



Database Teaching in Different Universities: A Phenomenographic Research

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Abstract: In this research, the different teaching methodologies practiced in the basic database course taught in different universities are discussed. This paper was written based on research conducted through a questionnaire about university students in three different universities. The study was performed with a phenomenographic research approach among university staffs that have been graduated from University of Duhok¹, Nawroz University² and University of Mosul³. It investigates how and how well they have learned the basic database course during their bachelor degree.

Keywords: Computing Education Research, Database, Learning Environment, Pedagogy, Phenomenography, Teaching Database, University Teaching.

I. Introduction

Databases are an essential part of computer science, and the suitability of the course to the class-level is rather a critical task. Teaching methodologies and structures of the course should be based on a scientific form. A phenomenographic study approach has been performed among university staffs that have taken the database course in their bachelor studies in different universities to investigate how they have learned the first database course.

First, this paper will give an overview about the systems that are practiced in each of Duhok, Mosul and Nawroz universities. Second, a theoretical background for the study will be set and an analysis will be performed. Following that, the study and the results will be presented. Finally, implications for teaching and learning will be shown from the results of the study.

A. Statement of the Problem

As a result of coming from different universities, teaching staff have different background and understanding about the database subject. The researchers experienced many differences during their work at University of Zakho. Thus, they decided to do a research on this theme. After several weeks of hard work, the results are presented in the following sections.

B. Objectives

This research wants to emphasize how different background influence different ways of teaching, learning and thinking. It will be shown, as well, the relations between teaching and learning. The way to improve both of them is discussed.

C. Different Education Systems and Evaluation Standards

1) University of Duhok

The first database course is given to the senior students. The course is given in two semesters with two hours of theoretical lessons and two hours of practical lessons. There are 13 class lessons and 13 lab sessions each semester.

Students take the lectures in classrooms while they do their works in a lab room. Learners sit in front of computers which has all the software needed for the course already installed. The teacher mainly uses slides to demonstrate the contents of the course. The whiteboard is also used for extra explanations and for exercises. In the labs, small practical exercises are given and corrected during the lab with the help of two teaching assistants (TAs). No assignments are given after lab.

The assessment of the course is achieved by taking two written exams as well as two lab exams each semester. The final mark for each semester is 65% of the written exams and 35% for the lab exams, while the final score of the course is the average of the final semester marks.

2) UNIVERSITY OF MOSUL

The first database course is usually given for the entire year to the students in the third level. It spans 25 weeks. The students take both the labs and the ordinary lectures concurrently. Each week, three hours of lectures and two hours of labs are scheduled. The lectures are delivered by the teacher in a classroom. The teacher utilizes

¹ <http://www.uod.ac>

² <http://www.nawrozuniversity.com>

³ <http://www.uomosul.edu.iq>

slides to show concepts and examples. The labs are given by TAs in a lab room; they use their notebooks connected to a data show projector to illustrate the software tools to be used. During the time the course is running, there are no assignments, but there is a mid-term exam. At the end of the year there is a final theoretical written exam and a small project. For this project, the students are asked to form small groups in order to produce a practical product using the knowledge they have gained from the course. At the end of year, each group presents its product to the teacher and TAs, and explains how they divided the tasks. After that, the students will answer a few questions concerning their project. The final result for the project will be given according to how well the students have done the project. The final grade is a total of the obtained marks.

3) NAWROZ UNIVERSITY

The database course is taught to second year of the studies. The course is given for the entire year and has class lessons and lab works which lasts 25 weeks. Each week, a two hour lesson and a two hour lab works are given. Teacher, usually, explains the course concepts from the slides in a classroom via a data show projector. Students use computers in the labs for working on their assignments and exercises with support of usually three TAs. The requirements of the course and scale of marks are specified at the beginning of the study year. The final result of this course is given according to two term exams and a final exam. All exams have theoretical and practical parts but a higher percentage of the marks go to the theoretical part.

II. Methodology

In this section, the use of the scientific methods of the research is presented; the data collection procedure and the process of data analysis are also discussed.

The researchers had a discussion with a number of experts in the fields of psychology and pedagogy regarding the methodologies to be used in the study. A phenomenographic approach was decided upon and the focus would be on database teaching in computer science departments in different universities.

Initially, the researchers and the experts designed a questionnaire together concerning the first database course. Then, the investigators have asked four graduates from each university to fill it out. After the gathering of the data, the researchers analyzed it in order to reach conclusions about teaching and learning in database course.

A. Phenomenography

Phenomenography is an empirical and qualitative study which investigates the various different ways in which aspects of the world are experienced. Because of this, it involves the relations between persons and aspects of their world [1].

Phenomenography has been used here to understand how the teachers' own background influence their teaching. Through an analysis of the teaching staffs' feedbacks, the researchers also discover how the learning of a subject is influenced by its teaching.

Historically, phenomenography has been used to research the experience of learning, the experience of teaching, the different ways of experiencing the content learned, and describing aspects of the world around us [2]. Phenomenography is a qualitative, non-positivistic approach, which during the past few years has come to play an important role in Computing Education Research [3].

B. The Questionnaire

The researchers sent out questionnaires via email to a group of sample staffs in the department of Computer Science at the University of Zakho⁴. Each sample consisted of four staffs from the same university. The questionnaire consists of several questions which are listed in the appendix part of this research. All the questions are related to the first database course the staffs had taken (e.g. how they did, how they felt concerning the database course).

C. The Phenomenography Analysis

The researchers read the collected data and analyzed it, then focused on looking for similarities and qualitative differences amongst the opinions of the staffs on the basic database course in the different universities. Phenomenography was used during the analysis.

1) University of Duhok

The staffs took this course during their fourth year in their bachelor program. They used MS access as the DBMS and SQL as a programming tool.

Most of the staffs liked the course when they were students. The main reason is because they understood the goals and contents of the course. The following quotes are taken from the questionnaire to show the students' feedbacks.

Question: Did you like the course? Why?

Staff 1: Yes I liked it, because it connects the real world's information to the software...

Staff 2: I liked the course, because database makes programming manipulating records of information same as drinking a glass of water...

⁴ <http://www.uoz.ac>

As it is easily noticed from their answers, the staffs talked about why and where they use database. They used a practical approach to the course. As strengthening of this assumption, one staff explicitly mentions that he appreciated the practical part of the course more than the theoretical part.

Describing their abilities of designing databases after taking the course, the staffs again showed how their study approach to the subject was more theoretical than practical. They measured their knowledge gained from the course by talking about queries and SQL statements, without mentioning any other aspects of the relational model. It's interesting that the staffs who talked about the theory at the core of databases are the ones who had spent more hours studying after lectures on their own.

Most of the staffs liked the subject. Taking this course in the fourth year made it easier for them when they were students. They talked positively about the basic database course because they used some of the knowledge from the courses they had already taken.

Suggestions from most participants were to increase the number of hours spent on practical lectures and labs. Staffs passed the course with high grades but they were not able to create a complex database design.

2) University of Mosul

The staffs of this university took their basic database course in their third year of the studies. They used various developing tools. Some of them used Oracle as the WebServer and PostgreSQL as the DBMS, while others used Oracle and MySql as the DBMS. All of them used PHP as the programming language. The following answers have been observed.

Question: Did you like the course? Why?

Staff 1: Yes, because it is a simple way of representing information, and it is also useful and powerful means to navigate and aggregate data...

Staff 2: Yes, because it allows you to classify and manipulate information (that is the main element in computer science); and second, it's a subject related with all the other computer science aspects, so, it's always useful knowing a little of it...

Most of the staffs got a high grade in the final exam. Through reading the surveys, the researchers found out that the staffs enjoyed database course very much when they were students. All of them liked to talk about their study and opinions.

After the course was finished, most of the staffs were able to design and implement database systems with different complexity and manage the relational DBMS with SQL languages. They showed that their study was not focused on the tools or on specific languages, but on the concept at the base of the subject.

Most of the staffs got a good grade as a final result in the course. The final grade is the total of the written exams and the project. Staffs' suggestions indicated that if the teacher would have given more examples and solved more exercises during the lectures, they would have gotten the opportunity to learn more. They stated that they couldn't apply the knowledge acquired during the lectures because the labs represented only two thirds of the total lectures. The students had to apply and practice what they learned on their own.

3) Nawroz University

The staffs who took the survey studied the basic database course in their second year of studies. They used MS Access as DBMS and SQL as programming language. Through analyzing the questionnaire, the following highlights had been noticed.

Question: Did you like the DB course? Why?

Staff 1: No, because the teaching was boring.

Staff 2: No, because the teacher is boring and I didn't gain anything in class.

...

It is interesting that most of the interviewees from the Nawroz University stated that they didn't like the course. Most of them mentioned that the teaching of the instructor was "boring".

What have been noticed here is that after taking the course, the staffs were not expected to be able to design a complete database system while they were students, but were simply expected to get an idea of it. They were supposed to be capable of writing SQL statements and queries independently. However, for their lab works, they had to learn how to design a complete database system by themselves. Apparently, the staffs didn't have a pleasant experience taking this course. The teacher played a big role in their studies.

All the interviewees participating in the questionnaire passed the course from the first trial and most of them obtained an average grade. However, although they were required to do database design for the labs, some staffs were still not able to do so after the course.

Interestingly, in the suggestions' field of the questionnaire, most of the interviewees complained about lectures in a lab room instead of a normal lecture room. They said that it would have been better if the labs had been

conducted as it was in a classroom. Using a computer connected to networks, the students can easily start to surf the Internet or do other activities. This causes them to lose contact with the “boring” teacher and TAs. In addition to that, it was suggested that the TAs should keep in touch with the students and interact with them, in order to keep them from becoming “bored”.

Of all the participants in this questionnaire, two of them liked the database course and two did not. As a result, it can be said that the analysis is fair because the staffs felt the same about the teacher regardless of whether they liked the course or not.

III. Findings

The situations in the three universities are somehow different from each other, which also indicate that different universities in different locations have different teaching structures.

The first database course is offered in different study periods. The teaching methods are also different. Furthermore, the expectations and evaluation methods are different. It's interesting that the students are learning about the same technology through different paths. The following findings might give some inspiration for teaching and learning of this subject or in general.

Speaking of the sample group of Nawroz University staffs, it can be seen that the teacher plays a very important role in their study. The analysis shows that when staffs classified the teacher as “boring”, they lost the interest in that subject. As a side effect, their results of the course will not be good. Although the problem regarding to the teacher is only mentioned by those staffs, the researchers think it could happen to any subject in any university. Especially when it's the sophomore year, the students need more help from the teachers in the labs.

For the fourth year students in University of Duhok, exam grades were relatively higher. The students had a very good understanding of database concepts after taking the course. It can be seen that when it's the fourth year of study, the students know better how to approach a course. Moreover they did not complained about the teacher, which means they don't rely on the teaching as much as the sophomore students. The students are eager to apply what they have learned in theoretical lectures into practical exercises.

In University of Mosul, students take their first database course in their junior year. They have already had enough knowledge to get a high grade in the exam. However, the results were not excellent because, while the students had a practical approach to the course, the exam was focused on theoretical concepts.

The researchers found out the three key elements of database teaching/learning: the teacher, the students and the teaching environment. In different study periods, these three elements change in importance. The sophomores are easily distracted by their environment and need more guidance from the teacher. The juniors show their ability to study independently and their desire of study. The seniors obviously already knew and understood what they were studying and enjoyed themselves during the study.

IV. Conclusion

Databases are an important part of computer science. However, learning about databases requires some prior knowledge of computer science. The research has shown that how different backgrounds influence different ways of teaching, learning and thinking. It explained, in addition, the relations between teaching and learning. Suggestions for teaching the database course are presented as follows.

A. Suggestions

Through the findings of the research, some suggestions can be made.

Firstly the teachers should give more attention to the students during the lessons. Especially for sophomores, the teacher should not only provide the contents of the subject but also an efficient way of study. Non-proficient teachers often correlate to a negative study attitude amongst the students. This can be seen from the Nawroz University sample group.

Secondly, the students should have a clear idea of what they are learning from the subject. It's better when they have their own study plans and goals. Milestones can be good in their study plan, so they can check their achievements. In this case, seniors can usually better plan their studies compared to the sophomores.

Thirdly, the researchers agree that having lab lectures is efficient to some extent. The students can follow the instructor step by step whilst performing the exercises. However, it's not necessary to have access to networks for database teaching. Removing the Internet connection can be an effective way to prevent sophomores from being distracted when having lectures in lab rooms. Thus it will be easier for them to focus on the teachers teaching.

Fourthly, the researchers believe that, it's more suitable to employ this course in the third year of university study. This is because the juniors would have already gained enough basic knowledge to support their database learning. They can plan well with their study and apply the knowledge obtained from the course into future studies.

B. Future Work

Further study concerning the research subject can be carried out with a larger number of interviewees and a larger number of universities.

V. References

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VI. Appendix

The questionnaire of the research consists of the questions listed below.

Table I: Shows the questions contained in the questionnaire

	Question
1	Name of the University
2	In which year did you take the course? (1st, 2nd, 3rd, 4th)
3	Which programming language did you use?
4	Did you like the course? Why / Why not?
5	What are you able to do after taking the course?
6	Which developing tools did u use for the labs / assignments / projects?
7	Did you pass the exam with a low/middle/high grade? How did you get your final result? (Practice/Theo)
8	How many hours do you spend on the course after class every week?
9	Suggestions for teaching/ lab working/ anything else