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## **CHALLENGES IN BASIC SQL OPERATIONS ITS IMPLICATION TO LEARNING AND TEACHING: A CASE STUDY IN STATE UNIVERSITIES AND COLLEGES (SUCs) IN THE PHILIPPINES**

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### **ABSTRACT**

The alarming low rate of Information Technology graduates of the institution pointed out the argument whether or not the IT students acquired the concrete foundation of knowledge. Basic Structured Query Language (SQL) is an important topic for the IT students to learn, hence the challenges of the students on this subject was addressed and analyzed to understand its implication in learning and teaching. Embedded single-case design was utilized through in-depth interview, focus group discussion and observation. The participants were identified using purposive sampling through selection criteria and the data gathered was analyzed using an inductive process with thematic cross-sectional interpretation. The result of this study serves as a basis for revisiting the teaching strategies and the course syllabus of Database Management 1.

**Keywords:** Information Technology, Structured Query Language, inductive process, student competencies, database management, case study, Philippines

### **INTRODUCTION**

Structured Query Language (SQL) is a primary language responsible for data management and data structure in a relational database management system. SQL is one practical knowledge that Third Year BSIT Students should learn to have the solid foundation in writing complete programs with the database application. Basic SQL Operation is a vital topic which is considered as the core element in Database Management 1 (DBMS1). In fact, in the curriculum of Bachelor

of Science in Information Technology in Leyte Normal University (LNU), DBMS1 is set as a pre-requisite subject for the students to enroll Database Management System 2 (DBMS2) in which complex programming and database applications are apportioned. Subsequently, IT students will undoubtedly apply the basic SQL operations in developing their comprehensive IT programs for their capstone project as one requirement to pass the degree in BSIT. Hence, SQL plays a vital role for them to graduate.

The IT unit of LNU is now alarmed by the low graduation rates of BSIT in the three consecutive years which is incomparable to the past years. Before this occurrence, the BSIT program was able to produce desirable graduation rates because students were able to comply the general requirement in their capstone project. However, in the past three years, only a few of the students had graduated. During the school year, 2014 – 2015 out of twenty-five (25) groups only eleven (11) groups were able to completely pass the capstone project on time while during the school year 2015 – 2016 none of the graduating students were able to finish one time. In the academic year, 2016 – 2017 out of twenty-two (22) groups only one (1) were able to complete their capstone project.

According to Noel and Levitz (2008), the common indicator of institutional performance is the statistical records of student success. It will reflect the overall quality of the student learning and their intellectual involvement, how well-integrated students are in campus life; and how effectively a campus delivers what students expect and need. For this, the IT unit believed that the students have different levels of learning due to the challenges and difficulties that have experienced hence the study anchored the theory of Robert Gagne (1965) that stipulates the several different types or levels of learning. Gagne identifies five major categories of learning: verbal information, intellectual skills, cognitive strategies, motor skills and attitudes. Moreover, the competencies of the students might also affect the situation. As Kruger and Dunning (1999) stated in its competency theory, students skills are associated with the ability to self- assess their skill set, furthermore, students who have low-level skills might recognize that they have the kind of deficit. In fact, according to Tobias (2003) competency is the cognitive knowledge and expertise, effective attitudes and values, behavioral and motivational characteristics of dispositions of a person which enables him or her to perform well in a given situation. Additionally, it is also anchored to the experiential learning theory of Kolb (1984) that defines learning as the process in which knowledge is created through the transformation of experience. That defines learning as the process whereby knowledge is created through the transformation of experience should also be considered in this situation. Therefore, this study would like to determine the challenges and difficulties of the Third Year IT students in learning SQL basic operations as fundamental knowledge in completing their capstone project.

## **METHODOLOGY**

### *Research Design*

This study utilized embedded single-case research design where the case was the BSIT Third Year students who have finished learning basic SQL operations. Purposive sampling was used for the data collection in forms of interview, focus group discussion and observation.

### *Respondents of the study*

The respondents of the study include the Third year students enrolled in the database management system one subject of the school year 2017 – 2018. The students were identified according to their grades in programming two subjects which are a prerequisite to database management one subject. Based on their grades, the participants were grouped into two, the low performers' group and high performers' group.

### *Research Procedure*

The researcher used the following procedures in conducting the study:

Identifying the Topics to be used. The researcher utilized the course syllabus of database management system 1 in selecting the specific topic which is the Basic Structured Query Language (SQL) Operations.

Data gathering. The participants of the study were initially taught of the basic SQL operations through classroom discussion, demonstration, and hands-on activities. They were also given references and other learning materials to further improved their knowledge. The researcher conducted a face to face interview to each of the participants. The interview was recorded and transcribed for data analysis using inductive process. Observation and focus group discussion was also conducted to validate the responses of the participants.

## **RESULT AND DISCUSSION**

The study revealed five significant themes from the responses of the students:

### *Theme 1: Students Learning Style;*

Students Learning Style
Technology support mechanism
Seating preferences
Note taking
Brainstorming
Peer teaching
Memorization
Observation

Students learning style affects the way the student acquire knowledge on subject matter. The table presents that students of Database Management System prefer different learning style. Students of the subject do memorization, brainstorming, and peer teaching, note talking, and others.

*Participant 3: "The memorization of queries were there, the manipulation of a database was there."*

*Participant 2: "We also learn a lot because we have done brainstorming by the group so we can solve the problem."*

*Participant 1: "I am taking down notes. I use keywords and mark them for me to remember the commands. I have my notes from the handouts and discussion I can create a program. I need to take down notes to refresh my mind with the several commands that made me confused."*

Learning Style as cited by Anbarasi, et. Al (2015) defined as to an individual's preferred method of gaining knowledge. It is the sophisticated condition where in learners most efficiently and most effectively see development and recollect what they are attempting to learn.

***Theme 2: Issues on the Delivery of Basic Structure Query Language;***

Issues on the Delivery of Basic SQL
<u>Issues</u> on teaching mode of delivery
Clarity presentation of lesson
Pacing of instructional delivery
Stimulate student interest
Problem in giving instruction
Retention of subject matter
Choice of medium of instruction
Issues on student feedback
Issues on test construction

SQL is an easy yet complex topic to learn. Students experience difficulty in learning the subject. This challenge is made even worst by the issues encountered by the students on the delivery of basic SQL. Participants say that there is a problem with the giving of the instruction, the choice of medium of teaching, mode of delivery, clarity of presentation of the lesson, test construction, and others.

*Participant 2: "If I do report, I will give brief introduction then dictate the codes and functions with examples. I am slow in visualization, so I do not like to have the topics in all power point presentation."*

*Participant 7: "Uhhmm, during discussion usually is fast, that's all."*

The teaching strategy in delivering the topic for SQL is a significant factor that affects the student learning. The strategy aims to transfer the knowledge in a particular way, and the implementation delivers material in the way specified by the strategy (Mitrovic,1998).

***Theme 3: Challenges in Learning Basic Structure Query Language;***

<b>Challenges in Learning</b>
Issues on Family
issues on scheduling
Issues of the access to facilities
Issues on time management
Learning difficulty

Many factors affect the students' learning towards the lesson. These refer to the schedule, family, the availability of resources, and on the student itself.

*Participant 1: "Learning SQL is good because our instructor teaches us the correct functions. It is just difficult because we were not able to hands-on because of no electricity caused by the earthquake. We are only able to hands-on at home or outside the school. My other classmates have no computer that makes the difficulty to learn."*

*Participant 1: "I know how to delete the table, but I forgot how to update. I am confused with the commands because there are plenty of them."*

*Participant 1: "Yes. I pass the midterm exam, but I do not know how to modify tables maybe because I was late to the discussion."*

Learning SQL is a rigorous activity. It requires time, effort and practice to develop the skill in SQL. According to Mitrovic (1998), Structured Query Language (SQL) is the recent predominant database language that contains data, view definition, and data manipulation

statements that even if it is simple and highly structured language students have many difficulties in learning it.

***Theme 4: Teaching Strategies in Learning Basic Structured Query Language;***

Teaching Strategies in Learning Basic Structured Query Language
Experiential Learning on development through independent learning
Self-ability recognition
Experiential Learning using Technology
Defining examples
Hands-on Activity
Hands-on Discussion
Promotes Visual Learning Style
Experiential learning through SQL Application
Promotes a healthy exchange of ideas in classroom
Integrate topics discussed to concepts previously learned
Supplement student learning through homework
provides exercises which develop analytical thinking

Data gathered through interview revealed that the teaching strategy of the teacher in teaching basic SQL has a significant impact on the students learning. Most of the students would want more hands-on activity, lecture demonstration of the topic through examples, learning must be accompanied by technology, and students need to develop the ability in themselves that learning SQL is an easy thing. Some students of DBMS I would want to have homework given to them, and exercises that will develop analytical skills, topic/concepts from the previous topic be integrated, etc.

*Participant 1: "If I may suggest, the kind of strategy that I will apply are the discussion, then activities and homework."*

*Participant 1: "Homework is fine because we cannot maximize our time in the laboratory. This time we are doing our homework outside the school."*

*Participant 2: "Our teacher should conduct the class with more application because this subject is the stepping stone to our capstone so it should not be more in the discussion. It needs more on activities and directs to the point which means minimize theories and history."*

Teachers and teaching strategy are significant components to students learning. Every student requires learning strategy appropriate to the student type of learner. Wehrwein et al. (2007) define that learning style preferences are the manner and a condition in which students are most efficiently and most effectively see, develop and recall everything the attempt to learn, (2007).

***Theme 5: Impact of teaching for independent learning.***

<b>Impact of teaching for independent learning</b>
Cause of Absenteeism
Student Interest
Expectation through motivation
Demonstration of Knowledge
Student get bored

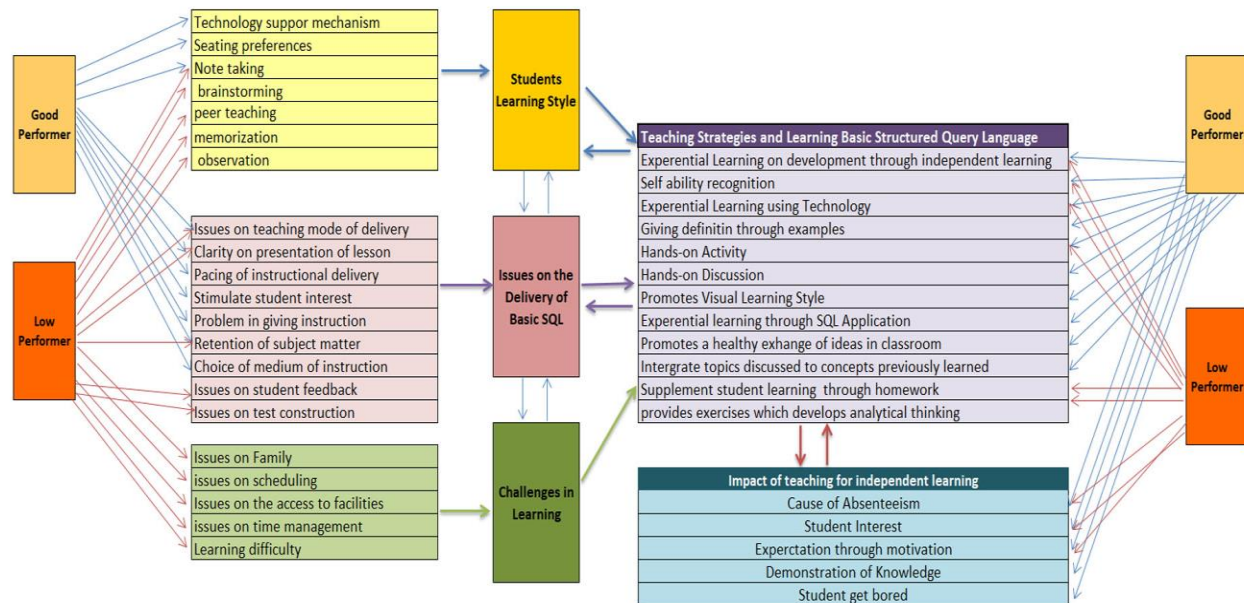
Independent study is a process wherein the student acquires knowledge by his efforts and develops the ability for inquiry and critical evaluation (Independent learning, nd). Some students prefer to learn on his own. Some students of the Database Management System I would prefer to take the learning process on his own. These students would rather ask for guidance, topic, or activity to perform rather than listening inside the classroom to the discussion. This learning style of students became a cause for student's setback inside the class. Independent learners show a different interest in the class, would prefer a different expectation and a way of demonstration of knowledge Students tend to do absences and get bored.

*Participant: "I like self-study with resources from the internet. For me, it is good to study in a silent environment like home than in the classroom."*

*Participant: "Maybe, if I am late in attending my class, I cannot follow the topic. For me, I find it difficult if I missed some parts of the subject."*

Every student requires learning strategy appropriate to the student type of learner. Wehrwein et al. (2007) define that learning style preferences are the manner and a condition in which students are most efficiently and most effectively see, develop and recall everything the attempt to learn.





**Figure 1.0. The Network Map of the Study**

The participants of the study were classified into two categories: the good performer and the low performer. Good performer students have the qualities that a low performer that does not possess. The same result was revealed that a low performer has unique qualities that a good performer do not have. However, both good performer and low performer shares a commonly preferred learning style, issues on the delivery of basic SQL, Challenges in learning, Teaching strategy in learning basic, and the impact of teaching for independent learners. The diagram presents that the issues on the delivery of basic SQL are directly affected by the Students learning style, the student's challenges in learning, and the teaching strategies used by the teacher in learning basic SQL. The impact of teaching for independent learners does not affect any of the other themes except for the teaching strategy in Learning Basic SQL. The teaching strategy in learning basic SQL is directly affected by the challenges in learning, but it does not affect the challenges in learning.

## CONCLUSION

Database Management System I, specifically on basic SQL operation is an easy topic. However, it should be delivered properly to the students, with the appropriate teaching strategy. Teachers should conduct the first assessment to the students that will determine the students type of learner and the preferred learning style of the students. More hands-on activities should be given to the student to have a hands-on experience on the topic. During the discussion, students might

be allowed to use the computer to follow the lecture-demonstration by the teacher. Moreover, teachers teaching the subject might look into several pedagogical patterns in teaching the subject. It would be helpful to database educators if tried and tested pedagogical patterns to teach SQL were formulated. There are many approaches that can be taken and the educator does not initially know whether a particular pedagogical pattern is a true pattern or an anti-pattern (Mitrovic, 1998). Further, the class schedule should be strictly followed by the students so that students would not miss a topic in the subject. Attendance in class indicates that a student is more severe in class 39 (Hijazi & Naqvi, 2006).

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