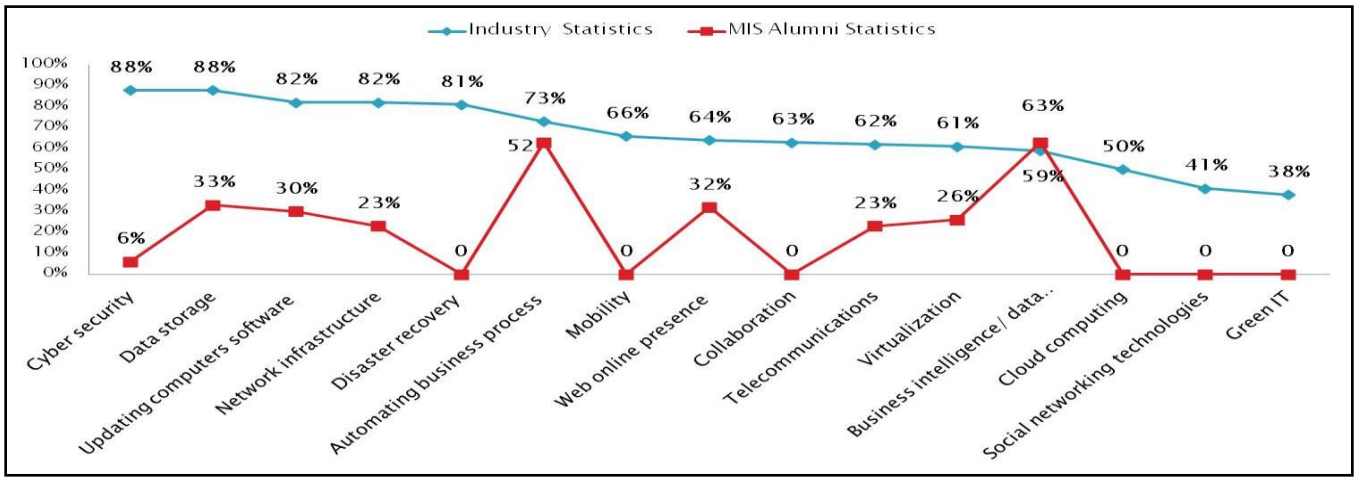

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Figure 4: Industry trends vs MIS alumni trends in terms of technical skills.

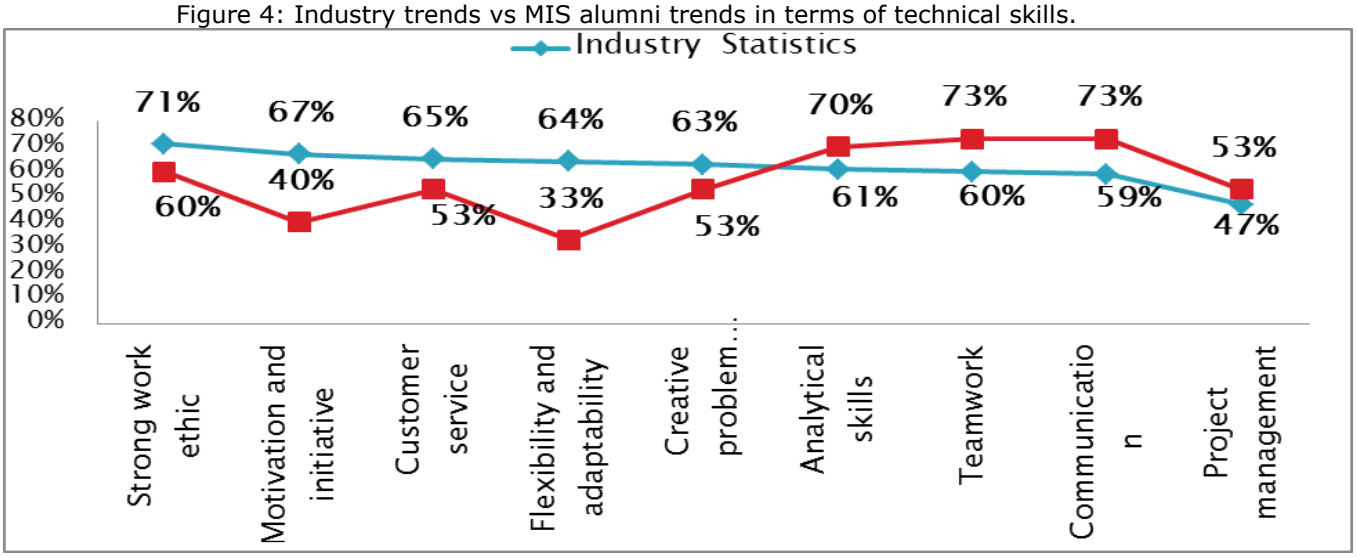

Figure 5: Industry trends vs MIS alumni trends in terms of soft skills

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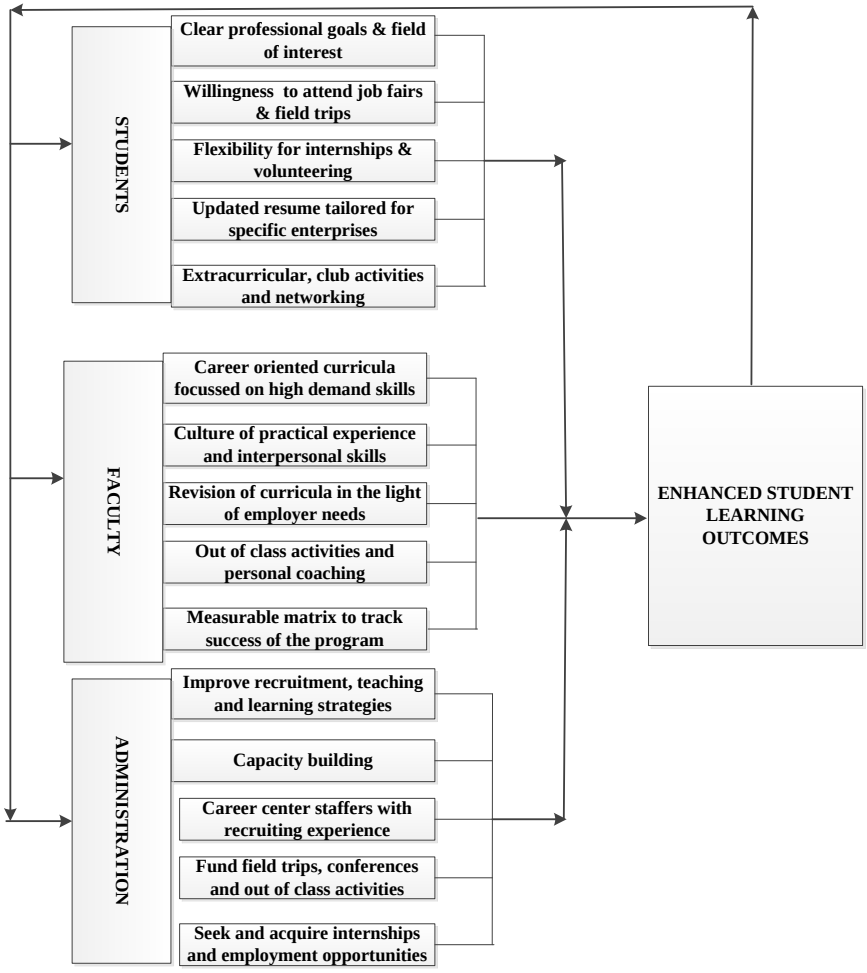

Figure 6: Proposed model to enhance student learning outcomes