DIRICHLET STRIPES OF LOGIC FORMULATION: A CASE-STUDY OF STUDENT'S SENTIMENTS ON DIFFICULTIES AND UNDERSTANDING IN WRITING PSEUDOCODES AND FLOWCHART

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ABSTRACT

Pseudocode writing is a method of the operating principle of a computer program or other algorithm in step by step manner. On the other hand, Flowchart is a type of diagram that represents process and algorithm showing boxes as process and connectors to perform a certain task. The case study investigated the different difficulties and understanding of 1st-year BSIT students in writing Pseudocodes and Flowchart in Program Logic Formulation. The participants are grouped by four and identified using purposive sampling through selection criteria. This paper will use Colaizzi's method in descriptive phenomenology data analysis using seven steps to analyze the data collected from an in-depth interview with the teacher, students, and classroom observation. The process of Colaizzi was used to assist in extracting, organizing, and analyzing such narrative dataset. The main barriers lie in student's difficulties in understanding the fundamental concepts of the subject. Besides the challenges in dealing with the problems, the teacher shows up to be more resourceful in strategies in teaching and simplifying the subject. The possible effect of the result of this study will serve as the parameter for reviewing the teaching strategies and the course content of the Program Logic Formulation subject. Furthermore, it will assess on the different multiple intelligences of the students in dealing with the logic formulation, synchronization, and analyzation of the given problems.

Keywords: education, program logic formulation, Colaizzi method, student difficulties, pseudo codes, and flowchart, qualitative -phenomenology

INTRODUCTION

Logic Formulation is the process of coming out with the necessary steps to implement a procedure in computer programming. Usually, this is resorted to a top down approach bringing down the levels as required by the task in proper order so that when it is performed procedurally, the desired result is achieved according to its required output specification. It is known that this course is not an easy subject to be studied. It requires proper and correct understanding of the concepts and its abstracts. A lot of students are having a problem with learning the subject matter because of its nature. It means commonly accepted that logic formulation is complex, incomprehensible and to some people, it is of little interest. The study of logic formulation carries with it a stigma and people who are talented in this course as though they are quite reasonable. Logic Formulation has importance over and above the application of basic computer programming skills. It is also the prime vehicle for the development of student's logical thinking and higher order cognitive skills. It also plays a significant role in some other courses in the field of information technology, such as programming, discrete structures, and models such as flowcharts and pseudo codes. About this, a positive attitude towards logic formulation among students is an important goal of the course in many rules to follow.

It is perceived among Filipino students that they excel in knowledge acquisition but fare considerably low in lessons requiring higher order thinking skills. The problematic state is evident in the performance of students in national and international surveys. According to Ali (2012), it is a complex and demanding task for teachers in promoting an in-depth and comprehensive learning. The inability of the students to be able to show and exhibit a really good understanding of the basic concepts of the subject is the primary barrier and key point to learning. Also, it is notable to say that the teachers still seem to be committed to teaching the subject even with this kind of problem. In another study conducted by Murtonen, Mari, and Lehtinen (2003), it shows the different difficulties experienced by students in learning quantitative methods. According to the results of the existing study, students tend to experience more problems in statistics and quantitative method compared to other fields of study, like qualitative and their main subjects. There were five leading causes of the difficulties that were recognized: (1) superficial teaching, (2) linking theory with practice, (3) unfamiliarity with and difficulty of concepts and content, (4) creating an integrated picture of research in order to really understand it, and (5) negative attitudes toward these studies. The students cited the strategy of teaching as one of the high ratings for the difficulty of learning. Some students mentioned negative attitudes as the main reason for difficulties.

The Bachelor of Science in Information Technology program of the Leyte Normal University was established in the year 2006. It offers a program curriculum that is based on the existing guidelines of the Commission on Higher Education of the Philippines. One of the program

courses is Program Logic Formulation. This subject offers the very basic concepts before the actual programming theories that are used to create various application and software. This case study will perceive directly the different learning difficulties of 1ˢᵗ year BSIT students in writing Pseudocode and Flowchart in Logic Formulation perspective.

METHODOLOGY

Research Design

This study used embedded multiple case study research design where the case of BSIT 1ˢᵗ year who have finished learning pseudocode and flowchart writing. The participants are grouped by four and identified using purposive sampling through selection criteria. This paper will use Colaizzi's method in descriptive phenomenology data analysis using seven steps to analyze the data collected from an in-depth interview with the teacher, students, and classroom observation.

Respondents of the Study

The respondents of the study will include the 1ˢᵗ year students enrolled in Program Logic Formulation subject of the school year 2017-2018. All the of the students from the class are all participants and grouped by four.

Research Procedure

The researchers conducted a face to face interview to each of the grouped participants. The interview was recorded and transcribed for data analysis. The researchers used seven steps to analyze the data collected from an in-depth interview with the teacher, students, and classroom observation. The process of Colaizzi was used to assist in extracting, organizing, and analyzing such narrative data set in Program Logic Formulation.

RESULT AND DISCUSSION

Five themes were identified from the responses of the participants.

Theme 1: Acquired Learning

Transfer of learned knowledge and skills is still considered a fundamental goal of education (De Corte, E., 2003). Based on the responses of the participants, they were able to describe the processes in the creation of Flowcharts and Pseudocode, such as we use to start, then input, then process, then output. It's similar to a child talking, and you understand them. But if you won't study, you won't know that it's a step by step process. It's just like understanding a child saying, mama. Additionally, another participant stated: yes, because flowchart is like our everyday process, you have to explain it. It is easy to explain, how we wake up, eat, daily routine. It takes time to write and of course if we have time, but then during that time we have. This indicates that

the participants have understood the concept of flowchart and pseudocode. However, it should also be noted that a participant in Groups B and D, had already experienced doing flowchart and coding. A participant from Group B stated that among the four of us, he has already a background in pseudo code and he could understand flowchart. Likewise, the participant from Group D stated that I have experienced doing flowchart and coding, I already know the basics on how to create a system.

Theme 2: Learning Style of Students

It is said that novices have great difficulty mastering new domains (Merrill, D. C., Reiser, B. J., Merrill, S. K., & Landes, S., 1995). (Curry, 1983; Felder & Soloman, 1997; Kolb, 1984) As cited by (Hsieh, S. W., Jang, Y. R., Hwang, G. J., & Chen, N. S., 2011), states that Learning styles refer to the set of preferences individual students have for perceiving, assimilating, and interpreting incoming information. Moreover, (Hsieh, S. W. et al., 2011) further defines Learning Styles as one's preference in processing external information of internal knowledge and experience. All four participating groups resulted in a variety of learning styles. Peer Mentoring, Self-Learning, and Visual Learning are the most prevalent learning style used by the participants in which it is identified among the three groups.

Thomas, K. M., Willis, L. A., & Davis, J. (2007) defines mentoring as the act of giving direction and support delivered from a mentor to a student. On the other hand, (Falchikov, 2001; Kram, 1985) as cited by (Colvin, J. W., & Ashman, M., 2010) states that peer mentoring focuses on a more performance student extent effort to the less knowledgeable students improves performance and encourage the mentor to do more. The presence of Peer Mentoring among the three groups can be a parameter to the acquired knowledge of some participants who have awareness of the subject matter and helps his classmates understand. Just as a member says, some of our classmates mentored us.

Cherry (n.d.), states the benefits of self-learning, according to her, the benefits of learning by individual self can explore more knowledge and get new ideas, and you can go through difficult concepts on your own without help. Sentiments like, we keep on reading the book, and then we compared the example since it has a sample pseudo code to what is written on the board, reflects how the participants do not always rely on the information discussed by the mentor during lectures. Zimmerman (1990) describes these type of students as self-regulated students who unlike their passive classmates, proactively collect information when needed and take the necessary steps to master it.

On the other hand, some people are better at processing words and some people are better at processing pictures (Mayer, R. E., & Massa, L. J., 2003). Visual learners according to International Learning Styles Australiasia (ILSA) (n.d.) are those students who directly get the

topic using the picture and other graphical representation. Our teacher's way of teaching is also detailed; it is easier to understand because it is more on visualization, this statement reflects how the participant finds it easy to grasp the topic since visuals were utilized by their professor in the class.

It should also be noted however that all participating groups have shown cooperation or teamwork amongst its members who contributed to the learning process. One participant expressly reveals teamwork is fun; it makes it easier for us to understand because we share ideas on how to do it.

Theme 3: Teaching Strategies

Teaching strategies refer to process to help the students able to learn the content of the lessons and be able to develop achievable goals in the future (Armstrong, Steve, 2013). The teacher's challenge is how to impart knowledge to a diverse group of students. The effectivity of one's strategy can be included on how a student performs in class. If the teaching style of the teachers matches the learning style of the students, acquiring knowledge will be easier and natural, results improve and learning time is reduced (Rose, 1998). All participating groups indicated that one strategy used by their teacher was through the formation of groups, for example, the pseudocode and flowchart we've made, we were grouped then our professor gave us problems for us to answer and write it down on a manila paper, explain how we came up with the flowchart and how we have converted it to a pseudo code. Participants have expressed how their teacher motivates them, the good about sir, he motivates us and encourage us to try our best. In essence, students will not learn if they are not motivated and they will not be motivated unless they believe that they will succeed (Jenkins, T., 2001).

Theme 4: Student's Suggestions

Delivering quality service has become an important goal for most higher education institutions (Athiyaman, A., 1997). Moreover, higher education institutions are increasingly recognizing that higher education is a service industry, and are placing strong focus and factors on meeting the expectations and needs of their participating customers, that is, the students (DeShields Jr, O. W., Kara, A., & Kaynak, E., 2005). What you learn, prepares you for the rest of your life. The participants in this study are aware of the importance of education. Sentiments like, of course, we represent our university, I want to learn, to be excellent, shows that the participant is eager to learn and be excellent on his chosen field. If students are to develop 'justified confidence' in their ability to take purposive and sensible action, and to develop the unseemly characteristics of confidence in their ability to learn, belief in their power to perform and proven powers of judgement in unfamiliar situations, they need real experience of being responsible and

accountable for their own learning, within the rigorous, interactive, supportive and, for them, unfamiliar environment of higher education (Stephenson, J.,1998).

It is also worth noticing that the participants, based on their experience and observation, had provided suggestions. Sentiments like we suggest sir that Major subjects must have longer time that minor subjects, reflects on how the participant values the importance of having more time dedicated to learning the major subjects. Another sentiment is, it will be better if it is not pure lecture, it's better to have games so that students will participate. Because honestly, in some of our subjects it was purely lecture, sometimes our classmate sleeps, there is no excitement, not fun, reflects on the participant's view on how the learning environment affects their interest. This can also be attributed to two factors: Student Satisfaction and Teaching Strategy. Student satisfaction results when actual performance meets or exceeds the student's expectations (Elliott, K. M., & Shin, D., 2002). To achieve this, teacher's must know their students. It is significant for the mentor to know more of their students because the more they get recognized each student, the better they can teach them in a way that they will learn (Schultz, Michael, 2015).

Theme 5: Challenges in Learning

First year Information Technology students encountered many difficulties in dealing the subject matter, not only they experienced pressured off the subject but also an adjustment of being an IT students in the university, they also are confronted with immersing themselves into a discipline in which they may not have had any prior formal education and for which they must essentially learn a new language, a programming language (Butler, M., & Morgan, M., 2007). This particular experience of first-year students was also expressed by the participants like we have no knowledge especially on Pseudocodes, we find it difficult because we have no prior knowledge. Additionally, the participants pointed out issues in the consistency of the meanings of symbols from instructional materials; there are differences, we have a book, it was yours, right? The symbols and shapes that are there have a different meaning. Most importantly, all participants have expressed their concerns with the time allotment for their major subjects and the activities given by the teacher. These are the participants' sentiments: We suggest sir that Major subject must have longer time that minor subjects and we give more time to other subjects because we find our time in our major subjects insufficient. This sentiment is more supported by this statement; we lack the time. We were given an example for the pseudo code only, but none for the flowchart and we give more time to other subjects because we find our time in our major subjects insufficient.
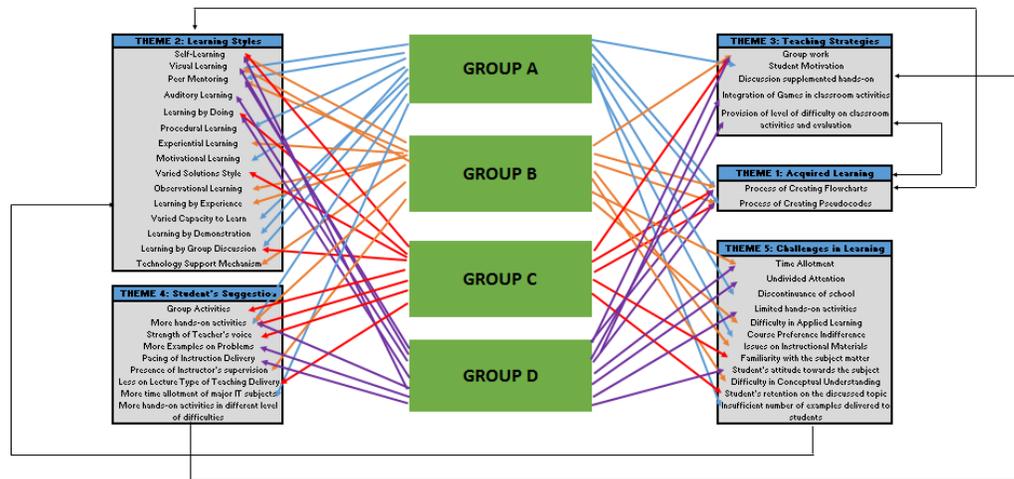
Figure 1: Network Map

From the result of the study, five themes were classified: Acquired Learning, Learning Styles, Teaching Strategies, Student's Suggestion, and Challenges in Learning. The figure above shows that the acquired learning of students with Flowcharts and Pseudocodes is directly related to the teaching strategies and learning styles of students, likewise the students' challenges in learning is directly related to their learning styles. It is also revealed that all groups have similar learning styles and difficulties in learning. However, there are issues when it comes to the teaching strategies which results to some suggestions made by the students.

CONCLUSION

Creating Flowcharts and Pseudocodes is a simple topic. However, since this is offered to the First Year Information Technology students in the university, students encounter difficulty with the subject. To facilitate the learning of students, teachers handling the subject should take into consideration the learning style of their students. The traditional style of teaching may work in the past, but for today's generation of students, it will not be effective. Different strategies, learning activities, and learning environments are needed for each generation (Billings, D., 2004). Furthermore, the institution should consider the time allotment given for subjects that involve laboratory work. CMO 25 series of 2015 of Commission of Higher Education stipulated the courses that should be of pure lecture, 2 hours' lecture and 3 hours' lab per week, and Supervised Independent Study.

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