Immediate Program Learning Outcomes of Information Technology Candidates and their Introspections Towards IT Education Relevance and Global Competence Initiatives

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   ABSTRACT: A nation's economy runs on the knowledge and skills of its people.Quality assurance mechanisms for higher education institutions must take cognizance of the graduates' acquisition of skills to become productive and contributory for societal development. The study is a quantitative survey assessing the attainment of the immediate program learning outcomes of the graduating Bachelor of Science in Information Technology of one campus of a public higher education institution in the Philippines. It also assessed the introspection and level of satisfaction of the graduates in their studies. Findings disclosed that the graduates have a high level of attainment of the program's learning outcomes and a high level of satisfaction. The high school where the respondents graduated is the single variable that defined the difference in attainment of program intended learning outcomes. As to the

graduates' introspections, themost significant percentage of them learned the program from family, relatives, and friends. Reasons for pursuing the degree program are because of parents' influence, prestige of IT profession. Meanwhile, the university's reputation, affordable tuition fees, and proximity to home were the factors affecting the enrolment in the BSIT program. The findings will be the basis for strategic program interventions of the program.

INTRODUCTION

The quality and relevance of information technology are challenges that confront educational institution. (Avgerou& Walsham, 2017, Hollister, et al, 2017, Mwangi &Ingado, 2020, Mwangi &Ingado, 2020, Shaikh &Karjaluoto, 2015, Spraakman, et al, 2015). Graduate attributes are essential factors in planning any university undergraduate program curriculum, particularly the Bachelor of Science in Information technology. The attributes which are practically demanded by industry can be classified as the technical knowledge and skills, and generic attributes (Dubey & Tiwari, 2020, Albina &Sumagaysay, 2020, Verma, et al, 2020).

Initial education must provide the necessary skills for any professional to be able to overcome the current challenges, either to seek a job with continuity or to create their job through entrepreneurial behavior. Accordingly, the university curriculum should be consistent with employment and self-employment demands, especially at the higher education level. In addition, competitive graduates in the job market often rely on an intense program curriculum." In various sectors, graduates compete among themselves to meet the job market. Because of the restricted amount of employment available, many graduates end up unemployed. The CHED Memorandum Order (CMO) No. 46, s. 2012 which spells out Outcomes-Based Education (OBE) for Higher Education in the Philippines, is competency-based learning standards and outcomes-based quality assurance monitoring and evaluation. As competencies are identified, the program learning outcomes were also established, describing what the graduates of a certain higher educational institution will demonstrate after graduating from a program. Likewise, Student Learning Outcomes for an academic program are defined as the knowledge, skills, or behaviors that a program's students should demonstrate upon program completion. Learning outcomes are statements that describe significant and essential learning that learners have achieved and can reliably demonstrate at the end of a course or program. In other words, learning outcomes identify what the learner will know and be able to do by the end of a course or program.

Chee-Ming (2016) emphasizes a positive direct relationship between the program graduate attributes and industries' expectations. Employability of graduates rises if it directly addresses the manpower needs of the sectors, particularly on the technical and soft skills of graduates. Hence, any incompatibility between what the industry needs and what the graduates possess would eventually reduce graduates' employability. Consequently, the assessment of graduate attributes both from technical and generic should be clearly depicted in planning and implementing and evaluating curriculum. It likewise calls for the effective integration and, alignment and harmonization of the curriculum design, teaching-learning modalities, testing, and assessment and evaluation activities to support the attainment of what the curriculum intends to develop among the students (Borah, et al, 2021, Herbert, et al, 2020, Schreck, et al, 2020).

Attune to the attainment of the graduate attributes of the BSIT students to ensure a more responsive and flexible degree program is to identify their retrospection and satisfaction of the students while studying in the university. Magulod et al (2021) explained that satisfaction is the individuals' psychological construct whether positive or negative as a result of product, process, performance or outcomes comparison in relation to their expectations. In other words, if the performance matches the expectation, the customer will be satisfied. Thus, in the university context, student retrospection and satisfaction are import part to successfully market higher education (Bertaccini et al, 2021) If students are viewed as consumers of higher education, their satisfaction is crucial(Rasmussen et al, 2021).

Universities have increasingly offered a wide spectrum of providing students with the necessary tools to develop their employability skills, heighten their awareness of these skills, and improve their ability to articulate them. Once acquired, these skills need to be honed throughout the students' 'working life, being put into practice not only on job

searching and during interviews but also in personal development planning and making the most of work experience opportunities.

Most of the universities have policies to strengthen their curricula and their existing links and create new bridges with the world of work for their graduates. Universities taketheir role as the premier public higher education institution guided with its vision of transforming lives by educating for the best and its mission of changing people and communities' lives through high quality instruction and innovative research, development, production, and extension. Among its priority courses are the applied and pure sciences courses particularly Bachelor of Science in Information Technology. The program aims to produce graduates who can utilize of both hardware and software technologies involving planning, installing, customizing, operating, managing and administering and maintaining information infrastructure that provides computing solutions to address the needs of an organization, and prepare graduates to address various user needs involving the selection, development, application, integration and management of computing technologies within an organization.

The need to assess the attainment of immediate program learning outcomes of BS Information Technology Graduating Students and their Introspections in Studying will present two significant productivity angles: the possible productiveness of the graduates and the cost-effectiveness of the BSIT program and possible reforms and interventions to meet industrial expectations. Besides, this study will be a powerful tool for the BSIT Program in assessing the graduates' immediate training needs.

Objectives of the Study:

The purpose of this study is to assess the extent of attainment of the immediate program learning outcomes, level of satisfaction and introspections in studying of the BS Information Technology graduating students. More specifically, it identifies the agencies to which the respondents learned about the program, their reasons for pursuing the degree program, and the factors affecting the degree program's enrollment.

METHODS

Research Designs

The descriptive survey research design was employed to determine the extent of the course program's attributes and learning outcomes of IT candidates and their retrospection on studying at a higher learning institution. It surveyed and systematically described the respondents' characteristics and perceptions about their level of competencies and skills acquired upon finishing their degree programs.

Participants, and Research Procedure

Data of the study were surveyed and generated from the sampled 62 IT candidates. To ensure equal representation of the participants, the researcher employed systematic sampling was used. Raosoft was used to compute the sampling size set with a margin of 5%, 95% level of confidence, and 50% response distribution. Raosoft online software was accessed through this weblink http://www.raosoft.com/samplesize.html. The use of Raosoft as a sampling package provides power values to given sample size and alpha levels to avoid Type I and Type II errors (McCrum-Gardner, 2010). The complete list of the class population was requested to the dean's office with the university authorities' approval. A systematic sampling technique was employed. The following research ethics considerations guided this study. First, the university ethics committee approved data privacy and informed consent forms to be signed by the study respondents. Second, the researcher conducted an orientation on the purposes of the research before administering the instruments. Thirdly, the anonymity of the respondents and the institution was observed by not mentioning names.

Data Analysis:

Descriptive statistics such as mean, frequency and percentage distribution were used to come up with the profile of the respondents and their introspections in studying. Weighted mean and standard deviation were used to determine the attainment of the intended program learning outcomes and their satisfaction level. Inferential statistics such as independent sample t-test and one-way analysis of variance were used to ascertain the differences on the attainment of the IPLO when grouped according to the profile of the respondents. To interpret the weighted mean, the following scale of 1 to 5 was adopted with 1 as the lowest and 5 as the highest.

RESULTS AND DISCUSSION:

Level of Attainment of the Program Learning Outcomes

Table 1. Level of attainment of the Program Intended Learning Outcomes

Program Intended Learning Outcomes	Mean	Std. Dev.	D.I.
1. Apply knowledge of mathematics and computing appropriate to information technology;	4.02	0.70	High Extent
2. Communicate effectively with the computing community and with society at large about complex computing activities through logical writing and presentations;	3.39	0.71	Moderate Extent
3. Design, implementation and evaluate computer-based systems to meet the needs of the community	4.10	0.66	High Extent
4. Analyze the impact of information technology and integrate IT-based solutions on individuals, organizations and society effectively;	4.07	0.73	High Extent
5. Analyze complex problems, and identify and define the requirements appropriate to its solution;	4.07	0.78	High Extent
6. Understand professional, ethical, legal, security and social issues in the utilization of computer technology;	4.22	0.72	Very High Extent
7. Recognize the need for and engage in planning, self-learning and improving performance as a foundation for continuing professional development.	4.08	0.74	High Extent
Grand Mean	*4.07*	*High Extent*	

Legend: 4.20-5.00- Very High; 3.40-4.19- High; 2.60-3.39- Moderate; 1.80-2.59- Low; 1.00-1.79- Very Low

Learning outcomes are statements that describe significant and essential learners have achieved, and can reliably to do by the end of a course or program. Table 1 presents the level of attainment of the intended program outcomes. The table disclosed that the graduate respondents manifested a high extent level of attainment of the immediate learning outcomes with the computed gran mean of 4.07. The finding indicates that the respondents perceived themselves to have positively developed among themselves the graduate outcomes needed in their degree program. The respondents manifested a very high level of attainment on understanding professional, ethical, legal, security and social issues in computer technology utilization with the mean of 4.22 (SD=0.72). The finding suggests that the graduates perceived themselves to have possessed the appropriate behavioral actions on the utilization of computer technology for society's benefits. Hence, they manifest a clear grasp on the observance of information technology ethics. Kaplan (2020) suggested that the inclusion of computer ethics in IT curriculum because of limited policies surrounding new possibilities. Likewise, Chatterjee et al (2020) affirmed that the in association with computer and information technologies, ethics concerns the relationship of systems with the people who use them (Gal et al, 2020, Shilton et al, 2020, Yaokumah, 2021)

The high extent of attainment of the respondents on the recognition of the need for and engage in planning, self-learning and improving performance as a foundation for continuing professional development assessed with the mean of 4.08 (SD=0.74) explains that they put high emphasis to value learning as part of their career preparation and development. They are aware that their skills and competencies will be further developed through active engagement and involvement to professional development activities. CPD is the educational process by which members of any profession maintain, improve and broaden their knowledge, skill and personal qualities required in their professional life (Homes, 2020). It is a holistic commitment to structured skills enhancement and personal or professional competence (Price & Campbell, 2020). CPD can also be defined as the conscious updating of professional knowledge and professional competence throughout a person's working life. It is the key to optimizing a person's career opportunities, both today and for the future (Lochan et al, 2020).

The respondents manifested a high level of extent on the design, implementation and evaluate computer-based systems to meet the community's needs with the mean of 4.10 (SD=0.66). The respondents highly acknowledge themselves to have possessed the skills as web developer, database administrator, IT manager, computer system administrator. Meanwhile, the respondents also assessed themselves to have the high extent of attainment on the ability toanalyse the impact of information technology and integrate IT-based solutions on individuals, organizations and society effectively with the mean of 4.07 (SD=0.73). The

finding means that the respondents capably viewed themselves to have posseted ability to critically understand the role of technology for individual and organizational development. Hence, they consider information technology connects and binds individual, organization and social agencies because of data-driven society.

Seufert et al (2021) suggested that IT personnel's four main focuses are business computer network and database management, information security, business software development, and computer tech support. Therefore, he further affirmed that IT professionals are the ones responsible for helping others get their work done efficiently without the complex jargon of the technology world (Andiola et al, 2020, Burke &Maceli, 2020).

The table also revealed that the respondents have a high level of attainment on applying knowledge of mathematics and computing appropriate to information technology obtained the mean of 4.02 (SD=0.70). This indicates that BSIT program requires students to have strong logical and mathematical skills. Lin, et al (2020) on the role of mathematics in information technology students' performance found a very high significant relationship among the variables. Hence, it was concluded that achievement in mathematics predicts computer programing skill of IT students. He further noted that performance of students in mathematics could be a basis for admission in IT courses.

The high extent of the respondents' attainment on the ability to analyse complex problems, and identify and define the requirements appropriate to its solution obtained the mean of 3.97 (SD=0.70). This indicates that the respondents acknowledged themselves to have possess good problem solving skills. According to Kurniawati et al (2020), developing good problem solving skills is very important to successfully navigate through school, career, and life in general. In like manner, Lin et al (2020) identified problem solving skill as a person's ability to engage in cognitive processing to understand and resolve problem situations where a method to solve the problem is not immediately available. Likewise, the moderate extent of assessment of the respondents on their ability to communicate effectively with the computing community and with society at large about complex computing activities through logical writing and presentations obtained the mean of 3.39 (SD=) implies that they have a moderate level of good communication skill. Hence, there is a need to look in this concern considering that having a good business communication skill will help them become better IT professionals. Effective business communication helps one to become productive in writing, reading, and speaking effectively in an academic business context (Gnambs, 2021). Two of the essential skills needed from IT professionals are teamwork and communication skills (Fernández-Gutiérrez, et al, 2020). This further suggests that there is a need for enhancement on good communication skills of the respondents. The high extent of attainment of the respondents on the seven intended program learning outcomes of BS Information technology program indicates that they are confident with the graduate attributes they should possess at the end of their degree courses.

Difference on the Level of Attainment of the Immediate Intended learning Outcomes

Table 2 presents the test of difference in attaining the immediate intended learning outcomes when grouped according to their profile variables. The table revolved significant difference along with the respondents' type of high school graduated from while other personal profile variables showed no significant difference. The significant difference in the attainment of IPLO when grouped according to type of high school graduated from shows that students who graduated from private schools showed a higher level of attainment of the intended program attributes than those who graduated from public school.

Table 2. Test of Difference on the Attainment of the Immediate Intended Program Learning Outcomes when grouped according to profile variables

Profile Variables	Intended Learning outcomes (ILO)	Decision
Sex	0.481 ns	Accept HO
Age	0.642 ns	Accept HO
Weekly allowance	0.352 ns	Accept HO
Type of HS Graduated from	0.031 *	Reject HO
Father's Occupation	0.462 ns	Accept HO
Mother's Occupation	0.971 ns	Accept HO
Birth Order	0.651 ns	Accept HO
Father's Education	0.678 ns	Accept HO

Mother's Education	0.175 ns	Accept HO
Family Monthly Income	0.773 ns	Accept HO

*= Significant at 0.05 level
Ns= not significant

The significant difference is attributed to the students' exposure from the high school they graduated from revealing a favorable higher assessment of the respondents who graduated from private schools compared to those who graduated from public high schools. Findings showed that there is a difference on the computer literacy and attitude of students when grouped according to type of high school they graduated from showing that private school secondary students have higher access to, and use of computers therefore private school students were more exposed and engaged in computer literacy. As implication of the finding to the BSIT program, there is a need for the college to stress out supportive policy environment for better access and use of computers to students who graduated from public schools.

Level of Satisfaction of the Respondents

Table 4. Satisfaction Level of the Respondents

Areas	Mean (n=6)	Std. Dev.	D.I.
Structure of the degree program	3.98	0.77	High
Topic contents of courses	4.08	0.81	High
Testing and grading system	4.05	0.77	High
Quality of instructors and professors	4.22	0.76	Very High
Academic counseling and guidance program	4.32	0.75	Very High
Quality of library resources	3.77	0.91	High
Quality of computer laboratories and equipment	3.70	0.93	High
Quality of On-Job Training Experience	4.02	0.75	High
Scheduling of classes	3.52	0.91	High
Provision for research and extension	3.87	0.81	High
Provision for comprehensive trainings on IT Updates	3.93	0.58	High
Grand Mean	**3.98**	**High**	

Legend: 4.20-5.00- Very High; 3.40-4.19- High; 2.60-3.39- Moderate; 1.80-2.59- Low; 1.00-1.79- Very Low

Table 4 presents the satisfaction level of the respondents. The table reveals that the students have high level of satisfaction with the grand mean of 3.88. The finding implies that the students are highly satisfied in the provision of student services of the Campus. Consequently, the respondents were very satisfied with the Quality of instructors and professors with the mean of 4.22 (SD=0.76) and on the anemic counseling program and services with 4.32 (SD=0.75). Accordingly, the respondents showed a high satisfaction on the structure of the degree program with the mean of 3.98 (SD=0.77), topic contents of the courses with the mean of 4.08 (SD=0.81), grading system with the mean of 4.05 (SD=0.77), library resources with the mean of 3.77 (SD=0.91), quality of computer laboratories with the mean of 3.70 (SD=0.93), OJT experience with the mean of 4.02 (SD=0.75), class scheduling rated with the mean of 3.52 (SD=0.91), provision for research

and extension with the mean of 3.87 (SD=0.81), and provision of retraining on IT updates with the mean of 3.93 (SD=0.58).The students' favorable level of satisfaction on the above mentioned indicators implying that the BSIT program has quality compliant standard. It should be noted that the program was given the Certificate of Program Compliance (COPC) issued by the Commission on Higher Education. The maintenance and improvement of school environment plays a crucial role in determining level of school performance. A closer look at the data, it shows that the variable obtaining the lowest mean among the items is the quality of computer laboratories and equipment. This indicates that there is a need for the University to work on the campus's physical environment to put up computer laboratories quipped with more advanced and adequate tools for the program.
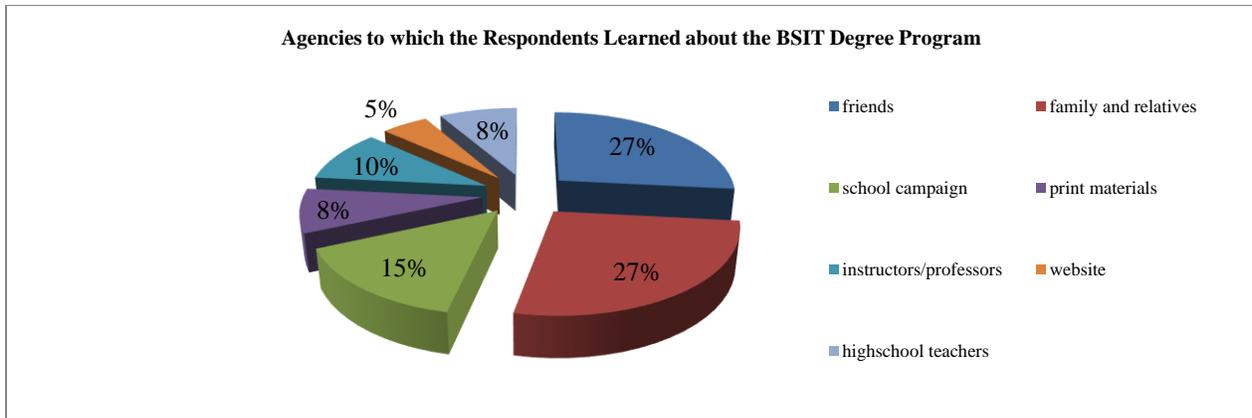
Figure 1. Percentage Distribution of Agencies to Which the Respondents   Learned about the Program

Figure 1 presents the percentage distribution of agencies to which the respondents learned about the BSIT program. The study's result disclosed that most of them learned the program from their family and relatives with 27% and 27% of them learned from friends. Likewise, 15 % of them disclosed that they learned the program through school campaign. However, 10 % of the respondents learned through the instructors and professors of the Campus, 8 % from both print materials and high school teachers, and the least 5 % through website.
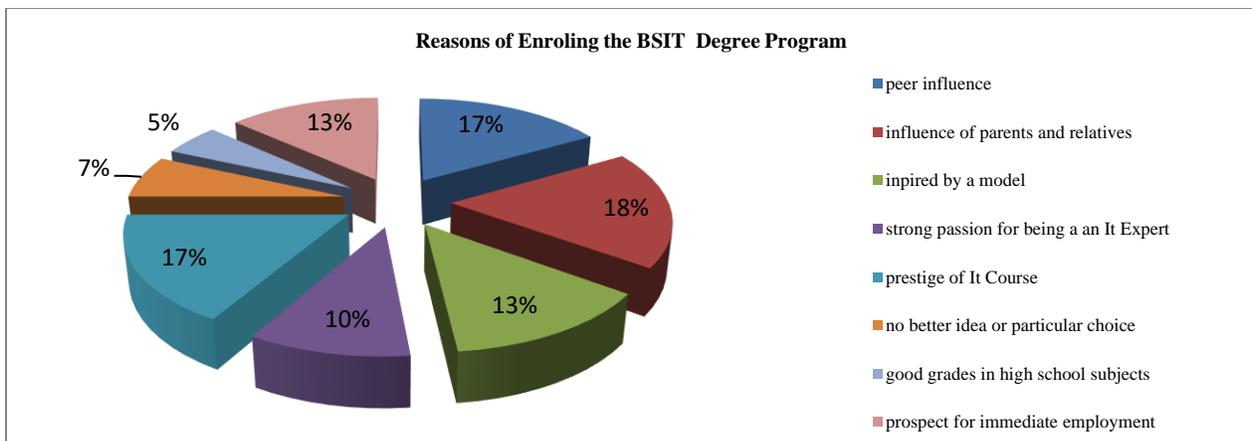

Figure 2. Percentage Distribution of the Reasons of Enrolling the BSIT Program

Figure 2 shows the distribution of the respondents on their reasons of pursuing the program. Results revealed that most of the respondents with 18 % of them were influenced by parents and relatives, 17 % enrolled through peer influence, and 17 % is the prestige of the IT course. Meanwhile, there were 13 % of them inspired by a model, and 13 % is prospect for immediate employment, 10% disclosed strong passion for being an IT expert. 7 % admitted no better idea or particular choice. And the least of 5% disclosed good grades in high school subjects. The findings imply that parents are influential in the career planning of their children.
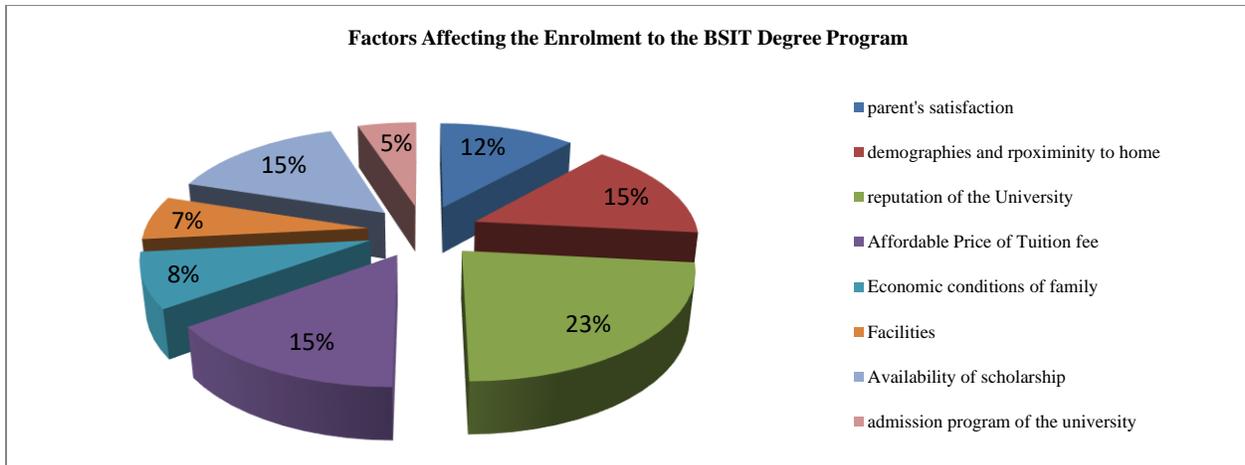
Figure 3. Percentage Distribution of the Factors Affecting the Enrollment to the BSIT Degree Program

Figure 3 presents the percentage distribution of the factors affecting the enrollment to the BSIT degree program. Most of the respondents with 23 % of them enrolled BSIT program due to the university's reputation. 15 % enrolled in the program because of demographic proximity to home. 15 % of them also admitted due to affordable price if tuition fee. Likewise, 15% of them is due to availability of scholarship. 12 % admitted is due to parents' satisfaction. 8%. The least 5 % is due to admission program of the university.

Proposed Strategic Interventions for BSIT Program

Table 5 presents strategic interventions for BSIT program. Six interventions are proposed namely: (1) Intensive Orientation of the IT students on the program graduate attributes in the early stage of their courses; (2) Career Guidance and Campaign for Parents on the Depth and Breadth of opportunities for IT Profession; (3) Improvement of Physical learning environment of the Campus ; (4) Business Communication Skill Training for IT Students; (5) Computer Literacy enhancement Training for Entering freshmen It Students; (6) Improve the admission policy of Information technology.

Table 5. Proposed Strategic Program Interventions

Interventions	Description
Intensive Orientation of the IT students on the program graduate attributes in the early stage of their courses	The activity aims to facilitate better student acquisition of the graduate attributes by allowing instructors to orient the graduate attributes of the IT students intensively.
Career Guidance and Campaign for Parents on the Depth and Breadth of opportunities for IT Profession.	The program aims to provide career guidance and orientation to parents of graduating high school students since the study communication with parents highlighting the opportunities for Information technology.
Improvement of Physical learning environment of the Campus	This activity aims to improve the physical facilities and resources to maximize students' learning spaces, which will lead to their personal, individual and group learning activities for better acquisition of their intended program attributes.
Business Communication Skill Training for IT Students	The activity aims to hone further the business communication skill of the BSIT students focusing on communicating effectively with the computing community and with society at large about complex computing activities through logical writing and presentations.

Computer Literacy Training for Entering freshmen IT Students	The activity aims to provide computer training program for entering freshmen students to improve their computer literacy.
Improve the admission policy of Information technology	Implement admission policy for IT courses taking into consideration the agencies to which the students learned about the program, factors and reasons of enrollment.

CONCLUSION AND RECOMMENDATIONS

The study's findings disclosed that the BSIT graduates have a high level of attainment of the immediate program learning outcomes and high level of satisfaction indicating that they are confident with the graduate attributes they should possess at the end of their degree courses. The type of high school where the respondents graduated is the single variable that defined difference on the level of attainment of program intended learning outcomes. As to the graduates' introspections, the biggest percentage of them learned the program from family, relatives, and friends. It is evident that reasons for pursuing the degree program are parents' influence and the prestige of the IT profession. Meanwhile, reputation of the university, affordable tuition fee, and proximity to home were the factors affecting the enrolment to the BSIT program. The findings were the basis for program strategic interventions of the Campus. In light of the study's conclusion, it is recommended that the results of this study be the basis for the BSIT program to initiate upgrading activities.

As to the limitation of the present study, it only covered the descriptive assessment of the students in one campus of a public higher educational institution in Region 02, Philippines, hence, a follow-up study is recommended with the inclusion of more personal and professional related variables with larger scope. Likewise, study pertaining to the longitudinal tracking of BSIT graduates' cohorts should be conducted to generate concrete data on how beneficial the BSIT program is in identifying and developing necessary graduate attributes for employability opportunities and graduate employment outcomes.

As a general implication of the present study, for universities offering BSIT Program, there is a need to effectively partner with IT related industries for the formulation of graduate employability agenda, putting emphasis to the development of the intended program attributes should be seriously embedded on the realm of lifelong career development.

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