Evaluating the Outcomes of BS Information Technology Curriculum: Implications to Twenty-First Century Information Technology Education and Development

Using survey research design to purposively sampled IT professors and program graduates, the aim of the study was to evaluate the outcomes of Bachelor of Science in Information Technology (BSIT) curriculum in the Philippines. The study also provides concrete evidence of how much the specific program outcomes have been achieved and to what extent they have been applied by the program graduates in their present employment. The study reveals that although most of the identified program outcomes have been achieved and performed excellently by the program graduates, there are still specific program outcomes that need to be given much emphasis as far as holistic IT education is concerned. Implications of the study point to the specific role of higher education in preparing graduates for the workplace. This is heightened by the ever-changing demands and expectations of employers who are more after what their employees can do and less in what they know in terms of learned theories and concepts. This brings to the realization of some of the important steps that will help bridge the gap in the outcomes of the BSIT curriculum. Thus, this will serve as a basis for developing the twenty-first century IT professionals who will be responsible for sustainable IT development in the country.

Keywords: curriculum, development, education, information technology, outcomes, twenty-first century

Introduction

In this modern era, information technology (IT), the study and use of systems for storing, retrieving, and sending information (Frick, 2017) takes a greater role in a nation’s responsibility towards its people. Much of what people use in the twenty-first century is created with the help from IT. And to be able to become effective in the twenty-first century, people must be able to exhibit a range of functional and critical thinking skills related to information and technology. The fundamental part of IT in almost all sectors, be it in industrial, educational, management or any other conveys its importance in the various walks of life. This makes the role of IT professionals equally significant towards its development.

The field of IT has been growing at a very fast pace over the last few years. This resulted to a serious challenge in the field of IT education especially when the graduates of Bachelor of Science in Information Technology (BSIT) program with required skills and competencies are becoming insufficient.

Higher education institutions (HEIs) serve as the vehicle to produce skilled IT professionals to bridge the gap between the changing technology and industry needs. Developing countries like the Philippines are slowly coming to grips with the rapidly changing IT industry and need for IT education and development.
Since the HEIs serve as the vehicle by which IT professionals are trained and prepared to meet industry needs, it should therefore be able to produce people to meet the demands of the changing world.

Employers argue that HEI graduates possess general computing knowledge, but lack specific skills that industry requires. Not only in the case of developing countries like the Philippines (Patacsil, & Tablatin, 2017; (Department of Labor and Employment (DOLE, 2014 in Orbeta, Gonzales, & Cortes, 2016; Orillaza, 2014), but there is indeed a worldwide issue on labor mismatch and overall skills gap among employees (Görlich, Stepanok & Al-Hussami, 2013; ILO, 2013; Sitek, Claghorn, Docalovich, Feinstein, Hansen, Larsen & Homer, 2012). Similarly, many graduates’ expectations of employers differ from employers’ expectations of new graduates (Wilkinson, 2016; Walker et al., 2012 in Nagarajan, & Edwards, 2015; Gibbs, Steel & Kuiper, 2011; Hannemann & Gardner, 2010; Koc & Koncz, 2009; Weligamage, Susima, & Sununta, 2003). On account of this, IT development might take too slow specifically to developing nations.

Putting priorities on the quality and relevance of education is essential in providing graduates the sufficient knowledge, skills, attitudes and values. Especially critical in the industry demand are the skills and knowledge in IT for nations to have competitive industries and consequently, a prosperous nation. Higher education must ensure that the outcomes of the IT education are translated to the development of Information Communication and Technology (ICT) products and services that are necessary for sustainable ICT development of the country. Such ICT products include software applications and operating systems; web-based information and applications such as for distance learning; telephones and other telecommunication products; video equipment and multimedia products that may be distributed on videotapes, CDs, DVDs, email, or the World Wide Web; office products such as photocopiers and fax machines; calculators; and computer hardware. In addition, electronic textbooks, instructional software, email, chat, and distance learning programs which are all becoming highly significant in the twenty-first century.

The country is altogether caught in an information economy wherein IT knowledge, skills, experience and qualifications for the workplace and industries are of paramount importance. To ensure that the country sustains a pool of qualified IT professionals, IT education and training must be constantly upgraded through curricular calibrations. The calibrations must be attuned with the fast-paced technology and know-how that is being required of the IT industry and the country as a whole. Also, the calibrations must provide the ensuing gaps in the industry and academe divide. The overall challenge in the industries is being more responsive, innovative, and efficient in their operations. IT is said to enable these industry needs if and only if there is steady flow of qualified IT professionals, and the HEIs must have a determination to produce them. HEIs must see to it that they are able to train and produce IT students who are holistically equipped and comfortable with the information technologies that are totally linked to the twenty-first century skills the IT industries and any other workplace require especially in this challenging time.

The COVID-19 pandemic is forcing every person to rely on twenty-first century technologies such as the internet of things, social media, digital learning platforms,
augmented and virtual reality, and so much more to transform economies. This unprecedented context is driving people to become far more reliant and inventive on how to use these emerging technologies to create value in the new normal. Thus, HEIs are to prepare students for twenty-first century IT professionals. IT students need to be, and IT educators need to help pave the way.

Generally, this study is aimed at evaluating the outcomes of Bachelor of Science in Information Technology (BSIT) curriculum in a university in the Philippines. Specifically, this paper: (i) determined the outcomes of BSIT curriculum; (ii) evaluated the extent to which each outcome has been achieved and applied by the BSIT graduates to their present occupation; and (iii) analysed the difference in the performance level of BSIT graduates in their respective occupations.

Literature Review

Twenty-First Century IT Skills for Twenty-First Century IT Development

The twenty-first century skills are a set of abilities that students need to develop in order to succeed in this information age. The Partnership for twenty-first Century Skills (Larson, Lotta & Miller, 2011) lists three types: learning skills, literacy skills and life skills. But the following are some of the significant twenty-first century skills needed for twenty-first century IT development:

Digital Literacy

Digital literacy includes accessing information efficiently and effectively, evaluating information critically and competently, using information accurately and creatively (Charalambidis, 2014). According to the Organization for Economic Cooperation and Development (OECD, 2017), digital literacy is about managing information from misinformation. Digital literacy is more than technological know-how: it includes a wide variety of ethical, social and reflective practices that are embedded in work, learning, leisure and daily life.

The International Society for Technology in Education (ISTE, 2007) frames its benchmarks for digital literacy around six standards: creativity and innovation; communication and collaboration; research and information fluency; critical thinking, problem solving and decision making; digital citizenship; and technology operations and concepts. Educated IT workers in the twenty-first century need to be able to understand and work with complex ideas and be able to critically evaluate information. Other vital skills include the ability to discern relationships between existing and new information, and between new contexts and goals, and to locate new knowledge when needed (Gijsbers & van Schoonhoven, 2012; Redecker & Punie, 2013).

Inventive Thinking

The dimension of inventive thinking skills comprised of adaptability and managing complexity, self-direction, curiosity, creativity, risk taking and higher order
thinking and sound reasoning (Abdullah & Kamisah, 2010). This skill helps students
to easily adapt with complexities brought by global interconnectedness.

Creativity and Innovation

The creative person, according to a humanistic perspective, has the consciousness
and the abilities to address crisis in transformative ways (O’Hara, 2017) which lead to
innovation. Innovation is the most powerful tool for stimulating economic growth and

Teamwork

Information technology plays a key role in the ease with which individuals and
groups collaborate. Teamwork and interconnectedness are essential in both the
community and the workplace. These skills will help BSIT graduates to thrive in
collaborative working environments Among the critical qualities in a diverse twenty-
fifirst century world are the ability to foster interdisciplinary cooperation and the global
exchange of ideas to counter potential discrimination due to origin, gender or age
(Leis, 2010).

As teamwork has become an indispensable component of business processes in
almost every company and organization, IT education should help prepare the
students to gain the confidence to interact and collaborate using technology.

Learning to Learn

Learning to learn is the ability to persist in learning, to manage time and
information efficiently, both individually and in groups. This competence includes
awareness of one’s learning process and needs, identifying available opportunities,
and the ability to overcome obstacles in order to learn successfully (Charalambidis,
2014).

These skills have always been important for students, though they are particularly
important for BSIT students and graduates especially in this information-based
economy. The rapid changes in the world require IT students to think deeply about
issues, solve problems creatively, work in teams, communicate clearly in many media,
learn ever-changing technologies, and deal with a flood of information. In addition to
personal and social skills, IT professionals need to be flexible, to take the initiative
and lead when necessary, and to produce something new and useful towards
sustainable IT development of the country.

Materials and Methods

This section presents the research design, population and sampling technique,
data gathering instrument and procedures, and statistical tools for data analysis.
Research Design

This study was descriptive in nature and its aim was to evaluate the outcomes of BSIT curriculum using survey methods. This type of research used questionnaires to gather information from groups or subjects.

Population and Sampling Technique

The respondents for this study were IT education professionals or those who were teaching under the bachelor’s degree program and purposively selected sample of BSIT program graduates in a Public University in the Philippines. They were chosen on the basis of a specified criterion being the products of the BSIT program in a given time period. For the purpose of this study, the BSIT graduates of the Academic Year 2018-2019 were considered. They were considered for they were the first batch of BSIT students who were the products of Outcomes- Based Teaching and Learning (OBTL) BSIT curriculum in the Public University which started in 2015. The total number of respondents depended on the response rate. There were 18 faculty members and a total of 85 program graduates participated in the survey.

Instrumentation

The Outcomes of BSIT Curriculum Instrument was designed by the researchers. This was developed after an extensive literature review. This was primarily based on the Philippine Commission on Higher Education (CHED) Memorandum Order (CMO) number 25 series of 2015 regarding the Revised Policies, Standards and Guidelines for BSIT program. This version has become the guide in formulating the outcomes of BSIT program in all Higher Education Institutions (HEIs) in the country. The outcome referred to what is currently being taught through BSIT curriculum. Specifically, this referred to the student learning outcomes which were the specific observable or measurable results that were expected subsequent to a learning experience. These outcomes involved knowledge (cognitive), skills (behavioural), or attitudes (affective) that provided evidence that learning has occurred as a result of the BSIT program. These outcomes were of two types: the Intended Learning Outcomes (ILOs) and the Expected Learning Outcomes (ELOs). The ILOs were based on the BSIT program goals that provided a broad description identifying the foundations, concepts, theories, abstractions, principles, knowledge base, and/or skills, which were the products of what students are to be able to do, know, and care about upon the completion the program. It covered the recommended and required courses such as the General Education courses and other required events/experiences (e.g., internships, department symposium, advising session.). However, it did not include other specific learning outcomes for major areas or field of specialization under the degree program. The ELOs were the same with that of the intended students learning outcomes. The questionnaire for ELOs helped validate the responses of the faculty members regarding the ILOs and to what extent the graduates were able to achieve those ILOs of the BSIT program.
The study used two types of questionnaires: The first type was for the academic staff (i.e., for determining the ILOs) and the other was for the program graduates (for determining the ELOs). The ILO questionnaire was composed of 70 items which were classified under eight major categories. There was one open-ended question asking the faculty members for other student learning outcome that they know, which was not reflected in the given set of outcomes and was being considered by the bachelor’s degree program in Information Technology of the University. This was measured using five-point Likert scale ranging from strongly disagree (5) to strongly agree (1). While the ELO questionnaire with the same set of 70 items, additional one question for an overall assessment and one open-ended question asking the BSIT graduates for other student learning outcome, which was not reflected in the given set of outcomes but was being required of them in their current job as a BSIT graduate of the University. This was measured using a nominal scale no or yes to indicate if the specific outcome was being practiced/applied by the BSIT graduates and if the answer is yes, they were asked to indicate/evaluate the level of their performance depending upon how well they achieved and applied each expected outcome to their present job. The level of performance was measured using five-point rating scale ranging from needs improvement (5) to excellent (1). The ELOs were the same with that of the intended students learning outcomes. The questionnaire for ELOs helped validate the responses of the faculty members regarding the ILOs and to what extent the graduates were able to achieve those ILOs of the BSIT program.

Data gathering was done through emails and online survey to the subjects of the study. The instruments undergone face validity where the survey questionnaires were reviewed by two different parties. The first group was consisted of three IT education specialists who were familiar with the learning outcomes of BSIT program. They evaluated the statements and made sure that each statement successfully captured the research topic and problem. The second review was done by a statistician who ensured that the survey did not contain common errors such as confusing statements. The validation process resulted to slight alteration in the contents of the survey questionnaire. The researcher also run a pilot test of the online survey and reviewed the internal consistency of statements by conducting the test of reliability with a test-retest to a group of 20 students who were not part of the study. The administration of retest was two and a half weeks after the first test. Likewise, the Cronbach-Alpha method was applied, and the result got a total test and retest scores (0.80 and 0.82) with a reliability factor of ‘good’.

Confidentiality

Confidentiality was addressed by assigning a code number to respondents as they complete the survey and using only that code to indicate survey responses. This code was entered on each survey enabling the researcher to link the survey and the respondent. This link allows the survey results to remain confidential without being anonymous to the researcher.
The study employed descriptive statistics such as frequencies, percentages, and means to provide descriptive analysis of the survey. To test the relationship among the variables, the Spearman’s rho was used. Also, to test if there were significant differences among outcomes as achieved and performed by the program graduates based on their sex, the non-parametric method Mann-Whitney U Test was applied.

Results and Discussion

Profile of the BSIT Program Professors and Graduates

IT professors were described in terms of their age, highest educational attainments as well as number of years in teaching. Whereas, the students were characterized based on their age, sex, academic performance in terms of general weighted average, year graduated and present occupation.

The age of the faculty members ranged between 20 and 50 years old which constituted 94 per cent of the total number of respondents. A total of 18 respondents participated in filling out the survey questionnaire. Forty-four per cent of the professors have earned their master’s degrees, while 17 per cent of them have their doctorate degrees. Most of them have been into teaching from five to 20 years in the service.

On the other hand, there were 85 program graduates who participated in answering the online survey, 84 per cent male and 16 per cent female. The majority of these graduates were between 21 to 23 years of age. In terms of their college academic performance, 80 per cent of the respondents’ grade point averages fall into two. This means that most BSIT graduates have a good academic performance in their degree program. This constituted their general weighted average for the entire degree program. More than half of them graduated in 2019. Majority of them have an occupation that is exactly aligned with their completed degree program. In particular, 60 per cent of them are either programmers or mobile, web, or system developers.

Outcomes of BSIT Curriculum

Majority of the IT professors strongly believed that the aim of BSIT program is to produce graduates who are able to identify and solve computing problems by discussing the best practices and standards, explaining the fundamental principles, concepts, and evolution of computing systems and applying the knowledge of computing, science and mathematics appropriate to IT discipline. This fundamental knowledge helps enable the graduates to analyze problems in IT. Thus, it enables them to design and develop IT solutions with emphasis on the use of modern tools.

Meanwhile, findings from the assessment of program graduates revealed the achievement of the intended vis-à-vis expected student learning outcomes. This also indicated the success of the BSIT program outcomes in developing their knowledge,
attitude, skills and competencies to (i) identify and solve computing problems, (ii)
analyze problems in IT, (iii) design/develop IT solutions, (iv) use modern tools, (v)
demonstrate individual and team work, (vi) develop the skills and strategies in
communicating IT solutions/systems, information or argument to a range of audiences
for a range of purposes, (vii) practice computing professionalism and social
responsibility, and (viii) demonstrate interest in lifelong learning.

Performance of BSIT Graduates vis-a-vis the Achievement of Program Outcomes

The program graduates confirmed the application of all the indicated outcomes to
their respective occupations. Table 1 presents the top 25 expected student learning
outcomes of BSIT program, which were based on the order of overall weighted mean
from highest to lowest value. The data showed that most of the program outcomes
were excellently performed and practiced by the BSIT program graduates in their
present jobs.

Findings showed that most of the program outcomes applied in the actual
practices of the IT professions were directly related to designing and developing IT
solutions, using modern tools and somehow communicating proposed IT solutions
and systems to a range of audiences. This is particularly true given that majority of the
respondents were programmers. This affirms the importance of hard/technical skills
and soft skills as a customer-oriented communicative tool in their future employment
(Patacsil & Tablatin, 2017).

Table 1. Performance of BSIT Graduates vis-a-vis the Achievement of Program
Outcomes

<table>
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<th>Expected Student Learning Outcomes</th>
<th>Mean</th>
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<tr>
<td>1. Be able to perform existing software evaluation in terms of usability through evaluation of heuristics, performance and user preference metrics (i.e. learnability, task timing, completion of tasks and client satisfaction).</td>
<td>1.68</td>
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<tr>
<td>2. Be able to design, implement and evaluate as to how computer-based systems, as well as their components or sub-modules, meet client needs and requirements given various constraints and business rules.</td>
<td>1.68</td>
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<tr>
<td>3. Be able to program, debug and test script codes with distinctive familiarity with management of an operating system platform.</td>
<td>1.72</td>
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<tr>
<td>4. Be able to substantially discuss the issues in the utilization of information technology in terms of professional, ethical, legal, security and societal concerns.</td>
<td>1.72</td>
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<td>5. Be able to discuss the management of enterprise information systems in terms of legal and ethical considerations.</td>
<td>1.76</td>
</tr>
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<td>6. Be able to provide evaluation and interpretation of performance results of IT solutions according to set evaluation criteria.</td>
<td>1.76</td>
</tr>
<tr>
<td>7. Be able to design, develop and test software that uses an asynchronous messaging service through the network.</td>
<td>1.78</td>
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<tr>
<td>8. Be able to develop applications via different platforms like the web, mobile and emerging technologies with emphasis on the different software engineering methodologies such as in defining requirements, designing interfaces, evaluating</td>
<td>1.78</td>
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usability, software testing, and implementation in a manner that will be harmonious with ethical and considerations.

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<td>9. Be able to effectively implement the proposed IT solution.</td>
<td>1.78</td>
</tr>
<tr>
<td>10. Be able to recommend enhancements in the IT solution which has implementation concerns.</td>
<td>1.80</td>
</tr>
<tr>
<td>11. Be able to apply IT professional knowledge on current techniques, skills, tools and practices.</td>
<td>1.80</td>
</tr>
<tr>
<td>12. Be able to utilize a structured coding, documentation and licensing standard onto complex software project in which reliability, efficiency and robustness are considered alongside legal and ethical concerns.</td>
<td>1.84</td>
</tr>
<tr>
<td>13. Be able to formulate objectives, scope, limitations and evaluation mechanisms for an IT project.</td>
<td>1.84</td>
</tr>
<tr>
<td>14. Be able to analyse the impact of IT computing systems locally and globally on individuals, organizations and society.</td>
<td>1.84</td>
</tr>
<tr>
<td>15. Be able to analyse the ethics and legal issues that may arise in information technology filed and consequently determine the means to ethically and technically address the issues.</td>
<td>1.84</td>
</tr>
<tr>
<td>16. Be able to explain rudimentary principles, concepts, and evolution of computing concepts as to how they relate to other fields.</td>
<td>1.88</td>
</tr>
<tr>
<td>17. Be able to propose improvements in algorithms as may be needed on data warehousing and data mining.</td>
<td>1.88</td>
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<tr>
<td>18. Be able to recommend the use of a more appropriate programming and/or scripting language and, provide ample explanation in support of the recommended language.</td>
<td>1.88</td>
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<tr>
<td>19. Be able to design, code, test and debug event-driven programs with functionalities that correspond to user events.</td>
<td>1.90</td>
</tr>
<tr>
<td>20. Be able to design, test, debug and implement software that solve computing problems using basic data structures and supporting standard libraries.</td>
<td>1.90</td>
</tr>
<tr>
<td>21. Be able to provide an ethical and feasible IT solution proposal to the identified problems in the project.</td>
<td>2.00</td>
</tr>
<tr>
<td>22. Be able to effectively work as a member or leader of a software development team and to be able to recognize the various roles of people within the team towards the accomplishment of a common goal.</td>
<td>2.20</td>
</tr>
<tr>
<td>23. Be able to harmoniously and progressively work in a team that analyses, designs, implements, tests, and/or documents a software system in an organizational environment.</td>
<td>2.20</td>
</tr>
<tr>
<td>24. Be able to effectively communicate to the computing community and society through writing, presentations and clear instructions as to how a complex computing system works.</td>
<td>2.22</td>
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<tr>
<td>25. Be aware of and engage in planning, self-learning and performance improvement as necessary for continuous professional development.</td>
<td>2.29</td>
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However, outcomes related to identification and providing solution for computing problems, analysis of problems in IT, practice of computing professionalism and social responsibility, demonstration of individual and team work as well as interest in lifelong learning indicated low achievement and performance.
among BSIT program graduates. Truly, soft skills are equally important as technical skills especially for the company or industry that are involved in providing customer services. Common soft skills related to jobs in the fields of business and computer technology were communications, critical and decision-making, interpersonal, negotiation, problem solving, self-confidence, self-management, teamwork, and worth ethics (Bringula, Balcoba & Basa, 2016; Williams, 2015; Pritchard, 2013; Robles, 2012). Academic qualifications are essential, but the aptitudes and attitudes of graduates are equally, if not more, important to employers. These include motivation, an ability to think “outside the box” and an ability to work both as part of a team and independently. Other frequently cited attributes include trainability, presentation skills, positive attitudes, accountability, ambition, discipline, and civic skills. Several studies have pointed out that the rise of service industries and the use of information technology have made such softer skills more important in entry-level jobs (McQuaid, 2006 in UNESCO Bangkok. Asia and Pacific Regional Bureau for Education, 2012). Therefore, IT graduates must be trained concerning this aspect for their future employment requirement. Higher educational institutions must understand and embrace twenty-first century skills within the context of rigorous labour market standards. Higher education should focus on preparing students to solve complex problems by reinforcing new ways of thinking and acquiring new kinds of knowledge. In this regard, students should be able to evaluate knowledge critically and develop the ability to reflect on what they are doing and why (Brew, 2010 in Nagarajan & Edwards, 2015). This critical, inventive thinking, and digital literacy aside from collaboration and communication abilities are some of the significant twenty-first century skills that are required in their current and future workplace (Charalambidis, 2014) particularly in the field of IT.

Test of relationships (Table 2) among variables revealed a moderate positive correlation between the respondents’ general average and their perceived level of achievement and performance (rs(85)=0.34, p=0.09) as well as their age and performance (rs(85)=0.35, p=0.08. Nevertheless, the result is not statistically significant. This also indicates that the result is particularly true to the sample of 85 respondents and is not generalizable to other IT graduates in other State Universities and Colleges (SUCs) in the country.

Table 2. Test of Association Among Variables

<table>
<thead>
<tr>
<th>Correlations</th>
<th>Age</th>
<th>GWA</th>
<th>Sex</th>
</tr>
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<tbody>
<tr>
<td>Spearman's rho</td>
<td></td>
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<tr>
<td>ELO</td>
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<tr>
<td>Correlation Coefficient</td>
<td>0.348</td>
<td>0.345</td>
<td>0.198</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.089</td>
<td>0.091</td>
<td>0.342</td>
</tr>
<tr>
<td>n</td>
<td>85</td>
<td>85</td>
<td>85</td>
</tr>
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</table>

Moreover, statistical test (Table 3) revealed no difference among the respondents’ perceived achievement and performance of the expected student learning outcomes of BSIT program (Mann-Whitney U= (85) = 37.5, p=0.33). This means that the perceived achievement and actual performance is the same with all the respondents of
the study regardless of whether they are male or female. Likewise, the result is not statistically significant.

Table 3. Analysis of Difference in the Performance Level of BSIT Graduates

<table>
<thead>
<tr>
<th>Mann-Whitney U</th>
<th>ELO Performance</th>
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</thead>
<tbody>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>37.500</td>
</tr>
<tr>
<td>n</td>
<td>0.331</td>
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<tr>
<td>85</td>
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</table>

Conclusions

The study provides a discussion of the result of evaluation of BSIT curriculum in one of the public universities in the country. It also provides concrete evidence of how much the specific program outcomes have been achieved and to what extent they have been applied by the program graduates in their present employment. Though, most of the identified program outcomes have been achieved and performed favorably by the program graduates, there are still specific program outcomes that need to be given much emphasis as far as holistic IT education is concerned.

Implications of the study point to the specific role of higher education in preparing graduates for the workplace. This is amplified by the ever-changing demands and expectations of employers who are more after what their employees can do and apply and less in what they know in terms of the various theories and concepts as well as what the community demands of the IT-enabled learning with the advent of the new normal affecting educational delivery. This brings to the realization of some of the important steps that will help bridge the gap in the outcomes of BSIT curriculum. Thus, this will serve as a basis for developing the twenty-first century IT professionals. The BSIT curriculum should therefore provide holistic academic experiences and activities by:

- Enabling graduates to learn how to learn. The BSIT program may use methodologies which could foster flexibility, especially with attitude in relation to the work environment, self-autonomy, and learning. Simulated or real-life cases, projects and work experiences are means to develop skills in self-learning. Role playing, teamwork, problem-solving tasks during projects or assignments may also be employed to enhance self-learning.
- Aligning teaching with constructive learning. The alignment promotes deep learning for students. The outcomes-based approach enhances alignment of learning outcomes with teaching and assessment. In the approach, the focus in learning shifts from the usual activities of an IT educator during teaching sessions...
to the learning activities which the students undertake to realize the intended learning outcomes (Biggs, 2016).

Developing management skills. Graduates should not only develop software development skills. They also need to develop management skills. Career management and self-management skills are foremost among the needed management skills. By using role playing, self-audit of resumes, problem-based group work, peer review, work-integrated learning, reflection, and feedback exercises, etc., these skills can be significantly developed (Bridgstock, 2009).

Developing social and cultural skills. Social and cultural skills are essential for fitting into the global workplace. By encouraging student participation in work placements, internships, involvement in student organizations and/or events, networking and, career building activities, students will be able to develop more their social and cultural skills.

Developing well-rounded graduates. Developing graduates holistically may be realized by making them aware of their strengths and keeping their minds open to work-pursuing opportunities. This can happen not only in the discipline-specific sector but also in other sectors where they are likely to be employed.

The technology-driven world of IT poses a reality wherein HEIs have a marching order to make their graduates match the evolving needs of the twenty-first century industries. To be able to respond to the demand associated to twenty-first century IT education and development, HEIs must adopt curricula that are comprehensive yet flexible, and focus on learning outcomes that extend thinking and reasoning. Problem-solving, reflection, creativity, critical thinking, metacognition, risk-taking, communication, collaboration, innovation, and entrepreneurship become key competencies for twenty-first century life and work.

A dynamic twenty-first century BSIT curriculum should enrich these competencies and skills so that graduates can adapt and take the lead in the changing world. This even more engenders the role of IT education in preparing learners for what the post-pandemic future IT professionals might hold- an IT-enabled learning. By equipping them with the right knowledge, attitude, values, skills, and competencies, the nation will have developed well-rounded IT professionals who will be responsible for sustainable twenty-first century IT development.

References


