Proposed Enhancements of Factors that Relate to Student Performance in Basic Computer Programming Course in a Local University in the Philippines

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Abstract: The study was conducted to determine the factors that relate to the academic performance of the Bachelor of Science in Information Technology students in Basic Computer Programming course. The researchers administered survey questionnaires to 200 second year BSIT students. In terms of professor-related factors, the researchers found out that the top characteristic of computer programming professors for them to be perceived as having mastery of their course is the knowledgeability of the teacher. A general friendly atmosphere is the most preferred choice of the students for classroom management. While being inspirational and respectful are preferred personalities for their teachers. Also, giving challenging tests is the preferred teaching strategy for the students. In terms of student-related factors, the researchers found out that application of programming skills in future career ranks most among the students. The adequacy of computers is the foremost concern of the students to have a very conducive learning environment. The students perceive that studying hard is crucial to success in their career. As for social stimuli, the students perceive that group collaboration works best for them. While compliance with requirements is the most viewed critical for them to achieved better academic performances. The researchers conclude that all the stated factors both student-related and teacher-related, are directly related to the academic performance of the students. Therefore, the researchers recommend enhancing these factors.

Keywords: Factors, Computer Programming, Information Technology, Student Performance

1. Introduction

Computer Programming is a core course in the field of Information Technology (IT) which requires an individual to be trained to write computer program instructions with the use of the programming languages like C, C++, Java, Visual C# .NET etc. According to Hanselman (2016), computer programming is a difficult skill to learn but is considered very rewarding for IT professional career.

The number of students, especially the female students, engaging in IT programs has been decreasing over the years (Sherman, 2015). However, it does not affect the volume of required IT professionals in the field of work, especially in the Philippines. In fact, based on CHED Memorandum Order No. 01 Series of 2014,

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Information Technology-related programs are included in the official list of in-demand and priority college programs for academic year 2014 - 2015 to academic year 2017 – 2018. It implies that the Commission on Higher Education (CHED) encourages high school graduates to consider these programs because they offer better employment opportunities after graduation.

Pamantasan ng Cabuyao (PnC) is a local government university in Cabuyao City, province of Laguna, Philippines. It was founded by then Mayor Proceso "Etok" Aguillo, through the enactment of Municipal Ordinance 2003-059 approved on April 16, 2003. Currently, the PnC (under the College of Computer Studies or CCS) offers academic programs related to the field of IT such as Bachelor of Science in Information Technology (BSIT) with specialization in Web Development or Database Administration and Bachelor of Science in Computer Science (BSCS). All these academic programs require knowledge of basic computer programming. The university also offers two-year associate courses in computer technology (ACT). Hence, basic programming is included in their respective curriculum.

Computer programming needs problem-solving and analytical skills. And for beginners, it is apparent that to create a simple computer program would already be a tough undertaking. But it is still a major requirement to acquire a degree in IT. That is why beginners should first learn the basics and have an introduction and hands-on training on how to write programs using a particular programming language (Henn, 2014).

Being professors teaching the basic programming course, the researchers have decided to conduct a study about the perceptions of the students on the factors affecting their academic performance. It is since the researchers observed that some students enrolled in the basic programming course during their class encountered problems especially in coping with the course as a beginner. As a result, the researchers had aimed to help the students as well as the professors to enhance classroom instruction and university policies.

The study enabled the researchers to make recommendations to PnC policy makers on what policies and strategies can be employed to improve the academic performance of BSIT students. The study may help align the program offering to the university's mission and vision. Likewise, the study identified the characteristics the computer programming professors must possess to become more effective computer programming educators.

In general, the study identified the factors affecting the academic performance of BSIT students of PnC in the Basic Computer Programming course.

Specifically, answers to the following questions are sought:

1. From the perception of BSIT students, what are the required characteristics of computer programming professors in terms of:
   a) mastery of the course.
   b) communication skills.
   c) classroom management skills.
   d) personality; and
   e) teaching strategy?

2. From the perception of BSIT students, what are the characteristics of computer programming students in terms of:
   a) the view of the course.
   b) environmental learning conditions.
   c) emotional stimuli; and
   d) social stimuli?
3. Are there significant relationships among student-related, professor-related and academic performance of students in the Basic Computer Programming course?
4. What measures can be recommended to enhance the factors affecting academic performance of the students enrolled in Basic Computer Programming course?

1.1 Theoretical Framework

Theories are formulated to explain and understand a phenomenon. The theoretical framework is a structure that can support a theory of a research study. The theoretical framework introduces and describes the theory that explains why the research problem under study exists.

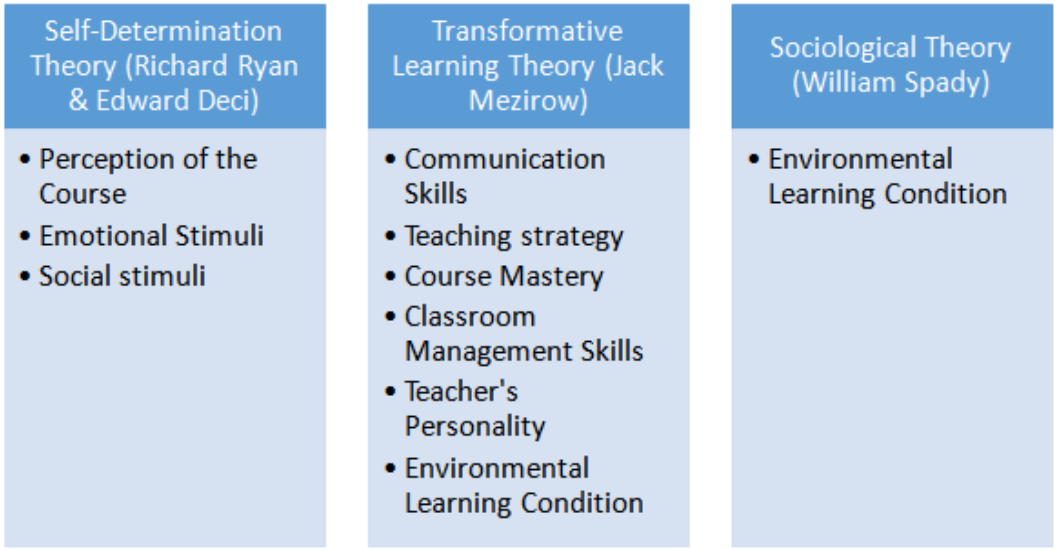

Figure 1: Learning Theories

To have a good background about the study, the researchers consulted various theories related to learning: Self-detemination Theory, Sociological Theory, and Transformative Theory.

According to self-determination theory, people do things because they are properly motivated. Motivation is categorized into two: extrinsic and intrinsic. Intrinsic motivation is defined as the tendency to engage in an activity because it is inherently interesting and enjoyable. On the other hand, extrinsic motivation is the opposite. A person engages in an activity in order to attain some separable outcome (Ryan & Deci, 2000). Applying this theory in learning, an intrinsically motivated student will do his homework even without supervision from his parents simply because he finds the activity interesting and/or challenging. However, if the student is extrinsically motivated he will do the same but for the sake of a reward or to avoid

punishment from his parents. Relating this theory to the study, perception of the course and emotional stimuli are factors that trigger intrinsic motivation while social stimuli triggers extrinsic motivation.

Another theory consulted by the researchers is the Sociological Theory by William Spady as cited by McGonigal (2005). According to this theory, there is an interaction between an individual student and its university environment. This interaction is defined through student's attributes such as attitudes, skills and interests which are exposed to the influences, expectations, and demands of the university. The effect of interaction describes whether the student will be able to integrate to the academic and social system of the university and therefore decide if the student will stay in the university. Satisfaction with the university environment and institutional commitment are variables which promotes social integration of the students in higher education. Relating to this theory, environmental learning condition is a significant factor that would possibly affect the academic performance of students.

The Transformational Learning Theory originally developed by Jack Mezirow (1991) is described as being "constructivist, an orientation which holds that the way learners interpret and reinterpret their sense experience is, central to making meaning and hence learning". The theory has two basic kinds of learning: instrumental and communicative learning. Instrumental learning focuses on learning through task-oriented problem solving and determination of cause and effect relationships. Communicative learning involves how individuals communicate their feelings, needs and desires.

As a conclusion, the study attempts to verify if the factors mentioned by the theories really affect the academic performance of the Pamantasan ng Cabuyao students in Basic Computer Programming course.

1.2 Significance of the Study

The study can be beneficial to the following:

University Administrators. The study may enable the administration of the institution to set new policies with regard to teaching the programming subject, devise a concrete plan in order to satisfy the needs of the professors and students of the subject, and empower the administration to achieve the mission and vision of the institution.

IT Education Professors. The study can help the professors identify what to be given attention during classes and improve their teaching strategy to provide quality education. Likewise, the professors may possibly undergo trainings and seminars about teaching the programing course as a part of their professional growth in cooperation with the programs of the university administrators for professors.

Students. The study may enable the students express their needs in understanding the programming subject as a fundamental concept to be learned all throughout their course.

Researchers. As researchers and part of the teaching force of IT Education, the researchers can apply their management and planning skills in order to find solutions for the research problems.

Future Researchers. The findings of the study may serve as a reference for other researchers intending to conduct a similar study.

2. Materials and Methods

2.1 Research Design

The research design is the general plan on how the research questions were addressed (Saunders, Lewis, & Thornhill, 2006). A research can be classified as exploratory, descriptive, or causal. Each of the research design is more applicable than the other depending on the nature of the research problem. For this study, the researchers used descriptive research design. "Descriptive research design aims to portray an accurate profile of people, events or situations, and the treated problem must be clear before the research" (Robson, 2002).

The researchers employed descriptive method since it describes the nature of a condition, as it takes place during the time of the study and it explores the cause of a particular condition. The researcher decided to use this kind of research considering the desire to acquire firsthand data from the respondents so as to formulate rational and sound conclusions and recommendations for the study.

Two types of data were gathered: the primary and the secondary data. The primary data were obtained from the questionnaires distributed to the respondents. The secondary data on the other hand, were derived from the findings stated in published documents and literature related to the research problem. Online journals were used as the primary source for secondary data.

2.2 Setting of the Study

The study was conducted at Pamantasan ng Cabuyao (PnC), a local government-funded university located at Katapatan Village, Banay-Banay, City of Cabuyao, Laguna. Pamantasan ng Cabuyao offers various bachelor programs managed by 5 colleges: Computer Studies, Engineering, Arts and Sciences, Business Administration and Accountancy, and Nursing. To be specific, the study was conducted at the College of Computer Studies since the target respondents are the students enrolled in BSIT program.

2.3 Subject of the Study

The study determined the factors affecting the academic performance of BSIT students in Basic Computer Programming course. For this reason, the respondents of the study are composed of students who have already taken the said course.

The respondents of the study are the 200 second year BSIT students at the university enrolled in the first semester of academic year 2015 – 2016. The second-year students were chosen since they are the most recent takers of the said course.

2.4 Sampling Design

A population may be studied using one of the two approaches: total enumeration or selecting a sample. Total enumeration is a study of every unit in a population. On the other hand, sampling is selecting a partial of the population to represent all the units of that population.

Both approaches have their own advantages and disadvantages. In terms of time and cost, sampling is more efficient compared to total enumeration. However, data gathered using total enumeration can serve

as benchmark data for future studies since total enumeration provides a true measure of the population (no sampling error). This is not usually possible for data gathered using sampling approach (Census and sample, 2013). Regardless of the advantages and disadvantages, both approaches can provide information that can be used to draw conclusions about the whole population.

Since the respondents of the study are conveniently accessible to the researchers, the researchers decided to implement total enumeration.

2.5 Data Gathering Procedures

The researchers employed survey questionnaire as the primary data gathering instrument for the study. The factors affecting the academic performance of the BSIT students and its indicators were determined based on the published research of Garcia and Al-Safadi (2013) and the existing professor's performance evaluation system of PnC. Internet and library research were also employed by the researchers in gathering data from related literature and studies.

The survey questionnaires were distributed during the enrolment of the second year BSIT students of PnC. Though the researchers aimed for total enumeration, only 185 out of 200 students were present during the dissemination of the survey questionnaires. It turned out that a lot of these students were late enrollees or discontinued their schooling.

2.6 Statistical Treatment

The responses in the questionnaires were analyzed using Likert Scale. "The Likert Scale is a five (or seven) point scale which is used to allow the individual to express how much they agree or disagree with a particular statement" (McLeod, 2008).

A Likert Scale allows the respondents to express their opinion in varying degrees. Thus, quantitative data were obtained, which means that the data were analyzed with relative ease. The responses used in the questionnaires and their corresponding points are as follows:

Responses	Points
Strongly Agree	5
Agree	4
Undecided	3
Disagree	2
Strongly Disagree	1

The responses in the questionnaires were interpreted using statistical methods. The researchers used weighted mean in determining the average of the responses. According to Simmons (2014), weighted mean is a kind of arithmetic mean of a set of numbers in which some elements of the set carry more importance (weight) than others. The researchers also used Person's r to determine if there is a significant

correlation between professor-related and student-related factors, and the academic performance of the BSIT students in Basic Computer Programming course.

3. Results and Discussions

3.1 Student Perceptions on the Required Characteristics of Computer Programming Professors

Table 1 shows the indicators for the Required Characteristics of Computer Programming Professors as perceived by BSIT students. These include mastery of the course (MC), communication skills (CS), classroom management skills (CMS), personality (P), and teaching strategy (TS).

Table 1: Students' perceptions on the required characteristics of computer programming professors

Indicators	SD	D	U	A	SA	Weighted Mean
MC1	6 (3.2%)	7 (3.8%)	34 (18.4%)	103 (55.7%)	35 (18.9%)	3.83
MC2	5 (2.7%)	12 (6.5%)	41 (22.2%)	94 (50.8%)	33 (17.8%)	3.75
MC3	5 (2.7%)	6 (3.2%)	47 (25.4%)	93 (50.3%)	34 (18.4%)	3.78
MC4	5 (2.7%)	8 (4.3%)	50 (27.0%)	84 (45.4%)	38 (20.5%)	3.77
MC5	4 (2.2%)	11 (5.9%)	58 (31.4%)	90 (48.6%)	22 (11.9%)	3.31
CS1	5 (2.7%)	8 (4.3%)	33 (17.8%)	84 (45.4%)	55 (29.7%)	3.95
CS2	4 (2.2%)	4 (2.2%)	41 (22.2%)	94 (50.8%)	42 (22.7%)	3.90
CS3	4 (2.2%)	10 (5.4%)	45 (24.3%)	91 (49.2%)	35 (18.9%)	3.77
CS4	3 (1.6%)	6 (3.2%)	39 (21.1%)	94 (50.8%)	43 (23.2%)	3.91
CS5	4 (2.2%)	9 (4.9%)	53 (28.6%)	89 (48.1%)	30 (16.2%)	3.71
CMS1	6 (3.2%)	6 (3.2%)	51 (27.6%)	82 (44.3%)	40 (21.6%)	3.77
CMS2	4 (2.2%)	11 (5.9%)	35 (18.9%)	103 (55.7%)	32 (17.3%)	3.80
CMS3	3 (1.6%)	10 (5.4%)	43 (23.2%)	93 (50.3%)	36 (19.5%)	3.80
CMS4	3 (1.6%)	7 (3.8%)	27 (14.6%)	97 (52.4%)	51 (27.6%)	4.00
CMS5	3 (1.6%)	9 (4.9%)	37 (20.0%)	90 (48.6%)	45 (24.3%)	3.88
PER1	2 (1.1%)	8 (4.3%)	39 (21.1%)	101 (54.6%)	35 (18.9%)	3.86

PER2	1 (.5%)	7 (3.8%)	28 (15.1%)	116 (62.7%)	33 (17.8%)	3.94
PER3	5 (2.7%)	5 (2.7%)	29 (15.7%)	87 (47.0%)	59 (31.9%)	4.03
PER4	3 (1.6%)	4 (2.2%)	32 (17.3%)	92 (49.7%)	54 (29.2%)	4.03
PER5	3 (1.6%)	7 (3.8%)	35 (18.9%)	97 (52.4%)	43 (23.2%)	3.92
TS1	4 (2.2%)	5 (2.7%)	23 (12.4%)	106 (57.3%)	47 (25.4%)	4.01
TS2	2 (1.1%)	12 (6.5%)	33 (17.8%)	91 (49.2%)	47 (25.4%)	3.91
TS3	6 (3.2%)	12 (6.5%)	56 (30.3%)	88 (47.6%)	23 (12.4%)	3.59
TS4	2 (1.1%)	8 (4.3%)	40 (21.6%)	93 (50.3%)	42 (22.7%)	3.89
TS5	6 (3.2%)	13 (7.0%)	39 (21.1%)	89 (48.1%)	38 (20.5%)	3.76
TS6	1 (.5%)	9 (4.9%)	39 (21.1%)	106 (57.3%)	30 (16.2%)	3.84

The Basic Computer Programming professors' mastery of the course have the following indicators: MC1 - demonstrates comprehensive, accurate, and up-to-date knowledge of the course; MC2 - provides link between theory and practice by citing real-life situations to make discussions relevant and interesting; MC3 - gives well-organized lecture presentation and comes to class well prepared; MC4 - brings in additional and useful information, materials, and references related to the subject matter, and; MC5 - able to link the subject matter with other subjects or disciplines. Among these indicators, MC1 received the highest percentage of frequency counts with a weighted mean of 3.83. It implies that the students agree that their professors in Basic Computer Programming are knowledgeable of the course.

According to Hammond (2000) as restated by Kamamia, Ngugi, and Thinguri (2014), the professor's knowledge of the course content and of teaching strategies as well as qualifications attained in professional training largely determine the effectiveness of a professor. This statement is further supported by Hill, Rowan and Ball (2005), Baumert et al. (2010), and Voss, Kunter and Baumert (2011) as restated by Guerriero (2014) stating "Better content knowledge of professors equates to higher student achievement".

However, the students are undecided regarding the ability of the Basic Computer Programming professors to relate the subject matter with other field of disciplines as indicated by MC5 with a weighted mean of 3.31.

The communication skills of the Basic Computer Programming professors have the following indicators: CS1 – speaks clearly, audibly, and confidently; CS2 - establishes eye contact with students and makes them feel important in classroom communication; CS3 - uses appropriate bodily actions, gestures, and vocal variations; CS4 - encourages students to think independently and to make use of their own reasoning in formulating judgments, and; CS5 - adapts language use to the level of comprehension of the students.

Among these indicators, CS2 and CS4 both received the highest percentage of frequency counts. These two indicators received a weighted mean of 3.90 and 3.91, respectively.

The result implies that the students agree that their professors in Basic Computer Programming establish eye contact during class discussions. According to the findings of a study conducted by Ibrahim (2008) as restated by Khan, Mohammad, Shah, Irfanullah and Farid (2016), there is a significant relationship between eye contact of professors and academic achievement of students. Eye contact also helps in maintaining discipline in the teaching-learning process.

The result also implies that the students agree that their professors in Basic Computer Programming encourage them to think independently and formulate judgments. Being able to think independently and formulate judgment are important in computer programming. Computer programming requires problem-solving skills. Conversely, problem solving skills can be developed by studying computer programming accompanied by curriculum standards, learning resources, best practices in teaching-learning approaches and well-trained professors (Fessakis, Gouli, & Mavroudi, 2013).

The classroom management skills of the Basic Computer Programming professors have the following indicators: CMS1 – starts and ends the class on time; CMS2 - establishes appropriate control of classroom; CMS3 - able to adapt his/her teaching to the students' level; CMS4 - maintains a generally friendly atmosphere that will enhance learning, and; CMS5 - maintains a clean and orderly classroom. Among these indicators, CMS2 received the highest percentage of frequency counts with a weighted mean of 3.80.

The result implies that the students agree that the Basic Computer Programming professors establish appropriate control of the classroom. Full control of the classroom is important as pointed out by Postholm (2011) stating "pupils need professors as managers when they are training to assume responsibility for their own learning in self-regulated learning processes, which may be focused on academic and social development".

The personality of the Basic Computer Programming professors has the following indicators: PER1 – available, accommodating, and approachable during consultation hours; PER2 - encourages participation of students during classroom discussion and makes student feel they are "listened to"; PER3 - inspires students to develop self-confidence, self-expression, and love for learning; PER4 - shows respect for students and invites respect for himself / herself, and; PER5 - fair and impartial in dealing with students, showing no sign of favoritism, and making students feel equal in his/her eyes. Among these indicators, PER2 received the highest percentage of frequency counts with a weighted mean of 3.94.

The result of the study implies that the students agree that their professors in Basic Computer Programming encourage them to participate in class discussions and make them feel they are listened to. Participating in class discussions has positive effects on students' preparedness in class according to a study conducted by Chandran (2015).

While the teaching strategy of the Basic Computer Programming professor has the following indicators: TS1 - gives challenging tests that adequately measure the attainment of learning objectives; TS2 - prompt in checking and returning quizzes, papers, exams and similar; TS3 - gives constructive feedback and criticism of students' works and performances; TS4 - explains clearly and reminds constantly the students

of the grading procedure and standards; TS5 - makes necessary adjustments to classes based on evaluation results, such as re-teaching lesson when needed or holding make-up/remedial classes, and; TS6 - gives sufficient assignments and classroom activities. Among these indicators, TS1 and TS6 received the highest percentage of frequency counts. These indicators received a weighted mean of 4.01 and 3.84, respectively.

The result implies that the students agree that their professors in Basic Computer Programming give examinations, assignments and classroom activities that are adequate to achieve the learning objectives. Giving adequate assessment tasks to students has a positive impact on their class performance as reported by Hanover Research (2014) stating "students who receive formative assessment perform better in class on a variety of achievement indicators than their peers do."

3.2 Student Perceptions on the Characteristics of Computer Programming Students

Table 2 shows the indicators for the characteristics of computer programming students as perceived by BSIT students. These include the students' view of the course (PERC), their environmental learning conditions (ENV), their emotional stimuli EMO), social stimuli (SS), and student academic performance (SAP).

Table 2: Student Perceptions on the Characteristics of Computer Programming Students

Indicators	SD	D	U	A	SA	Weighted Mean
PERC1	3 (1.6%)	6 (3.2%)	18 (9.7%)	84 (45.4%)	74 (40.0%)	4.19
PERC2	2 (1.1%)	4 (2.2%)	8 (4.3%)	101 (54.6%)	70 (37.8%)	4.30
PERC3	3 (1.6%)	6 (3.2%)	30 (16.2%)	94 (50.8%)	52 (28.1%)	4.00
PERC4	3 (1.6%)	2 (1.1%)	24 (13.0%)	91 (49.2%)	65 (35.1%)	4.15
PERC5	3 (1.6%)	1 (.5%)	28 (15.1%)	106 (57.3%)	47 (25.4%)	4.04
PERC6	2 (1.1%)	2 (1.1%)	20 (10.8%)	67 (36.2%)	94 (50.8%)	4.34
PERC7	1 (.5%)	4 (2.2%)	39 (21.1%)	102 (55.1%)	39 (21.1%)	3.94
PERC8	3 (1.6%)	4 (2.2%)	29 (15.7%)	93 (50.3%)	56 (30.3%)	4.05
PERC9	2 (1.1%)	2 (1.1%)	19 (10.3%)	73 (39.5%)	89 (48.1%)	4.32
ENV1	13 (7.0%)	13 (7.0%)	52 (28.1%)	89 (48.1%)	18 (9.7%)	3.46
ENV2	6 (3.2%)	14 (7.6%)	49 (26.5%)	93 (50.3%)	23 (12.4%)	4.14

ENV3	4 (2.2%)	4 (2.2%)	36 (19.5%)	105 (56.8%)	36 (19.5%)	3.89
ENV4	7 (3.8%)	9 (4.9%)	60 (32.4%)	90 (48.6%)	19 (10.3%)	3.57
ENV5	25 (13.5%)	22 (11.9%)	55 (29.7%)	65 (35.1%)	18 (9.7%)	3.16
EMO1	5 (2.7%)	2 (1.1%)	22 (11.9%)	99 (53.5%)	57 (30.8%)	4.08
EMO2	3 (1.6%)	3 (1.6%)	17 (9.2%)	95 (51.4%)	67 (36.2%)	4.21
EMO3	3 (1.6%)	3 (1.6%)	31 (16.8%)	101 (54.6%)	47 (25.4%)	4.00
EMO4	2 (1.1%)	4 (2.2%)	34 (18.4%)	101 (54.6%)	44 (23.8%)	3.98
EMO5	3 (1.6%)	5 (2.7%)	18 (9.7%)	72 (38.9%)	87 (47.0%)	4.76
EMO6	3 (1.6%)	5 (2.7%)	18 (9.7%)	91 (49.2%)	67 (36.8%)	4.14
SS1	4 (2.2%)	6 (3.2%)	29 (15.7%)	91 (49.2%)	55 (29.7%)	4.01
SS2	2 (1.1%)	4 (2.2%)	25 (13.5%)	115 (62.2%)	39 (21.1%)	4.00
SS3	9 (4.9%)	12 (6.5%)	54 (29.2%)	84 (45.4%)	26 (14.1%)	3.57
SS4	2 (1.1%)	5 (2.7%)	34 (18.4%)	104 (56.2%)	40 (21.6%)	3.94
SAP1	8 (4.3%)	13 (7.0%)	91 (49.2%)	63 (34.1%)	10 (5.4%)	3.29
SAP2	3 (1.6%)	11 (5.9%)	62 (33.5%)	94 (50.8%)	15 (8.1%)	3.58
SAP3	6 (3.2%)	8 (4.3%)	32 (17.3%)	96 (51.9%)	43 (23.2%)	3.91
SAP4	4 (2.2%)	7 (3.8%)	34 (18.4%)	96 (51.9%)	44 (23.8%)	3.88
SAP5	3 (1.6%)	7 (3.8%)	55 (29.7%)	92 (49.7%)	28 (15.1%)	3.73
SAP6	5 (2.7%)	8 (4.3%)	73 (39.5%)	74 (40.0%)	25 (13.5%)	3.57

The perceptions regarding the Basic Computer Programming course have the following indicators: PERC1 – I consider computer programming an interesting course; PERC2 - Computer programming helps me think analytically; PERC3 - I want to solve computer programming exercises personally; PERC4 - I want to solve computer programming exercises in groups; PERC5 - I think that computer programming is

useful in any undertaking; PERC6 - I am proud if I can solve computer programming exercises; PERC7 - I feel comfortable in my computer programming lectures; PERC8 - Spending time solving computer programming exercises is worthwhile, and; PERC9 - I can apply computer programming skills in my future career. Among these indicators, PERC5 received the highest percentage of frequency counts with a weighted mean of 4.04.

The result implies that the students agree that the Basic Computer Programming course is useful in any undertaking and helps them think analytically. Being able to understand the relevance of the course can help students to become "engaged, motivated and self-regulated learners" (Roberson, 2013).

The environmental learning conditions have the following indicators: ENV1 – there is an adequate number of computers in the laboratory; ENV2 – the specification of the computers in the laboratory is sufficient for laboratory exercises; ENV3 - the classrooms are properly lighted; ENV4 - the class sizes are adequate for educational setting, and; ENV5 - the classrooms are well-ventilated. Among these indicators, ENV3 received the highest percentage of frequency counts with a weighted mean of 3.89.

The result implies that the students agree that the classrooms are properly lighted. According to Samani and Samani (2012), properly lighted classrooms can increase students' performance. However, the study did not consider the different types of lighting. Different types of lighting have different effects on learners. According to a study conducted by Choi and Suk (2016), 6500 K dynamic lighting is more appropriate for student learning especially during intensive academic activities compared to the 5000 K standard lighting which may be applied for reading activities.

Another notable result of the study is indicated by ENV1 and ENV5 with a weighted mean of 3.46 and 3.16, respectively. It implies that the students are undecided regarding the adequateness of the number of computers in the laboratory and ventilation of the classrooms.

The availability of computer laboratories can affect the performance of students in school. This has been proven by the study of Usen (2016) which concluded that students who have adequate access to school facilities such as library and laboratories perform better in school. Aside from availability of facilities, classroom ventilation also affects the performance of the students. A well-ventilated classroom can significantly improve the academic performance of the students as pointed out by the research conducted by Shaughnessy and Shaughnessy (2015).

The emotional stimuli have the following indicators: EMO1 – I study better to realize my parents' expectations; EMO2 – I am driven by my desire to finish my studies; EMO3 - I learn lessons and prove that exercises can be solved; EMO4 - I am challenged by difficult lessons rather than being discouraged; EMO5 - I study better to succeed because success is the ultimate goal in life, and; EMO6 - I learn better when everybody around supports me. Among these indicators, EMO3 and EMO4 received the highest percentage of frequency counts with a weighted mean of 4.00 and 3.98, respectively.

The result implies that the students agree that they are challenged by difficult lessons and they can prove that computer programming exercises can be solved. The result emphasizes that the students have high self-esteem, and they believe that they have the skill to overcome the difficulties of the course. According to the study conducted by Arshad, Zaidi, and Mahmood (2015), there is a significant relationship between

self-esteem and academic performance. It means that students with high self-esteem can perform better in school. Additionally, it should be noted that EMO5 received a weighted mean of 4.76. It implies that the students strongly agree that studying is crucial to become successful in life.

The social stimuli have the following indicators: SS1 – I learn better when we have group collaboration; SS2 – I appreciate the course when I perceive that it is socially relevant; SS3 - I appreciate schooling because my friends are enrolled in the same course, and; SS4 - My effort is recognized by my classmates, instructors and parents. Among these indicators, SS2 received the highest percentage of frequency counts. In addition, SS2 received a weighted mean of 4.00. It implies that the students agree that the course can be appreciated if it is socially relevant.

Whereas, the academic performance of the students in the Basic Computer Programming course has the following indicators: SAP1 – My quizzes in Basic Programming course are high; SAP2 – I usually able to solve programming exercises according to the instructions; SAP3 - I was able to submit all my assignments; SAP4 - I was able to properly comply with required projects in programming; SAP5 - I was able to participate well during class discussions, and; SAP6 - I was able to get high scores in major exams. Among these indicators, SAP3 and SAP4 received the highest percentage of frequency counts with a weighted mean of 3.91 and 3.88, respectively. It implies that the students agree that they were able to comply with the required assignments and projects of the course. However, SAP1 received a weighted mean of 3.29. It implies that the students are undecided regarding their performance in quizzes.

The results indicate that the students are confident that they will get better grades in assignments, projects and major exams compared to quizzes. Between assignments, projects and major exams, the similarity is that students will have more time to prepare for these tasks. Assignments and projects are activities which can be accomplished at home giving the students more time to study. Major exams are scheduled. Hence, students can study ahead of time. On the other hand, quizzes are sometimes unannounced which gives the students little or no time to study. According to Ukpong and George (2013), “students with long study hours perform better than those students with short study time”.

3.3 Factors that Relate to Student Performance

Table 3 presents the factors that relate to student performance.

Table 3: Factors that relate to student performance

Indicators		SAP1	SAP2	SAP3	SAP4	SAP5	SAP6
MC1	Pearson Correlation	.245	.370	.403	.477	.316	.312
	Sig. (2-tailed)	.001	.000	.000	.000	.000	.000
MC2	Pearson Correlation	.249	.391	.378	.338	.276	.364
	Sig. (2-tailed)	.001	.000	.000	.000	.000	.000
MC3	Pearson Correlation	.188	.330	.341	.316	.273	.261
	Sig. (2-tailed)	.010	.000	.000	.000	.000	.000
MC4	Pearson Correlation	.227	.351	.304	.232	.247	.315

	Sig. (2-tailed)	.002	.000	.000	.001	.001	.000
MC5	Pearson Correlation	.109	.198	.270	.306	.210	.117
	Sig. (2-tailed)	.141	.007	.000	.000	.004	.112
CS1	Pearson Correlation	.262	.350	.291	.350	.262	.257
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
CS2	Pearson Correlation	.306	.388	.308	.332	.333	.313
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
CS3	Pearson Correlation	.189	.310	.248	.400	.286	.188
	Sig. (2-tailed)	.010	.000	.001	.000	.000	.010
CS4	Pearson Correlation	.212	.275	.193	.313	.222	.292
	Sig. (2-tailed)	.004	.000	.008	.000	.002	.000
CS5	Pearson Correlation	.305	.289	.326	.360	.278	.330
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
CMS1	Pearson Correlation	.220	.204	.232	.270	.219	.183
	Sig. (2-tailed)	.003	.005	.001	.000	.003	.013
CMS2	Pearson Correlation	.381	.421	.198	.298	.220	.315
	Sig. (2-tailed)	.000	.000	.007	.000	.003	.000
CMS3	Pearson Correlation	.343	.505	.253	.328	.253	.368
	Sig. (2-tailed)	.000	.000	.001	.000	.001	.000
CMS4	Pearson Correlation	.254	.343	.249	.330	.274	.295
	Sig. (2-tailed)	.000	.000	.001	.000	.000	.000
CMS5	Pearson Correlation	.179	.297	.344	.434	.284	.338
	Sig. (2-tailed)	.015	.000	.000	.000	.000	.000
PER1	Pearson Correlation	.322	.340	.419	.490	.384	.306
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
PER2	Pearson Correlation	.251	.359	.399	.462	.270	.306
	Sig. (2-tailed)	.001	.000	.000	.000	.000	.000
PER3	Pearson Correlation	.285	.423	.396	.446	.329	.314
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
PER4	Pearson Correlation	.380	.411	.425	.427	.319	.297
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
PER5	Pearson Correlation	.291	.338	.313	.365	.273	.312

	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
TS1	Pearson Correlation	.251	.397	.271	.324	.244	.299
	Sig. (2-tailed)	.001	.000	.000	.000	.001	.000
TS2	Pearson Correlation	.251	.358	.245	.313	.206	.267
	Sig. (2-tailed)	.001	.000	.001	.000	.005	.000
TS3	Pearson Correlation	.269	.322	.277	.354	.290	.247
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.001
TS4	Pearson Correlation	.342	.365	.380	.365	.319	.343
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
TS5	Pearson Correlation	.332	.355	.287	.354	.293	.281
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
TS6	Pearson Correlation	.189	.315	.360	.399	.351	.291
	Sig. (2-tailed)	.010	.000	.000	.000	.000	.000
PERC1	Pearson Correlation	.319	.341	.275	.354	.280	.288
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
PERC2	Pearson Correlation	.331	.376	.374	.424	.359	.401
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
PERC3	Pearson Correlation	.330	.408	.332	.308	.274	.310
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
PERC4	Pearson Correlation	.213	.203	.389	.396	.283	.246
	Sig. (2-tailed)	.004	.006	.000	.000	.000	.001
PERC5	Pearson Correlation	.336	.366	.317	.399	.263	.306
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
PERC6	Pearson Correlation	.307	.412	.410	.416	.366	.359
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
PERC7	Pearson Correlation	.277	.317	.312	.292	.434	.418
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
PERC8	Pearson Correlation	.263	.373	.382	.417	.410	.472
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
PERC9	Pearson Correlation	.256	.455	.405	.506	.370	.327
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
ENV1	Pearson Correlation	.178	.316	.261	.262	.225	.165

	Sig. (2-tailed)	.015	.000	.000	.000	.002	.025
ENV2	Pearson Correlation	.182	.335	.327	.331	.264	.280
	Sig. (2-tailed)	.013	.000	.000	.000	.000	.000
ENV3	Pearson Correlation	.251	.317	.357	.430	.265	.301
	Sig. (2-tailed)	.001	.000	.000	.000	.000	.000
ENV4	Pearson Correlation	.199	.228	.405	.381	.347	.259
	Sig. (2-tailed)	.007	.002	.000	.000	.000	.000
ENV5	Pearson Correlation	.216	.247	.217	.241	.308	.303
	Sig. (2-tailed)	.003	.001	.003	.001	.000	.000
EMO1	Pearson Correlation	.322	.389	.494	.549	.473	.404
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
EMO2	Pearson Correlation	.337	.430	.541	.547	.469	.374
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
EMO3	Pearson Correlation	.279	.409	.464	.546	.499	.439
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
EMO4	Pearson Correlation	.314	.461	.410	.484	.474	.376
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
EMO5	Pearson Correlation	.217	.333	.481	.525	.362	.260
	Sig. (2-tailed)	.003	.000	.000	.000	.000	.000
EMO6	Pearson Correlation	.250	.304	.485	.491	.406	.260
	Sig. (2-tailed)	.001	.000	.000	.000	.000	.000
SS1	Pearson Correlation	.148	.185	.419	.451	.310	.111
	Sig. (2-tailed)	.044	.012	.000	.000	.000	.132
SS2	Pearson Correlation	.246	.311	.458	.477	.426	.323
	Sig. (2-tailed)	.001	.000	.000	.000	.000	.000
SS3	Pearson Correlation	.335	.322	.187	.243	.329	.339
	Sig. (2-tailed)	.000	.000	.011	.001	.000	.000
SS4	Pearson Correlation	.288	.298	.367	.400	.283	.205
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.005

Results reveal that the correlation between the indicators for the professor's mastery of the course (MC1 to MC5) with the indicators for the academic performance of the students (SAP1 to SAP6). MC1 to MC4 are in significant correlation with all the indicators for the academic performance of the students since p-value $< \alpha < 0.05$. On the other hand, MC5 is in significant correlation with the indicators SAP2 to SAP6

but not with SAP1. It implies that the performance of the students in quizzes has no association with the ability of the professors to link the Basic Computer Programming course with other courses or disciplines

The correlation between the indicators for the professor's communication skills (CS1 to CS5) with the indicators for the academic performance of the students (SAP1 to SAP6). All indicators for the professor's communication skills are in significant correlation with all the indicators for the academic performance of the students since p-value $< \alpha < 0.05$. The result implies that the communication skills of the Basic Computer Programming professors are associated with the academic performance of the students. This supports the findings of a previous study conducted by Sabitu and Nuradeen (2010) stating that there is a high and positive relationship between the communication skills of the professors and the academic performance of the students. On the other hand, the result is contrary to a similar study conducted by Garcia and Al-Safadi (2013) concluding that there is no significant relationship between communication skills of the professors and academic performance of the students.

The correlation between the indicators for the professor's classroom management skills (CMS1 to CMS5) with the indicators for the academic performance of the students (SAP1 to SAP6). All indicators for the professor's classroom management skills are in significant correlation with all the indicators for the academic performance of the students since p-value $< \alpha < 0.05$.The result implies that the performance of the students is associated with the classroom management skills of the Basic Computer Programming professors. This supports the result of the previous study conducted by Sowell (2013) stating that there is a high positive correlation between classroom management skills of the professors and the academic performance of the students. Again, the result is contrary to a similar study conducted by Garcia and Al-Safadi (2013) concluding that classroom management skills of the professor do not correlate with the academic performance of the students.

The correlation between the indicators for the professor's personality (PER1 to PER5) with the indicators for the academic performance of the students (SAP1 to SAP6). All indicators for the professor's personality are in significant correlation with all the indicators for the academic performance of the students since p-value $< \alpha < 0.05$. The result implies that the personality of the Basic Computer Programming professors is associated with the academic performance of the students. This supports the findings of a previous study conducted by Muzenda (2013) stating that there is a high positive correlation between the personality of the professors and the academic performance of the students.

The correlation between the indicators for the professor's teaching strategy (TS1 to TS6) with the indicators for the academic performance of the students (SAP1 to SAP6). All indicators for the professor's teaching strategy are in significant correlation with all the indicators for the academic performance of the students since p-value $< \alpha < 0.05$. The result implies that the teaching strategy of the Basic Computer Programming professors is associated with the academic performance of the students. Again, this supports the findings of a previous study conducted by Muzenda (2013) stating that there is a high positive correlation between the teaching strategies of the professors and the academic performance of the students.

The correlation between the indicators for students' perception of the course (PERC1 to PERC9) with the indicators for their academic performance (SAP1 to SAP6). All indicators for the students' perception of the course are in significant correlation with all the indicators for the academic performance of the students since p-value $< \alpha < 0.05$. The result implies that the student's perception of the course is associated with

their academic performance. This supports the result of the study conducted by Zainal et al. (2012) concluding that "students who have positive pre-course perception towards the programming course and driven by extrinsic motivation are more likely to achieve good grades and programming skills. Students driven by intrinsic motivation are more likely to show positive behaviour and attitudes to achieve excellent results compared to the other types of motivation."

The correlation between the indicators for environmental learning condition (ENV1 to ENV5) with the indicators for the academic performance of the students (SAP1 to SAP6). All indicators for environmental learning condition are in significant correlation with all the indicators for the academic performance of the students since p-value $< \alpha < 0.05$. The result implies that the environmental learning condition is associated with the academic performance of the students in Basic Computer Programming. This supports the findings of a previous study conducted by Murillo and Garrido (2012) stating that there is a high positive correlation between the environmental learning condition and the academic performance of the students.

The correlation between the indicators for students' emotional stimuli (EMO1 to EMO6) with the indicators for their academic performance (SAP1 to SAP6). All indicators for emotional stimuli are in significant correlation with all the indicators for the academic performance of the students since p-value $< \alpha < 0.05$. The result implies that the emotional stimuli of the students are associated with their academic performance in Basic Computer Programming. The result supports the study of Garcia and Al-Safadi (2013) concluding "there is a significant relationship between students' emotional stimuli and their academic performance in the programming course".

The correlation between the indicators for students' social stimuli (SS1 to SS4) with the indicators for their academic performance (SAP1 to SAP6). SS2 to SS4 are in significant correlation with all the indicators for the academic performance of the students since p-value $< \alpha < 0.05$. On the other hand, SS1 is in significant correlation with the indicators SAP1 to SAP5 but not with SAP6. The result implies that studying in groups does not mean the students will get high scores in major exams. The result is consistent with a similar study conducted by Garcia and Al-Safadi (2013) and with other studies conducted by various researchers in non-IT courses (Rybczynski & Schussler, 2011; Devoe et al., 2007).

3.4 Measures to Enhance the Factors Affecting the Academic Performance of the BSIT Students

The following are the measures to be conducted to enhance the factors affecting the academic performance of the BSIT students in Basic Computer Programming course:

1. Hands-on Programming Workshop. To enhance the mastery of the course of faculty members, the researchers may propose to the Dean of the College of Computer Studies to design a training manual with the help of the BSIT Program Chair. The training manual must consider all the programming topics necessary for a faculty member to teach Basic Computer Programming. Based on the training manual, the researchers may recommend implementing in-house hands-on programming workshop. Experienced computer programmers may be invited to facilitate the workshop and to share their programming techniques and practices that are relevant in the industry. The hands-on programming workshop may be conducted during weekends and/or summer vacation depending on the availability of the faculty members. At the end of every lesson, faculty members may solve computer programming case studies for learning assessment purposes.

2. Workshop on Soft Skills. To enhance the communication skills and personality of the Basic Computer Programming professors, the researchers may recommend to the Dean of the College of Computer Studies with the help of College of Arts and Sciences to conduct workshops on communication and personality development. Workshop on soft skills will be conducted after completing the hands-on programming workshop.
3. Workshop on Teaching Strategies and Classroom Management. To enhance the teaching strategies and classroom management skills of the Basic Computer Programming professors, the researchers may recommend to the Dean of the College of Computer Studies with the help of College of Education to conduct workshops on effective teaching strategies and classroom management. The workshop may be implemented simultaneously with the workshop on soft skills.
4. Policy Review on Hiring New Faculty Members. The researchers may also recommend to the HRMO Director to review the policies and guidelines in hiring new faculty members aligned to the needs of the colleges. For the College of Computer Studies, the new guidelines and policies must be geared towards hiring faculty members that are not only skilled in computer programming but also knowledgeable with various teaching strategies, has skills in classroom management and communication, and has pleasing personality.
5. Class Advising. To enhance the students' perception of the course, emotional stimuli, and social stimuli, the researchers may recommend to the Vice President for Academic Affairs to push through with the plan of assigning academic advising load to full-time faculty members as part of the quasi-period every semester. With this, a full-time faculty member may be assigned to a section and must allot at least 10 hours of his/her quasi period per week to perform academic counselling. This may enable the university to easily monitor the academic performance of the students in their enrolled courses and lessen the drop-out rate.
6. Review the ventilation system of the university buildings. The researchers may submit recommendations to the University Council (UC) requesting the Director of the Property Management Services (PMS) to review the ventilation system of the university buildings. The findings of the PMS Director and/or his committee can be the basis for restructuring the university buildings (if needed) and/or requesting for additional electric fans and air conditioners.
7. Improve the computer laboratories. The researchers, in coordination with the Director of the Information Technology (IT) Department, may submit recommendations to the University Council (UC) to increase the number of computers in the computer laboratories appropriate to the number of students using the said facilities. The proposal should be submitted based on the existing records of the IT Department regarding the number of times they fix each computer per week. These records of the IT Department can support the claim that there is a need to purchase new computers.
8. Review the policy on class size. The researchers may recommend to the Vice President for Academic Affairs to review the policy on class size. The proposal for the new policy may be discussed in the University Council for approval of the Board of Regents. The new class size policy should be based on the ALCUCOA standards.

4. Conclusions

Based on the findings of the study, the following conclusions had been drawn:

Basic Computer Programming professors must have comprehensive, accurate and up-to-date knowledge of the course; must be able to encourage students to participate in classroom discussions and think independently; must be able to control the classroom appropriately; and can give challenging assessment activities.

Basic Computer Programming students perceive that the course is useful in any undertaking and can be appreciated if it is socially relevant; programming lessons are challenging, and exercises can be solved; and the classrooms are properly lighted.

All the stated factors, both student-related and professor-related are directly related to the academic performance of the students in Basic Computer Programming course. While the relationships may not be categorized as strong, it could be concluded that enhancing these factors is necessary.

The relationship between the student-related and professor-related factors and the academic performance of the students in Basic Computer Programming course may not be categorized as strong but enhancing these factors could directly enhance the students' various academic performance metrics, except for group studying.

The study drew its conclusion from the population of BSIT students who were the most recent takers of the Basic Programming Course. While the factors stated are correlated with the academic performance metrics of the students, the same factors may yield greater levels of relationships if the respondents could be drawn from students taking up higher programming courses. Enhancing both the professor-related and student-related factors could improve academic performance of the students. In line with this, the following are the recommendation of the researchers: (i) Implement the action plan proposed by the researchers to enhance the professor-related and student-related factors that affect the academic performance of the BSIT students in Basic Computer Programming course; (ii) Conduct a follow-up study to verify if the professor-related and student-related factors has been enhanced after implementing the plan. (iii) Conduct a similar study but this time the study should test other variables such as type of school attended before taking the BSIT program (private or public), scholastic performance on Mathematics and English during high school, mental maturity of the student, family income, sex of the student and studying habits.

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