



# BAZE UNIVERSITY COMPUTER SCIENCE STUDENTS' PERSPECTIVES ON PEN AND PAPER EXAMS FOR PROGRAMMING, AND DATABASE MANAGEMENT

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## ABSTRACT

Information and communication technology (ICT) is becoming common in various industries, including education. Technology enhances teaching and learning. It aids instructors to do their part as pedagogical environment designers. ICT enables teachers to make their lessons engaging and understandable for students at all levels of educational programs. ICT integration in education is a technologically oriented teaching and learning process that is closely related to the usage of ICT as educational instruments in classrooms. Baze University fully utilizes ICT for both teaching and learning. In addition, the students of the Department of computer science at Baze University are been thoroughly exposed to the theoretical and practical applications of programming languages and constructs. Although anecdotal evidence and some published data suggest that paper-based exams are still frequently utilized in introductory computer programming and design courses, students frequently express a preference for computer-based exams. At Baze University, students are been examined using the pen-and-paper examination method throughout their study. The research approach was centered on a quantitative research methodology, utilizing focus group sessions for data collection to acquire data from 200 – 300 level students. The purpose of the research is to determine the satisfactory level of students that are been assessed using pen-and-paper exam methods for programming, database, and system design courses at Baze University. The findings of the research show that Baze University students would generally prefer a computer-based exam approach for programming, and database management courses.

**Keywords:** *Pen-and-paper exam, Database, Programming, System design, Quantitative research.*

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## INTRODUCTION

The 21st century is the age of technology. Technology has a major impact on how we live. This is seen as the basis for economic growth alongside educational development (Raja & Nagasubramani, 2018). In today's civilization, an economy that lacks technology cannot advance. Every field that exists can be affected by technology, and education is one of them (Raja & Nagasubramani, 2018). "Information Communication Technology (ICT) integration in education usually refers to a technologically oriented teaching and learning process that is closely tied to the usage of ICT as educational instruments in classrooms (Ghavifekr & Rosdy, 2015). The topic of ICT integration in schools, especially in the classroom, is crucial since children are accustomed to technology and perform better in a technology-based environment. The pedagogical aspects of education are greatly aided by technology, where the usage of ICT will facilitate effective learning using ICT aspects and components (Finger *et al.*, 2013)."

Throughout the literature, computer programming is defined in a variety of ways. Some authors define it in the context of education by taking a historical approach (Waite *et al.*, 2020) while some loosely define it as synonymous with coding (Mason & Rich, 2020). Others claim that computer programming is more than just coding because it involves developing the processes necessary for a computer to solve a problem (Israel *et al.*, 2015). This is consistent with the widespread perception of computer programming as a strategy for developing computational thinking abilities, or more specifically, abilities that are connected to computational thinking, such as problem-solving, critical thinking, creative thinking, algorithmic thinking, reflective thinking, and so forth.

Baze University adopts a full use of ICT towards teaching and learning. In addition, the students in the Department of computer science at Baze University are been thoroughly exposed to the theoretical and practical applications of programming languages and constructs. Students are exposed to web application programming, mobile application programming, database design and implementation, object-oriented programming paradigm, and so on. All these courses are been taught with the appropriate Integrated Development Environment (IDE) with hands-on experience. However, when it comes to examinations, students are been examined using a pen-on-paper approach. It is obvious that learning programming and information system design is difficult, but another crucial issue that has emerged in response to substandard programming and design performance is how students are been examined in these courses are examined. It might be challenging to determine which method is best for a certain module given the wide range of methods by that programming proficiency can be assessed (Clariana & Wallace, 2002). Each evaluation method has a potential learning consequence in addition to its own set of benefits and drawbacks. It is crucial to pick an approach that produces the best learning results in terms of programming abilities. In the majority of Nigerian universities, written exams are the primary method of evaluating students in programming and design courses.

As (Sheard *et al.*, 2013) discovered throughout their investigation of the method of developing a written test, there are several reasons for having a written exam. The general agreement is that the standard written exam, in contrast to the individually assigned programming tasks, significantly lowers the likelihood of plagiarism (Sheard *et al.*, 2013). Although a standard written exam is thought to be an inadequate method of evaluating students' programming and design skills, it can nonetheless be used to gauge a student's comprehension of programming and design principles (Qvist *et al.*, 2018).

This study tends to conduct a survey to determine the satisfaction levels of students in the Department of computer science, of Baze University who are been practically taught programming and database management with modern tools and technologies but are, however, been examined with pen and paper for these courses.

## **RELATED WORKS**

The value of computer-based assessment in early programming and design courses has long been acknowledged. According to Daly and Waldron, computer-based assessments (lab exams) are a more reliable gauge of a programmer's skill than written tests or programming assignments (Daly and Waldron, 2004). It is known, however, that its effective use is more difficult than paper-based evaluation. Using a computer-based test,. According to (Barros *et al.*, 2003), computer-based tests are even more successful in boosting student motivation than group projects.

According to research by (Lappalainen *et al.*, 2016), when students were permitted to use the computer to continue working on a particular programming problem, they were able to fix any remaining faults in the corresponding programs than using a paper-based test. Grissom and others (2016) discovered that pupils who attempted computer-based tests to create a recursive response to a binary tree did better than those who took the paper-based exams with a 58% vs. 17% accuracy respectively.

In their presentation on the adaption of automatically assessed electronic exams, Rajala *et al.* pointed out that students may benefit from computer-based tests, such as the opportunity to compile, test, and debug the program code. They advise other educators to take computer-based tests as well.

## **MATERIALS AND METHODS**

The data gathered from each respondent in this study was collected and analyzed using a quantitative methodology. In order to explain and clarify numerous facts, this form of research requires undertaking empirical work with the collecting of data that may support, contradict, or dispute theories. The process of gathering and interpreting numerical data is known as quantitative research. It can be used to identify trends and averages, formulate hypotheses, examine causality, extrapolate findings, and so on. The instrument used for the collection of the data from respondents was the focus group approach. A focus group is a type of fact-finding technique in which a number of people get together to talk about a certain subject. Crucially, where this differs from research conducted through surveys or phone interviews is that we get the respondents' opinions and their reactions.

## **POPULATION AND SAMPLING**

This study follows an approach of the focus group method. The population included all the 200- level and 300-level students in the Department of computer science at Baze University. The overall total of respondents for this research was 100 200-level and 300-level students in the Department of computer science at Baze University. The focus group was done randomly amongst respondents regardless of gender, race, and programming skills amongst others.

## ETHICAL CONSIDERATION OF COMPUTER SCIENCE STUDENTS' OPINION

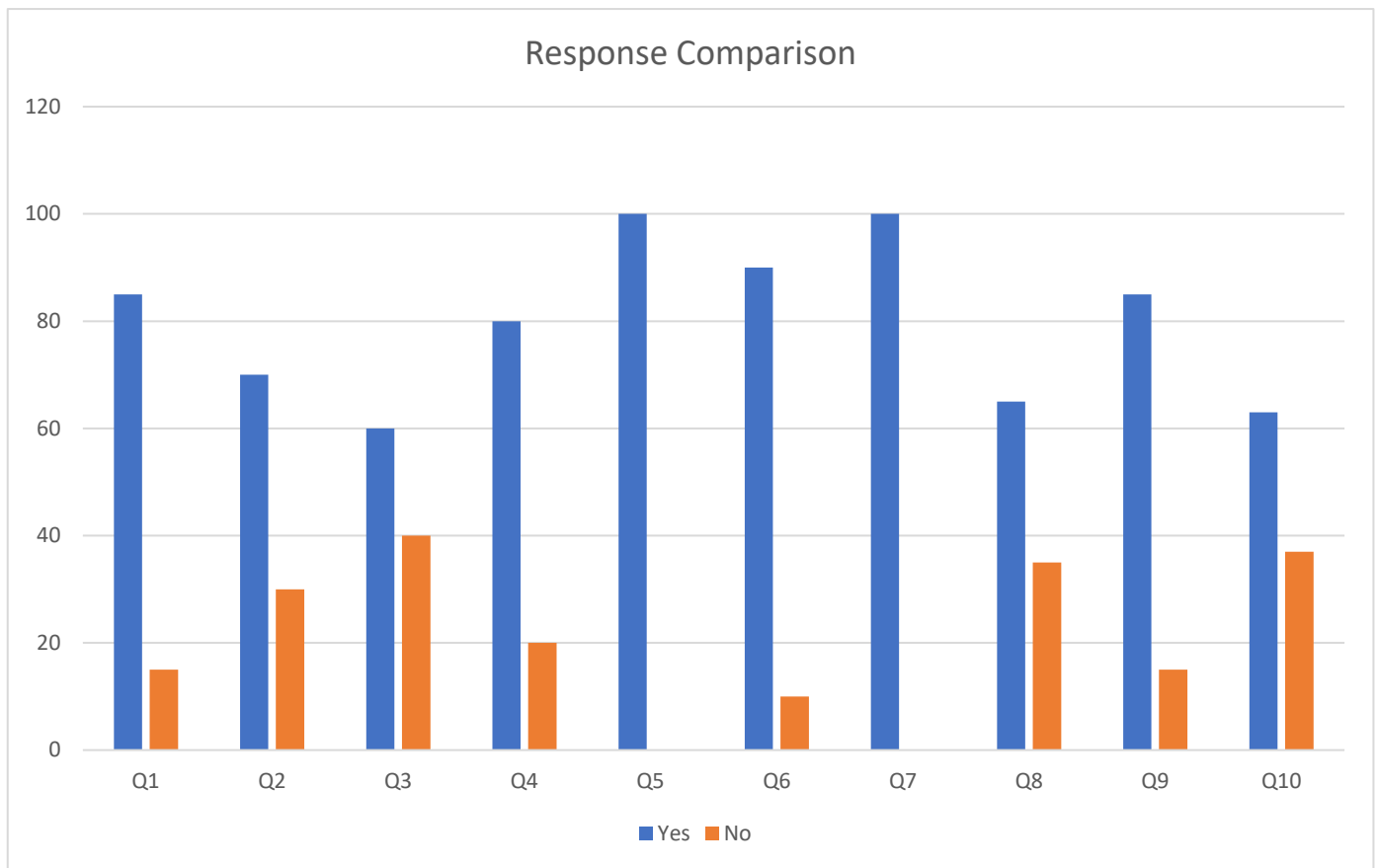
When conducting any kind of study, the researcher must constantly be mindful of the effects that their work will have on the participants and society at large and must take appropriate action as a result (Kumar, 2015). Kumar acknowledges that it is unethical to accumulate information without the knowledge of participants, and their expressed willingness and informed consent. As a result, we were very explicit with all participants in this study that their participation was voluntary and that they were free to leave the study at any moment. Participants were informed about the study's objectives, the type of information that would be needed from them, and how the information would be utilized.

## DATA COLLECTION AND RESULTS

The main purpose of the study was to ascertain the satisfaction levels of students in the Department of computer science who are been practically taught programming with modern tools and technologies but are, however, been examined with pen and paper for programming-related. Courses. The focus group was conducted with 100 students ranging from 200-level and 300-level students. Table 1 shows the set of questions discussed in the focus group and the respondents' feedback.

**Table 1:** Summary of Focus Group Discussion.

ID	Question	Yes	No
Q1	Would you prefer a computer-based exam for your programming-related courses?	85	15
Q2	Would you prefer a computer-based exam for your database management courses?	70	30
Q3	Would you prefer a computer-based exam for your design courses?	60	40
Q4	Do you think writing code on an IDE during an exam, as opposed to pen-and-paper, would help speed up the exam process for you?	80	20
Q5	Do you think the compiling and debugging features of IDE would aid in making programming exams easier?	100	0
Q6	Do you think the IDE code formatting and coloration features would improve your performance in programming exams?	90	10
Q7	Do you think the forward engineering process of MySQL workbench would help you create databases from data models easier during a database exam?	100	0
Q8	Do you think drawing Entity Diagrams on MySQL workbench during an exam, as opposed to drawing entity models on a per would help you design better data models for an Information System?	65	35
Q9	Do you find it difficult to enforce referential integrity in entities while using pen-and-paper for a database exam?	85	15
Q10	Do you think it would be much more convenient to implement inheritance and instantiation in an object-oriented programming exam on a computer rather than a pen-and-paper?	63	37



**Figure 1:** shows a chart to visually depict the response gotten from respondents regarding focus group sessions.

## DISCUSSION

According to the findings, students thought having the option to utilize a computer instead of a pen and paper was advantageous in many ways for their programming and design courses. This was true even when there was only a basic text editor like Notepad available and no Integrated Development Environment (IDE). The benefits of using a computer for writing come from being able to type more quickly and having the option to debug codes easily.

Students felt that they could exhibit their skills effectively by utilizing a computer to write their programming and database management exams, notably with an IDE, then in an exam with pen and paper. As a result, computer-based exams have a better chance to assess and even enhance students' real-world job skills in a way that is not achievable with a pen-and-paper exam.

## CONCLUSION

It is feasible to think of students as customers for universities. Universities need to focus on improving students' skills in addition to their academic work to better serve and satisfy their customers. The research determined the satisfaction levels of computer science students regarding their sentiment of pen-and-paper-based exams for programming courses, and database management courses. The use of a focus group for data gathering was employed in this study. With the help of this form of data collection, it was possible to gain a deeper understanding of the student's perceptions of the subject. This study highlighted that students prefer to have their programming,

and database management exam to be conducted via a computer-based method. The recommendation of this study is itemized below, the intention is to make recommendations on how the study's results may be used in academic settings to enhance learning outcomes.

1. Baze University should consider using computer-based exams for programming-related courses.
2. Baze University should consider using computer-based exams for database management courses.
3. Baze University should consider using computer-based exams for system analysis and design, courses amongst others.

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