ZIBELINE INTERNATIONAL PUBLISHING

Information Management and Computer Science (IMCS)

DOI : *http://doi.org/10.26480/imcs.02.2019.10.13*

Online ISSN : 2616-5961
CODEN : IMCSBZ

RESEARCH ARTICLE

PERFORMANCE OF SOPHOMORE INFORMATION TECHNOLOGY STUDENTS IN ASSEMBLY LANGUAGE SUBJECT BASED ON DIFFERENT TEACHING METHODS

Joanna A. Erlano-De Torres

Laguna State Polytechnic University- San Pablo City Campus, Cosico Ave, San Pablo City, 4000 Laguna, Philippines.
****Corresponding Author E-mail: joannaedetorres@gmail.com***

ARTICLE DETAILS

Article History:

Received 26 August 2019
Accepted 29 September 2019
Available Online 25 October 2019

ABSTRACT

The ability to understand and implement the programming language is an important skill for the students to acquire. With so many universities in the country offering computer-related courses, both private and state university, there is a need to assess the performance of the students towards their programming subjects in order to produce outstanding graduates. The primary focus of this study was to determine the academic performance of the students using two sets of teaching methods: (1) traditional learning approach, collaborative learning and peer-assisted learning for midterm (2) traditional learning approach and problem-based learning for final term. A sample of 115 Bachelor of Science in Information Technology sophomore students taking up Computer Organization and Assembly Language was used for the study. Assessment results which came from quizzes, activities and examinations were systematically gathered and analyzed. Using T test with assumed equal variances, result showed that there was a difference of 2.052 in the performance in midterm and finals, and this difference was significant based on the p value which is less than 05. Findings indicated that the set of teaching method focused on group learning helped the students more in achieving higher performance rate than the traditional and individual learning. This study recommends that professors/instructors must be encouraged to use teaching methods with more student collaboration and group learning that require the students think outside the box to help them achieve better academic performance.

KEYWORDS

Assembly language, combined teaching methods, peer-assisted learning, problem-based learning, traditional learning.

1. INTRODUCTION

In our modern-day society, technology plays a vital role in business, education, transportation, communication and even agriculture. It has changed the personal lives of most people. In addition, modern technology has changed civilization in many different ways. Humans have almost always been on a path of progression, and because of technology, the twentieth and twenty-first centuries have seen a number of advancements that revolutionized the way people work, live and play. Imagining what life would be like without some of these advancements has become a difficult task due to their importance and the people's reliance on them [1]. As the technology progresses, demand for computer-related courses escalates as well. The Commission on Higher Education includes Information Technology as one of their "priority courses" for academic year 2017-2018 [2]. The Laguna State Polytechnic University-San Pablo City Campus offers Information Technology, Computer Science, Associate in Computer Technology and Master of Science in Information Technology under the College of Computer Studies.

Programming forms part of the core concentration areas for students especially studying Information Technology (IT) and Computer Science as well as those other fields of study sandwiched with IT in an undergraduate degree programs [3]. Many students enrolled in information technology and/ or computer science courses due to the fact that they know that there so many opportunities waiting for them after graduation. The ability to understand and implement the programming language is important skill for the students to acquire. With so many universities in the country offering computer-related courses, both private and state university, there is a need to assess the performance of the students towards their programming subjects in order to produce outstanding graduates.

2. STATEMENT OF THE PROBLEM

This study aimed to analyse the effect of different teaching methods to the performance of students towards the assembly language subject. Specifically, it answered the question, "What combination of teaching methods are more effective to the students learning?"

a. Traditional Instructor Lecturing/Learning Approach; Collaborative Learning and Peer Assisted Learning? or;
b. Traditional Instructor Lecturing/Learning Approach and Problem-Based Learning?

3. SIGNIFICANCE OF THE STUDY

People who work with the students should understand the nature of the learner in order to be more effective in helping them deal with their difficulty of learning. With these findings, it is hoped that the teaching methods will be improved and become foundation of a good teacher-student relationship. In particular, the study is important to the following:

College Dean. The findings of the study may help the head of the college to plan for appropriate interventions to fit students and teachers' needs, specifically with students with difficulty in learning.

Curriculum Makers. Through this study, curriculum makers may be able to devise a curriculum in strengthening the academic performance of the students to achieve quality education.

Subject Teacher. The findings of this study can be helpful in planning and initiating appropriate learning materials inside the classroom and encourage them to upgrade their methods and techniques according to the needs of their students.

Students. Through this study, it can help them determine the techniques wherein they learn the most. It can also motivate them to cope with their difficulty and motivate them to overcome their weakness in programming.

Future Researcher. This study may serve as valuable resource of data while conducting their studies.

4. LITERATURE REVIEW

Teaching a programming language has long been a challenge in the classroom. The learning curve is a step function for many students; such students struggle to assimilate the concepts involved in the early stages, making little progress and becoming more and more confused, until, all of a sudden, the "penny drops". Overcoming this step is crucial; sadly, some students never make it, either failing or withdrawing [4]. The failure rates in programming courses at the university level are evidence to the fact that learning to program is a difficult task. In spite of research on factors that influence the enrolment and success of students in programming, it is still not fully understood what makes computer programming easy for a very little number of students, but difficult and frustrating for others [5].

Assembly Language sometimes referred to as assembly or ASL, is a low-level programming language used to interface with computer hardware. Assembly language uses structured commands as substitutions for numbers allowing humans to more easily read the code versus looking at binary. Although easier to read than binary, assembly language is a difficult language and is usually substituted for a higher language such as C [6]. Learning styles are considered to be intrinsic behaviours habitually applied by learners. Learning approaches describe tendencies: they are not immutable, nor are they independent of learning circumstance or environment. Nonetheless it is believed that "students also seem to develop habits in studying which may lead them to rely more on one or other approach" [7].

Learning approaches have been given less attention. Learning approaches have previously been considered in relation to a number of different subject disciplines, and high achieving students shown to be more likely to adopt a strategic approach to learning, and less inclined to adopt a surface apathetic approach [8, 9]. Traditional Learning Approach is concerned with the teacher being the controller of the learning environment. Power and responsibility are held by the teacher and they play the role of instructor (in the form of lectures) and decision maker (in regard to curriculum content and specific outcomes). They regard students as having 'knowledge holes' that need to be filled with information. In short, the traditional teacher views that it is the teacher that causes learning to occur [10]. Collaborative Learning takes place when students cooperate to construct a consensus to an open-ended activity.

It shares many of the same traits as cooperative learning. It differs from cooperative learning by being more student centered than teacher centered. It also provides a vehicle for social constructivism, where students are in control of their own learning and ultimately, the outcome of their learning. Cooperative learning is more concerned with a specific outcome based on teacher facilitation and knowledge transmission [11]. This type of learning is best suited to an arrangement of groups, where students can freely interact with each other and construct their ideas together. Peer-Assisted Learning or class wide peer tutoring demonstrated success, has been disseminated, and hybrid versions of the methods have been developed and tested.

Fuchs and colleagues, for example, extended class wide peer tutoring to incorporate practice on strategic reading behaviours, including paragraph summarization and prediction activities. This hybrid form of class wide peer tutoring, known as peer-assisted learning strategies, or PALS, has been shown to enhance the reading 310 development of low- and average-achieving students, as well as children formally diagnosed with learning disabilities, when PALS is implemented in elementary-level mainstream settings [12]. The roots of Problem-Based Learning (PBL) can be traced to the progressive movement, especially to John Dewey's belief that teachers should teach by appealing to students' natural instincts to investigate and create. Dewey wrote that "the first approach to any subject in school, if thought is to be aroused and not words acquired, should be as unscholastic as possible". More than 80 years after that was written, students still learn best by doing and by thinking through problems. Educators who use problem-based learning recognize that in the world outside of school, adults build their knowledge and skills as they solve a real problem or answer an important question—not through abstract exercises.

In fact, PBL originally was developed for adults, to train doctors in how to approach and solve medical problems [13]. Since the development of computer, in the early 1950's all programming was done in machine language. Machine language is also called Binary language because it includes only numbers 0s or 1s. The Assembly language is classified and the only low-level language. It is not a complex language but is awkward for human to work with. In the late 1950s, IBM developed the Assembly language as one of the first programming language to run on its System 360. The Assembly language assembles a series of symbolic representations of machine language operation codes. These symbolic representations are called Mnemonic operation codes. From the early years, Assembly language had been used in commerce to develop applications in banking, accounting, and insurance industries. Today, few of these applications are still being used most were converted to the other newer, easier to program, and more powerful programming language [13].

5. METHODOLOGY

This study is composed of respondents from Bachelor of Science in Information Technology (BSInfo) students who were enrolled at College of Computer Studies in Laguna State Polytechnic University-San Pablo City Campus. As shown in table 1, each section has diverse qualities in terms of emotional and intellectual ability. Their age ranges from 17-18 years old. The sample respondents of the study as shown in table 1 below covered all 115 students (73 males and 42 females) enrolled during the first semester of academic year 2016-2017.

Table 1: Distribution of Population

Year and Section	No. of Male	No. of Female	Total
BSInfo II-A	12	14	26
BSInfo II-B	21	9	30
BSInfo II-C	14	8	22
BSInfo II-D	14	5	19
BSInfo II-E	12	6	18

This study engaged in data analysis to allow the researcher to measure the performance of the students according to the field of study, teaching strategies of the instructor and other factors such as computer laboratory equipment. The combination of teaching strategies was already identified in the syllabus given to the subject instructor. The researcher gathered data from midterm and finals which consists of quizzes, activities and term exam [14]. Ratings of the students were analysed after the learning process. The teaching methods done by the instructor during midterm were Traditional Instructor Lecturing, Collaborative Learning and Peer-Assisted Learning.

On the other hand, the teaching methods done by the instructor during finals were pure lecture and Problem-Based Learning with laboratory exercises afterwards. Using frequency distribution, the performance of the students was categorized the intellectual level of the students into three-the above average, the average and the below average. The rating of the above average category ranges from 90.01 up to 100. On the other hand, average category ranges from 78.01 up to 90 while the range from 1 up to 78 falls under the below average category. In addition, the researcher also used T-test to determine if there was a significant difference on the performance between midterm and finals.

6. RESULTS AND DISCUSSION

6.1 Midterm Performance of the Sophomore IT Students

Figure 1 provides the analysis of the rating of the students' performance during midterm. The researcher categorized the intellectual level of the students into three- the above average, the average and the below average. The rating of the above average category ranges from 90.01 up to 100. On the other hand, average category ranges from 78.01 up to 90 while the range from 1 up to 78 falls under the below average category. The results obtained shows that Traditional Instructor Lecturing, Collaborative Learning and Peer-Assisted Learning are highly effective learning approaches resulting in high performance of students in Assembly Language programming subject. This is because 50.43% of the students' performance are above average, 46.09% of the students have average performance and only 3.48% of the students are below average in performance.

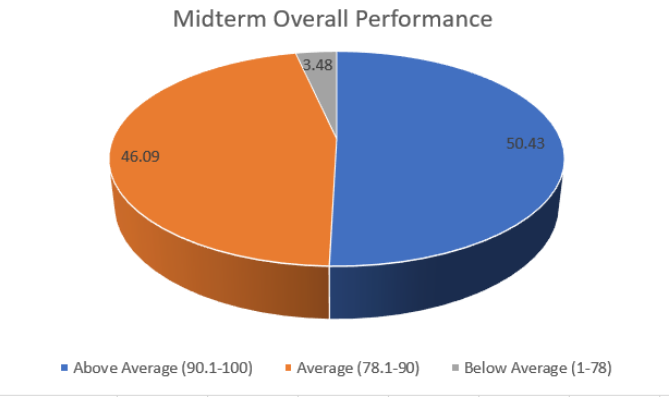

Figure 1: Midterm Overall Performance

6.2 Finals Performance of the Sophomore IT Students

Figure 2 provides the analysis of the rating of the students' performance during finals. The researcher categorized the intellectual level of the students into three- the above average, the average and the below average. The results obtained shows that pure lecture or Traditional Instructor Lecturing together with Problem-Based Learning are not effective learning approaches resulting in lower performance of students in Assembly Language programming subject. This is because only 30.43% of the students' performance are above average, 63.48% of the students have average performance and 6.09% of the students are below average in performance.

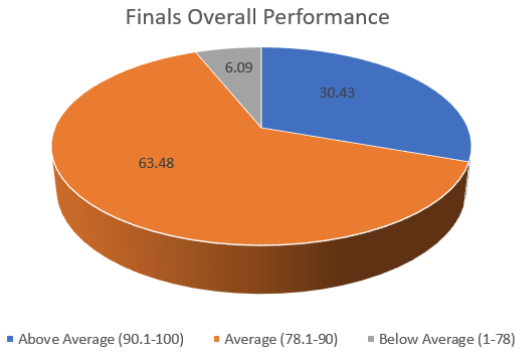

Figure 2: Finals Overall Performance

Based on Table 2, there is a difference of 2.052 in the performance in midterm and finals, and this difference is significant based on the p value which is less than .05. This result implies that the two methods used were found to have significant differences on the effect, which is the performance of the sophomore IT students taking up Assembly Language subject. T-test showed that the performance of the students during midterm was higher than the performance during finals.

Table 2: T-test for Equality of Means

		t-test for Equality of Means						
		t	f	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
grades	Equal variances assumed	2.256	228	.025	2.05217	.90970	.25968	3.84467

7. CONCLUSION

It is very conclusive that the 21st generation students cannot perform well in the programming course with traditional lecturing approach and problem-based approach only. Since findings indicated that the set of teaching method focused on group learning helped the students more in achieving higher performance rate than the traditional and individual learning. They are more inclined with collaborative and peer-assisted learning wherein they have the chance to express and discuss their ideas, as well as work with their peers. Programming language, particularly the Assembly language can be easily learned if the students have open communication and do not work alone.

It is also concluded that every time the instructor or teacher involves the student in the learning process, they are more likely to learn and love the Assembly Language programming subject. Moreover, the improvements in the method of conducting this type of course/subject must be a high priority and should be enhanced from time to time. Lastly, the result was supported by the previous study [3] that the different learning approaches that students adapt to the study of programming course is of greater importance with regards to their performance. In most cases, learning approach which requires practical and collaboration as well as persuading the learner to think outside the box and solve problem is much effective.

ACKNOWLEDGEMENT

This paper is an output of the action research for a curriculum enhancement for the subject Computer Organization and Assembly Language. The researcher would like to thank the sophomore students who participated in this work, as well as to the dean of the college, who encouraged the faculty members to make research studies that will enhance the programming curriculum of the Information Technology Students.

REFERENCES

[1] Kazmeyer, M. 2018. The importance of modern technology. Retrieved from https://itstillworks.com/importance-modern-technology-2077.html, Jan.

[2] Bacani, L. 2018. CHED lists in-demand, priority college courses until 2018", Retrieved from http://www.philstar.com, Jan.

[3] Amoako, P., Adu-Manu, K.S., Arthur, J.K.., Adjetey, C. 2013. Performance of Students in Computer Programming: Background, Field of Study and Learning Approach Paradigm. International Journal of computer Applications, 77, Pp. 12.

[4] Biggs, J. 1978. Individual and Group Learning Difference Study Processes. British Journal of Educational Psychology, 48 (3), Pp. 266-279.

[5] Akinola, O.S., Nosiru, K.A. 2010. Factors Influencing Students' Performance in Computer Programming: A Fuzzy Set Operations Approach. International Journal of Advances in Engineering & Technology, 7 (4), Pp. 1141-1149.

[6] Assembly language. 2018. Retrieved from https://www.computerhope.com/jargon/a/al.htm.

[7] Wilson Learning Worldwide Inc. 2007. Approach to Learning: How We EnhancHuman Performance Through Learning, Position Paper.

[8] Byrne, M., Flood, B., Willis, P. 2004. Using the Student Learning Framework to Explore the Variation in Academic Performance of European Business Students. Journal of Further & Higher Education, 28 (1), 67-78.

[9] Novak, J.D. 2010. Learning, Creating and Using Knowledge: Concept Maps as Facilitative Tools in Schools and Corporations. Journal of E-Learning and Knowledge Society, 6 (3), Pp. 21-30.

[10] Panitz, T. 2019. A Definition of Collaborative vs. Cooperative learnin. Retrieved from http://colccti.colfinder.org/sites/default/files/a_definition_of_collaborative_vs_cooperative_learning.pdf.

[11] Fuchs, D., Fuchs, L.S., Mathes, P.G., Simmons, D.C. 1997. Peerassisted learning strategies: Making Classrooms More Responsive to Diversity. American Educational Research Journal, 34, 174-206.

[12] Dewey, J. 1916. Democracy and education, New York, NY: The Free Press.

[13] Christensson, P. 2019. Machine Language Definition. Retrieved from https://techterms.com.

Rahmat, M., Shahrani, S., Latih, R., Yatim, N.F.M., Zainal, N.F.A., Rahman, R.A. 2012. Major problems in basic programming that influence student performance. Procedia-Social and Behavioral Science, 59, Pp. 287-296.