Motivation and Self-Efficacy in Java Programming among B.S. Information Technology and B.S. Information Systems Students

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Abstract

Motivation and self-efficacy play crucial roles in achieving goals and determining one's capability to succeed. This study explored the relationship between motivation and self-efficacy through a descriptive-correlational approach, and 260 participants were selected using proportionate stratified random sampling from an institution in the Philippines. The MSLQ was utilized to assess participants' motivation levels, while the Java Programming Self-Efficacy Scale measured their self-efficacy in Java Programming. Data analysis based on sex, chronological age, and year level revealed no significant differences in motivation, except for variations in course. Self-efficacy levels did not exhibit notable distinctions related to sex, chronological age, and course. A statistically significant difference was observed across different year levels. The findings demonstrated a significant correlation between motivation and self-efficacy. Most participants exhibited high motivation levels indicating better academic performance; however, high test anxiety insinuated more worrying during the examination. First-year students had lower self-efficacy in Java Programming than higher years, implying that self-efficacy tends to improve as the year level advances. It highlights the importance of addressing students' difficulties and underperformance in Java Programming and preparing them to navigate complex and intimidating situations within the program. By enhancing self-efficacy and maintaining motivation, students can better adapt to new challenges and succeed in their academic pursuits.

Keywords: self-efficacy, Java Programming, motivation

Introduction

The Commission on Higher Education (CHED), through the CHED Memorandum Order (CMO) No. 25 series of 2015 on the "Revised Policies, Standards and Guidelines for Bachelor of Science in Computer Science (BSCS), Bachelor of Science in Information Systems (BSIS), and Bachelor of Science in Information Technology (BSIT) Programs in the Philippines," has stated in its Article IV Section 7, most definitely on "Design and Development of Solutions." As stipulated, designing and developing a computing solution utilizing an object-oriented approach is one of the attributes expected of the students and graduates of BSIS and BSIT programs. Relative to Article IV Section 7 of CMO No. 25 series of 2015, the presented competence is plausible by setting a good foundation on programming subjects or courses, namely Computer Programming 1 and Computer Programming 2, both of which are about Java Programming. In order to identify the foundation of students' programming subjects, it was necessary to conduct studies related to this context, such as the variables of motivation and self-efficacy in computer-related courses.

Learners have various perceptions of computer programming, particularly Java programming. Self-efficacy encompasses a person's view of their competence, whereas motivation illustrates goal-directed behaviors. As learning to generate a computer program was regarded as a challenging academic undertaking, in comparison with other courses or undergraduate programs, high drop-out, and academic failure rates were prevalent [13]. Literature noted that there were learners experiencing difficulties in computer programming courses and needing to comprehend the course content, intended learning outcomes, and algorithmic structure, primarily because of low or poor self-efficacy and motivation[9], [13].

The literature also mentioned that the demand for college graduates with substantial proficiency in computer-related abilities was rapidly rising around the globe [13]. Market research disclosed that compared to businesses that were more focused on hardware, investment in software-related businesses was dramatically rising, which was seen as a sign that computer programming was becoming more and more important.

Another study disclosed that men had higher self-efficacy than women. The self-efficacy variation of 11.8% was supported by prior computer-related experience. Computer skills and selfefficacy scores were used to calculate a correlation coefficient that was statistically significant. The learning process in computerrelated skills was explored from professional software engineering and pedagogical perspectives—the professional software engineering perspective undertaken substantial projects demanding exceptional skill and coordinated teamwork [2].

In contrast, the pedagogical viewpoint concentrated on developing individual capacities for programming in a clear and constrained context [12], [13]. The assessments of computer language, programming techniques, and programming instruction have been grounded on a number of psychological factors [8], [13]. Apart from programming itself, the psychology of programming necessitates higher-order cognitive and affective processes that involve strategic planning, formulating, addressing issues, and conceptualization. Students perceived that learning "programming" required higher-order cognitive abilities. The perception was that programming classes were among the most difficult to complete [9], [13]. A number of variables influenced the success of the teaching-learning process, but it was broadly recognized that attitude and self-efficacy were the variables with the greatest impact [1], [8], [13].

In teaching, considering the dynamics of elements of motivation and self-efficacy of students in a particular course could be of assistance in understanding and guiding these students to strengthen their confidence in their innate competence and goaldirected behaviors. Studies on motivation and self-efficacy probed more on wellness and not on students' welfare. Relevant studies were mainly in the late 1990s and early 2000s. So far, there has never been any attempt to revisit and re-examine these two constructs relative to Java Programming in the local setting.

The result of this study could materialize the gap in the literature and may be valuable in the institution, particularly for those students enrolled in computer-related programs. In the innermost point of the study, this could be a powerful tool to circumvent the students' failing or underperforming in Java programming. This study could prepare them (students) to adapt to new situations in the most complex and intimidating circumstances in the aforementioned course. This undertaking may be an encouragement to produce more competent programmers from these two programs, Bachelor of Science in Information Technology and Bachelor of Science in Information Systems.

With these, the study hoped for a proposal intended for computer literacy-related community extension projects, a manuscript on motivation and self-efficacy in Java Programming, and a vision of designing appropriate and reasonable recommendations for all concerned. The study intended to ascertain the relationship between motivation and self-efficacy in Java programming among students enrolled in Bachelor of Science in Information Technology and Bachelor of Science in Information Systems in a certain institution in Negros Occidental for the academic year 2019-2020. Specifically, this study sought to answer the following questions: (1) What is the demographic profile of the students in terms of sex, chronological age, course, and year level? (2) What is the students' level of motivation, including the intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy for learning and performance, and test anxiety? (3) What is the students' level of self-efficacy in Java Programming? (4) What is the students' level of motivation when grouped according to sex, chronological age, course, and year level? (5) What is the students' level of self-efficacy in Java programming when grouped according to sex, chronological age, course, and year level? (6) Is there a significant difference between the students' level of motivation when grouped according to sex, chronological age, course, and year level? (7) Is there a significant difference between the students' level of self-efficacy when grouped according to sex, chronological age, course, and year level? (8) Is there a significant relationship between students' level of motivation and level of self-efficacy in Java programming?

In order to figure out how and to what degree an individual will become engaged in an undertaking and its results, this study was based on the Self-Efficacy Theory (SET). Self-efficacy was initially described by Albert Bandura in 1977 as the conviction that one can exert control over their behavior or the circumstances that affect their life. Self-efficacy is considered a personal evaluation of one's capacity to effectively carry out the actions necessary to address various possible circumstances [2]. As noted by SET, people who have a high sense of self-efficacy often believe they can excel at a task and place a higher importance on it. Individuals typically selfregulate to meet predetermined goals or anticipate how they will perform in upcoming tasks. To achieve this, they first select a goal and then alter their approach and level of effort [3]. Higher selfefficacy has several advantages, one of which is that people start to push themselves by raising the bar on the goals they set for themselves. They are even more likely to achieve these goals since they already have confidence in their abilities to succeed.

On the contrary, people with a lower sense of self-efficacy are more prone to having reservations about their abilities and ability to accomplish their goals. This situation results in failure to exert the necessary effort to accomplish a certain goal and, eventually, failure to engage in the intended behavior. Self-efficacy controls how individuals perceive, process, drive, and act when faced with a challenging or unfamiliar activity. Therefore, knowing an individual's self-efficacy and motivation could assist us in knowing how much of a role they played in a task and how it turned out.

The notion of motivation and self-efficacy has been widely used to assess students' performance and progress in a particular course. For instance, as stated in various literature [1], [8], [13], attitude and self-efficacy were the most significant factors affecting the success of the teaching-learning process. It was also evident that there were learners experiencing difficulties in computer programming courses and hardly understood the algorithmic structures and contents of the course mainly because of low selfefficacy and low level of motivation [9], [13]. Likewise, studies have shown that students' objectives, levels of motivation, and academic success are influenced by their ideas about their capacity to learn. At the same time, the success of the students is also influenced by the teacher's own perceptions of their own teaching abilities. By creating an environment that fosters curiosity and allows for experiential mastery, parents and significant others can increase their children's sense of self-efficacy [4].

For students, the administration, program chairpersons, academe, and future researchers, this study will be of great relevance. Students may earn insights to be more mindful of what encourages them to learn a particular course and their self-efficacy toward learning Java Programming. It may give them the perceptiveness of their present situation and yield essential steps to strengthen their good study habits. This study tends to assist the development of training, workshops, programs, and talks to help the students learn and practice Java Programming. Further, this study may provide data for the administrators and program chairpersons in creating holistic development plans to optimize the institution's targeted goals per the CMO No. 25, series of 2015. The result of this study may play an instrumental role in educating students about the potential implications of their motivation and selfefficacy level toward learning. A school-based program that could develop the students' competencies, particularly in Java Programming. Additionally, this study could be a great help in designing a comprehensive curriculum for the academe that could provide the students with the fundamentals and career-based competency in Java Programming. Lastly, this study may intend other linkage possibilities in exploring motivation and self-efficacy stipulations. Also, the findings of the study can open a door for other researchers who are fascinated by the dynamics of these two constructs.

The following terms were defined operationally to understand the stipulations presented in this study. The B.S. Information Systems and B.S. Information Technology Students refer to the potential participants of the study. Chronological age, which was divided into age groups of 18 to 23 and 24 to 29, represents the duration of the participant's existence. The course pertains to the corresponding program that the participants chose to enroll in. Java Programming refers to the subject or course being assessed in the study. It comprises Computer Programming 1 and 2 and is usually given at the first-year level (First Semester and Second Semester). Motivation refers to the goal-directed behavior of the participants in a particular course. "Value, expectancy, and affective" are the three elements of motivation level, and they have corresponding scales. Extrinsic goal orientation, intrinsic goal orientation, and task value are value-based motivational factors. Control over learning beliefs and self-efficacy for learning and performance are expectancy components of motivation. Test anxiety is a part of motivation's affective component. Intrinsic goal orientation on the MSLQ measures how much the learners believe they are engaging in an activity out of the challenge, inquisitive, or competence. Engagement in the course of study becomes purposeful rather than simply an instrument to an end when a learner pursues it with intrinsic goal orientation. The degree to which a learner thinks someone is participating in an activity for external variables, such as grades, perks, achievements, other person's impressions of oneself, and being competitive, is referred to as extrinsic goal orientation. An academic endeavor is an instrument with a purpose when one has a high extrinsic goal orientation. The learner's main reservations are about things that are not immediately involved with doing the task (such as grades, incentives, and the comparison of one's performance to other people). Task value is related to how interesting, significant, and useful learners think the course material is. Control of learning beliefs pertains to the learner's conviction that their learning efforts will yield fruitful results. Regarding performance expectations, self-efficacy for learning and performance relates explicitly to task performance and the self-evaluation of one's ability to effectively perform a task, which includes assessments of one's capacity to complete the activity and confidence in one's capacity to do so. Test anxiety is the term used to describe the learners' unfavorable feelings and thought patterns that interfere with their performance or the affective and physiological aspects of anxiety. Self-efficacy denotes the perception of participants on their competence in a specific field. Sex indicates the participant's organic sex, categorized as male or female. Year level marks the year of study in which the participants are enrolled and classified as the first-year level, second-year level, third-year level, and fourth-year level.

Methods

A descriptive-correlational research design was employed to ascertain the relationship between motivation, self-efficacy, and other data relevant to the study. A total of 260 students of a certain institution in Negros Occidental, Philippines, as of August 31, 2019, were the participants of this study. These participants were randomly selected under these programs, Bachelor of Science in Information Technology (BSIT) and Bachelor of Science in Information Systems (BSIS), through a proportionate stratified random sampling technique. The names of the students were undisclosed to protect the participants' identities.

To measure the level of motivation of the participants, the instrument used was the Motivated Strategies for Learning Questionnaire (MSLQ). It is a standardized instrument formulated by Paul R. Pintrich, David A. F. Smith, Teresa Garcia, and Wilbert J. McKeachie in 1991 for evaluating college learners' motivation orientations and their use of various learning strategies for college courses. The MSLQ has a 31-item for motivation section, which employs a Likert-type scale with seven (7) responses from 1 (not at all true of me) to 7(very true of me), which requires the participant to evaluate their goal-directed behaviors toward a particular course [16]. The MSLQ disclosed an internal consistency with Cronbach alpha values ranging from 0.62 to 0.90 and a reliability coefficient of 0.80 for motivation scales [6].

In scoring the MSLQ, scales are created by taking the mean of the components that make up each scale, and learners rate themselves on a seven-point Likert scale from "not at all true of me" to "very true of me" to determine their score. For instance, summing up the four items and taking the average would be used to determine a person's intrinsic goal orientation score. Reversecoded elements identified as "reversed" must be reflected before scale development. Before calculating a person's score, the ratings and these negatively worded items must be reversed. An individual who opted for one (1) for an item now obtains a score of seven (7), and so on, if the item must be reversed. As a result, a one (1) turns into a seven (7), a two (2) into a six (6), a three (3) into a five (5), a four (4) into a five (5), a five (5) into a three (3), a six (6) into a two (2), and a seven (7) into a one (1). Representing a reverse-coded item is as simple as deducting the original score from eight. For instance, if the negatively phrased item's original score were 2, one would calculate 8 - 2 = 6, where 6 is the score for the positively worded version of the same question. Only the test anxiety scale deviates from this rule, where a high score indicates more significant or greater worry [16].

The Java Programming Self-Efficacy Scale (JPSES) was utilized to gauge the participants' level of self-efficacy in Java programming. In 2009, Petek Askar and David Davenport developed a standardized tool based on the Computer Programming Self-Efficacy Scale of Ramalingam & Wiedenbeck (1998). The 32-item JPSES allows participants to rate their level of self-efficacy in performing tasks related to Java programming on a Likert-type scale from 1 (not at all confident) to 7 (completely confident). The instrument has a reliability coefficient of 0.99 across all 326 students [2], [10]. The scale yields a score between 32 and 224 points, with 32 being the lowest and 224 being the most possible. This means that the levels that correspond to the results of the sub-scales can be described as follows: Low Level (32-96), Medium Level (97-160), and High Level (161-224) [2], [10].

The institution's reported Official Students List for BSIS and BSIT as of August 31, 2019, served as another source of data. The utmost confidentiality was maintained with regard to all identifiers.

Before the data gathering, the researchers conducted an orientation and administered the Informed Consent Form (ICF) to the participants. The participants were asked for their consent and availability to administer the survey questionnaires. The administration period lasted for one month. After that, data were scored, coded, and interpreted. An expert then used statistical methods to assess the data. The quantitative data obtained by administering the MSLQ and JPSES was analyzed and contrasted.

The main concern of this study was to ascertain whether selfefficacy and motivation among BSIS and BSIT students had a significant relationship. SPSS (Statistical Package for the Social Sciences) software was used to process the statistical computation. In order to achieve the objectives of the study, appropriate statistical tools were applied. When participants were divided into groups based on their sex, chronological age, course, and year level, the motivation and selfefficacy profiles for each group were calculated using the frequency distribution and percentage. The Independent-Samples T-Test was used to determine the significant difference between the level of motivation and level of self-efficacy when grouped according to sex, chronological age, and course. In contrast, a Oneway Analysis of Variance (ANOVA) was used to determine the significant difference in motivation and self-efficacy in terms of year level. Finally, the Pearson correlation coefficient was utilized to distinguish the significant relationship between the two constructs, chiefly motivation and self-efficacy.

Results and Discussions

As shown in Table 1, roughly sixty percent (51.9%) of the participants at the time of the survey were males, while forty-one percent (48.1%) were females. The mean age was 20.55. The youngest was 18, while the eldest was 29 years old. The highest percentage belonged to the age group of 18-23, with nearly ninety-one percent (90.8%). Nine percent (9.2%) were aged 24-29. Thus, most participants were aged 18-23. Forty-two percent (42.3%) enrolled in BSIS, and roughly fifty-eight percent (57.7%) enrolled in BSIT. Hence, the majority of the participants enrolled in BSIT. Thirty-nine percent (39.2%) were first-year level, about thirty-one percent (30.8%) were second-year level, and fifteen percent (15.0%) were both third-year level and fourth-year level. The majority of the students were first-year students.

Variables	Groups	f	%
Sex	Male	135	51.9
	Female	125	48.1
	Tot	tal 260	100.0
Chronological Ago	18-23 years old	236	90.8
Chronological Age	24-29 years old	24	9.2
	Tot	tal 260	100.0
Course	Bachelor of Science in Information Systems	s 110	42.3
	Bachelor of Science in Information	150	57.7
	Tot	tal 260	100.0
Voorlovol	First Year	102	39.2
redi Level	Second Year	80	30.8
	Third Year	39	15.0
	Fourth Year	39	15.0
	Tot	tal 260	100.0

Table 1. Demographic Profile of the Participants

For the value components of motivation, most participants have a high level of Intrinsic Goal Orientation, Extrinsic Goal Orientation, and Task Value. In the MSLQ manual, goal orientation pertains to the learner's overall objectives or direction to the subject or course. Intrinsic goal orientation relates to how the learners realize themselves engaging in tasks because of challenge inquisitiveness, and mastery [11]. Having an intrinsic goal orientation to an educational endeavor signals that the learner's engagement in the task is an end-all to itself rather than engagement being a means to an end. Extrinsic goal orientation supports intrinsic goal orientation and measures the extent to which students believe they are engaged in an activity because of rewards, competition, grades, performance, and other people's evaluations. Participating in a learning task is the means to an end when a person has a high level of extrinsic goal orientation. The main area of worry for the learner is related to circumstances that are not directly related to performing the work, such as rewards, competition grades, performance, and peer evaluation. This has to do with the overall orientation to the course or academic subject. Task value measures how interesting, meaningful, and worthwhile an undertaking turns out to the learner. Goal orientation explains the justification for the learner's involvement in the task. High task value may encourage learners to become more invested in their studies. The task value on the MSLQ reflects how the students feel about the course material's importance, weight, and interest.

For the expectancy components of motivation, most participants have a high level of Control of Learning Beliefs and Self-Efficacy for Learning and Performance. Control of learning refers to the learners' conviction that their learning efforts might produce fruitful results. It focuses on the notion that action determines outcomes as opposed to outside influences like the instructor or learning facilitator [11]. If learners believe their study efforts have an impact on their learning, they should be more likely to analyze more strategically and effectively. Learners are more likely to intentionally put forth what is required to bring about the desired improvements if they believe they have control over their academic achievement. The items comprising this scale, selfefficacy for learning and performance, measure two aspects of expectancy -(1) expectancy for success and (2) self-efficacy. While self-efficacy is a self-evaluation of one's ability to complete a task and confidence in one's capabilities to perform that work, expectancy for success reveals the performance expectations and pertains particularly to task performance.

The majority of participants experience significant levels of test anxiety when it comes to the affective aspect of motivation. According to [11], academic achievement and test anxiety are adversely correlated. There are two aspects to test anxiety: worry and cognitive and emotional elements. The emotional component refers to the anxiety's affective and physiological arousal components, while the worry component deals with how the person's negative thoughts affect their performance. The most prominent causes of performance degradation are cognitive anxiety and performance preoccupation. Anxiety should be reduced with training in efficient learning techniques and testtaking techniques. As stated in this study, having greater test anxiety results in more worrying. Table 2 presents the level of motivation of the participants.

	Motivation Scales	Level	Rating	f	%
		High	4-7	199	76.5
	Intrinsic Goal Orientation	Low	1-3	61	23.5
10		Total		260	100.0
ente		High	4-7	214	82.3
pon	Extrinsic Goal Orientation	Low	1-3	46	17.7
> mo		Total		260	100.0
0		High	4-7	221	85.0
	Task Value	Low	1-3	39	15.0
		Total		260	100.0
		High	4-7	215	82.7
of str	Control of Learning Beliefs	Low	1-3	45	17.3
tano		Total		260	100.0
pec	Colf Efficacy for Learning	High	4-7	147	56.5
S E	Sell-Efficacy for Learning	Low	1-3	113	43.5
	and Performance	Total		260	100.0
nt		High	4-7	151	58.1
ctiv	Test Anxiety	Low	1-3	109	41.9
Affe		Total		260	100.0

Table 2. Students' Level of Motivation

As shown in Table 3, most students had an average or medium level of self-efficacy in Java Programming with thirty-nine percent (39.2%), followed by thirty-five percent (35.0%) for low level, and roughly twenty-six percent (25.8%) for high level.

The result on the medium level of self-efficacy in Java Programming was consistent in the literature [5], having a majority of participants with an average level of self-efficacy. It was followed by a low level, indicating inadequate confidence in developing a complete software solution to a given problem. It is imperative to highlight possible factors contributing to the student's lack of self-efficacy and shed light on the critical situations to provide an intervention to lighten the main impediments in Java programming. The low-level result was similar to the study by [15], which noted that one of the causes of learners' practical difficulties when learning computer-related tasks was low self-efficacy in programming. Isolating elements that may affect programming self-efficacy and success has not received much attention [15].

Table 3. Students' Level of Self-Efficac	y in Java	Programming
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Level of Self-efficacy	Scores	f	%
High	161-224	67	25.8
Medium	97-160	102	39.2
Low	32-96	91	35.0
Total		260	100.0

As shown in Table 4, both males and females have a high level of intrinsic goal orientation, extrinsic goal orientation, task value (value components of motivation), control of learning beliefs and self-efficacy for learning and performance (expectancy components), and test anxiety (affective component). The result indicates that regardless of sex, most participants do well in the particular course but tend to be more worried during an assessment.

				To	tal		
		Ma	Male		nale	10	lai
Motivation Scales	Level	f	%	f	%	f	%
Intrinsic Goal	High	102	39.2	97	37.3	199	76.5
Orientation	Low	33	12.7	28	10.8	61	23.5
Extrinsic Goal	High	110	42.3	104	40.0	214	82.3
Orientation	Low	25	9.6	21	8.1	46	17.7
Tack Value	High	112	43.1	109	41.9	221	85.0
Task value	Low	23	8.8	16	6.2	39	15.0
Control of Learning	High	105	40.4	110	42.3	215	82.7
Beliefs	Low	30	11.5	15	5.8	45	17.3
Self-Efficacy for	High	77	29.6	70	26.9	147	56.5
Learning and Performance	Low	58	22.3	55	21.2	113	43.5
Test Anvietu	High	77	29.6	74	28.5	151	58.1
lest Anxiety	Low	58	22.3	51	19.6	109	41.9
	Total	135	51.9	125	48.1	260	100.0

Table 4. Students' Motivation Profile as to Sex

As shown in Table 5, the majority of participants aged both 18 to 23 years old and 24-29 years old have a high level of Intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, and self-efficacy for learning and performance, which means that students scoring high on these factor scales tend to be better and are doing well in a particular course compared to those with low scores. However, a high level of test anxiety is present only in participants aged 18-23 years old, which indicates a more worrying individual, particularly in taking course assessments.

			Chronolo	gical Age		Te	
		18-23 y	ears old	24-29 y	ears old	10	tai
Motivation Scales	Level	f	%	f	%	f	%
Intrinsic Goal	High	184	70.8	15	5.7	199	76.5
Orientation	Low	52	20.0	9	3.5	61	23.5
Extrinsic Goal	High	195	75.0	19	7.3	214	82.3
Orientation	Low	41	15.8	5	1.9	46	17.7
Tack Malua	High	202	77.7	19	7.3	221	85.0
lask value	Low	34	13.1	5	1.9	39	15.0
Control of Learning	High	197	75.8	18	6.9	215	82.7
Beliefs	Low	39	15.0	6	2.3	45	17.3
Self-Efficacy for	High	132	50.8	15	5.7	147	56.5
Learning and Performance	Low	104	40.0	9	3.5	113	43.5
Test Anvietu	High	139	53.5	12	4.6	151	58.1
rest Anxiety	Low	97	37.3	12	4.6	109	41.9
	Total	236	90.8	24	9.2	260	100.0

Table 5. Students' Motivation Profile as to Chronological Age

As shown in Table 6, the majority of participants enrolled in B.S. Information Systems (BSIS) and B.S. Information Technology (BSIT) programs have a high level of intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, and test anxiety. The result shows that most of the participants in these two programs tend to be better and do well in their academic tasks than those with low scores. The only exception is that a high level of test anxiety presents more worrying learners in terms of quizzes, examinations, and other academic assessments. Moreover, only the B.S. Information Systems students have a high level of self-efficacy for learning and performance, which indicates that students tend to be better at doing a particular task because of their expectancy for success and self-appraisal because they expect to succeed, believe they can complete the task and are confident in their abilities to do so [11], [16].

			С	ourse		Te		
	BS		SIS	BS	BSIT		Otal	
Motivation Scales	Level	f	%	f	%	f	%	
Intrincia Cool Origination	High	83	31.9	116	44.6	199	76.5	
Intrinsic Goal Orientation	Low	27	10.4	34	13.1	61	23.5	
Extrinsic Goal Orientation	High	97	37.3	117	45.0	214	82.3	
	Low	13	5.0	33	12.7	46	17.7	
Tellale	High	101	38.8	120	46.2	221	85.0	
Task value	Low	9	3.5	30	11.5	39	15.0	
Control of Looming Doliofs	High	98	37.7	117	45.0	215	82.7	
Control of Learning Bellets	Low	12	4.6	33	12.7	45	17.3	
Self-Efficacy for Learning and	High	73	28.0	74	28.5	147	56.5	
Performance	Low	37	14.3	76	29.2	113	43.5	
Test Anviet	High	61	23.5	90	34.6	151	58.1	
lest Anxiety	Low	49	18.8	60	23.1	109	41.9	
	Total	110	42.3	150	57.7	260	100.0	

Table 6. Students' Motivation Profile as to Course

As shown in Table 7, most participants have a high level of intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy for learning and performance, and test anxiety. The result presents that most participants, regardless of year level, are doing better in their academic tasks than those with low scores. The only exception is that a high level of test anxiety indicates more worrying students when taking a particular assessment.

		Year Level									
		First	Year	Seco Year	nd	Thire	d Year	Four Year	th	Т	otal
Motivation Scales	Level	f	%	f	%	f	%	f	%	f	%
Intrinsic Goal Orientation	High	79	30.4	62	23.8	32	12.3	26	10.0	199	76.5
Intrinsic Goal Orientation	Low	23	8.9	18	6.9	7	2.7	13	5.0	61	23.5
Extrincic Coal Orientation	High	85	32.7	65	25.0	34	13.1	30	11.5	214	82.3
Extrinsic Goal Orientation	Low	17	6.5	15	5.8	5	1.9	9	3.46	46	17.7
Task Value	High	87	33.5	67	25.8	36	13.8	31	11.9	221	85.0
lask value	Low	15	5.8	13	5.0	3	1.2	8	3.0	39	15.0
Control of Loorning Poliofs	High	84	32.3	66	25.4	35	13.5	30	11.5	215	82.7
Control of Learning Bellers	Low	18	6.9	14	5.4	4	1.5	9	3.5	45	17.3
Self-Efficacy for Learning	High	52	20.0	50	19.2	23	8.8	22	8.5	147	56.5
and Performance	Low	50	19.3	30	11.5	16	6.2	17	6.5	113	43.5
Tost Aprioty	High	69	26.6	43	16.5	21	8.1	18	6.9	151	58.1
Test Anxiety	Low	33	12.7	37	14.2	18	6.9	21	8.1	109	41.9
	Total	102	39.3	80	30.7	39	15.0	39	15.0	260	100.0

Table 7. Students' Motivation Profile as to Year Level

As shown in Table 8, both male and female participants were found to have a medium level of self-efficacy in Java Programming, followed by a low level of self-efficacy. The result shows that regardless of maleness or femaleness, participants were likely to have adequate confidence vis-à-vis their competence in Java Programming, followed by inadequate confidence of competence in a particular subject. However, it refutes the study of [2] that males' self-efficacy levels were found to be stronger than females' and 11. 8 % of the variance in self-efficacy was demonstrated by computer experience. It was further supported by [14] that men have higher self-efficacy antecedents measured than women.

		Se	ex		Total		
	M	ale	Fen	nale		lotal	
Level of Self-efficacy	f	%	f	%	f	%	
High Level	34	13.1	33	12.7	67	25.8	
Medium Level	52	20.0	50	16.2	102	39.2	
Low Level	49	18.8	42	19.2	91	35.0	
Total	135	51.9	125	48.1	260	100.0	

Table 8. Students' Self-Efficacy Profile as to Sex

As shown in Table 9, participants aged 18-23 and 24-29 were both found to have a medium level of self-efficacy in Java Programming. The result shows that the majority of the students, regardless of age group, were more likely to have sufficient confidence concerning their competence in Java Programming. It deviates from the underlying assumption of this study that chronological age holds a vital function in the developmental aspect of selfefficacy. More so, this probe that age has nothing to do with selfefficacy level, and disclosing that self-efficacy in the young age group is not so high, but it could increase up to middle adulthood and then decrease.

		Chronolo	gical Age			Total
	18-23 y	ears old	24-29 y	ears old		TOTAL
Level of Self-efficacy	f	%	f	%	f	%
High Level	59	22.7	8	3.1	67	25.8
Medium Level	92	35.4	10	3.8	102	39.2
Low Level	85	32.7	6	2.3	91	35.0
Total	236	90.8	24	9.2	260	100.0

Table 9. Students' Self-Efficacy Profile as to Chronological Age

As shown in Table 10, most of the participants enrolled in B.S. Information Systems were both found to have a medium level of self-efficacy in Java Programming, followed by a low level.

The result shows that regardless of the program or course enrolled by the participants, most of them have adequate confidence concerning their innate abilities and competence in Java Programming. It also discloses that the study cannot generalize which program or course is better in Java Programming. With these, it could be concluded that both B.S. Information Technology and B.S. Information Systems students tend to believe that complex tasks in Java Programming are within or beyond their skill level and produce more competent programmers from these programs.

		Co	urse			
	B.S. Info System	rmation s (BSIS)	B.S. Info Technolo	ormation ogy (BSIT)		Total
Level of Self-efficacy	f	%	f	%	f	%
High Level	20	7.7	47	18.1	67	25.8
Medium Level	50	19.2	52	20.0	102	39.2
Low Level	40	15.4	51	19.6	91	35.0
Total	110	42.3	150	57.7	260	100.0

Table 10. Students' Self-Efficacy Profile as to Course

As shown in Table 11, most participants in the first year level were found to have low self-efficacy in Java Programming. In the second year level, most participants were within the average level in Java Programming. In the third year level, most participants were found to have a medium level of self-efficacy in Java Programming and more than half the difference in the number of students from the previous year level. Lastly, in the fourth year level, most participants were found to have a high level of self-efficacy in Java Programming. First-year level students were found to have a low level of self-efficacy compared to higher years, indicating that selfefficacy also increases as the year level advances.

Table 11.	Students'	Self-Efficacy	v Profile as to	Year Level
			,	

				Year	Level						
	First	Year	Secon	d Year	Third	Year	Fourt	h Year		Total	
Level of Self-efficacy	f	%	f	%	f	%	f	%	f	%	
High Level	7	2.7	19	7.3	16	6.2	25	9.6	67	25.8	
Medium Level	37	14.2	34	13.1	19	7.3	12	4.6	102	39.2	
Low Level	58	22.3	27	10.4	4	1.5	2	0.8	91	35.0	
Total	102	39.2	80	30.8	39	15.0	39	15.0	260	100.0	

As shown in Table 12, results revealed that there was no significant difference between the students' level of motivation when grouped according to sex (p=0.080), chronological age (p=0.944), and year level (p=0.061). However, a significant difference was found in terms of course or program (0.000).

Three out of four variables were found to have no significant difference; hence, the results failed to reject the null hypothesis. The findings implied that the data had insufficient evidence to conclude that the students' level of motivation varies on their sex. chronological age, and year level. Therefore, the null hypothesis was accepted. The results were substantiated by [7], that selfbelief was identified as the critical dimension of motivation influencing student success in the transition into university. Results identified the link between self-belief scores on entry and academic performance in the first year, including grade point average and performance in six courses. However, a certain study negates the significant difference between motivation and course results [7]. Courses were found to have no significant relationship to motivation, as students were more likely to be less motivated in their program curriculum. More so, the results negate a particular study that motivation varies on sex and age [18]. It further disclosed that female participants have a high level of motivation, particularly having a motivation oriented to the future, whereas males do not; such motivations in male participants were seen only in the older group and were inextricably linked to the parent's approval [18]. Both for males and females, the content of their motivation for cognitive achievement in the older age group was based on two motives, which were independent at the younger age: curiosity and prestige. However, apart from a desire to learn new things, females' aspiration to differ notably from others and to demonstrate their achievements to others was significantly greater than that of males.

Variables	Group	Test	Sig.	Decision
Cov	Male	Independent Samples	0.090	Potain He
JEX	Female	t-test	0.000	
Chronological	18 – 23 years old	Independent Samples	0.044	Potain He
Age	24 – 29 years old	t-test	0.944	
Course	BSIS	Independent Samples	0.000	Poinct He
Course	BSIT	t-test	0.000	Reject Ho
	First Year			
Vearloyal	Second Year	One-way Analysis of	0.061	Potoin H.
real Level	Third Year	Variance (ANOVA)	0.001	
	Fourth Year			

Fable 12. Difference between Students	' Motivation and	Demographic Variables
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Significant: p-value < 0.05

As shown in Table 13, results revealed that there was no significant difference between the students' level of self-efficacy in Java Programming when grouped according to sex (p=0.729), chronological age (p=0.830), and course (p=0.050). However, a significant difference was found in terms of year level (0.000).

Three out of four variables were found to have no variance. Hence, the result failed to reject the null hypothesis. The findings implied that the data had insufficient evidence to conclude that the students' self-efficacy in Java Programming varies on their sex, chronological age, and course. Therefore, the null hypothesis was accepted.

The no significant difference result means that regardless of sex and chronological age, self-efficacy is still the same or constant. Maybe there are factors other than sex and chronological age that are related to self-efficacy, such as the type of school (e.g., private schools, public schools) that students from private institutions have stronger self-efficacy than those students enrolled in public institutions [5]. However, it negates the study of [15], disclosing a significant difference between males and females, with males having higher levels of self-efficacy antecedents measured. The literature presented that as women's experience increases over time, so does their self-efficacy. Women's confidence increases more with age than men's, but many opportunities are lost in the early years because of fear and lack of confidence [19]. Furthermore, females rated themselves slightly higher than males [5]. On the other hand, the significant value of the year level to self-efficacy indicates a significant difference between students' level of self-efficacy in terms of year level, given that the significance level must be less than 0.05. Additionally, the results were consistent with the study of [15]; a t-test comparison showed a statistically significant difference between the mean scores of self-efficacy in Java Programming between undergraduates courses in Federal and State Universities (t-calculated = 7.57, df = 252, p < 0.05). The results implicated that the year level could be one of the several factors that could influence the students' level of self-efficacy in Java Programming.

Variables	Group	Test	Sig.	Decision
Cov	Male	Independent Samples	0 242	Potain He
JEX	Female	t-test	0.245	
Chronological	18 – 23 years old	Independent Samples	0 0 20	Potain He
Age	24 – 29 years old	t-test	0.650	
Courses	BSIS	Independent Samples	0.050	Potain He
Course	BSIT	t-test	0.050	
	First Year			
Veerleyel	Second Year	One-way Analysis of	0.000	Poinct He
fedi Level	Third Year	Variance (ANOVA)	0.000	Reject no
	Fourth Year			
C' 10 1 10.05				

Table 13. Difference between Students' Self-Efficad	cy and Demographic Variables
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Significant: p-value ≤ 0.05

As shown in Table 14, Scheffe multiple comparison results show that in terms of year level groups, the most significant differences were found between the third year and fourth year in terms of selfefficacy in Java Programming, followed by second year and first year students.

	First Year	Second Year	Third Year	Fourth Year
First Year		0.001	0.000	0.000
Second Year	0.001		0.020	0.000
Third Year	0.000	0.020		0.024
Fourth Year	0.000	0.000	0.024	

Table 14. Multiple Comparison for Self-Efficacy in Java Programming by Year Level

Post Hoc Test: Scheffe *p < 0.05

Table 15 shows the analysis of the relationship between students' level of motivation and level of self-efficacy in Java Programming. Pearson's correlation coefficient computed *p*-value is 0.002. This result denotes a significant relationship between students' level of motivation and level of self-efficacy since the level of significance must be less than or equal to 0.01. Therefore, the null hypothesis is rejected, and accept the alternative hypothesis. The significant relationship between motivation and self-efficacy denotes that there is an association between these two constructs, which is evident in literature that there is a direct and significant relationship existed between self-efficacy scores and students' academic performance in which improving self-efficacy could increase the students' academic performances [17].

Table 15. Significan	t Relationship	between	Motivation	and Self-Efficac	y
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Variables	r	<i>p</i> -value	Decision
Motivation and Self-Efficacy	0.192	0.002	Reject Ho
Significant: p-value ≤ 0.01 level (2-tailed)			

Conclusions

Based on the presented findings, the subsequent are the stipulated conclusions. The majority of the students in the institution had a high level of motivation, including intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy for learning and performance, and test anxiety. These students tend to do well in a particular course or academic task but are more worried during the assessment. Likewise, the majority of the students had a medium level of self-efficacy in Java Programming. These students tend to have adequate confidence in doing and completing complex tasks in Java Programming.

Results presented no significant difference in students' level of motivation as to sex, chronological age, and year level but a considerable difference as to the course or program. This result concluded that motivation is constant and still the same regardless of sex, chronological age, and year level, while the course or program could be one of the factors influencing the students' level of motivation. Also, results disclosed no significant difference between students' level of self-efficacy in Java Programming as to sex, chronological age, and course or program. However, there was a significant difference in terms of year level. This result may signify that self-efficacy is still the same regardless of sex, chronological age, and course, but not constant at the year level. Year level could be the several factors influencing students' self-efficacy. Lastly, regarding the significant relationship between the students' motivation and self-efficacy in Java Programming, the findings revealed a significant relationship between motivation and self-efficacy. Therefore, motivation had an association with self-efficacy in Java Programming in the institution.

Recommendations

With these presented findings and conclusions, the researchers projected the following recommendations to be initiated and undertaken. Invest in experts. There are two ways to invest in experts. First, the institution may have its faculty members get additional training on how programming courses will be delivered to their students to improve the teaching-learning activities. Second, while there are students who are not able to catch up with the programming lessons, it is advisable that they go the extra mile to learn programming by getting the help of an expert for an extra cost; that way, they do not only depend on their teacher's instructions. Consider revising the curriculum or reviewing whether it can still meet the expectation of the program for B.S. Information Systems and B.S. Information technology students and graduates. The administration of psychological tests for selfefficacy and motivation to students with the assistance of Guidance Counselors to ascertain the students' degree of confidence in a specific competence and goal-directed behaviors in a particular program. With this, we could come up with schoolbased programs on how to enhance self-efficacy and motivation and could mitigate the possibility of unfavorable outcomes (e.g., failing or dropping the course) in the CHMSC community. Collaboration of program chairs and core faculty members on strengthening the teaching-learning activities and approaches in programming lesson delivery, remedial class, tutorials, and other academic interventions.

Continuous training for all faculty members may be beneficial. The Human Resources Management Office (HRMO), in cooperation with college deans and program chairpersons, may initiate and stabilize this constant training in accordance with their field of specialization to maintain or increase the proficiency and competence of the institution's team members (e.g., faculty, staff, administrators). Future researchers may plan to engage in further investigation of motivation and self- efficacy in various situations. Potential research utilizing the various tools to gauge self-efficacy and motivation may still produce insightful data and, if practical, involve a wide variety of participants, such as private and public schools. Similarly, this study might give them instructive information that could support their studies.

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