

# The Use Of ChatGPT Tool In Calculus Material For Undergraduate Students In Kuwait

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**Abstract:-** This paper has been prepared to evaluate the use of ChatGPT tool in calculus material for undergraduate students in Kuwait. A questionnaire survey and face-to-face interviews has been carried out from a wide range of undergraduate students were studied the calculus material in Kuwait. The result from this research study revealed that the most of undergraduate students can not understand the results and the feedback after using the ChatGPT tool for calculus material. The main conclusion from this result is the most of undergraduate students have not enough knowledge to understand the results and the feedback after using the ChatGPT tool for calculus material.

**Keywords:-** Artificial intelligence, Calculus, ChatGPT, Kuwait, Mathematics.

## Introduction

Kemeny in 1959 stated that the mathematics was defined as "the study of number and space." The study of space led to the development of geometry, and the study of numbers led to algebra. Both of them merged in the calculus. Calculus is an important branch of mathematics dealing with the exact study of continuous change. Calculus is divided in two main branches of differential calculus and integral calculus. The integral calculus deals with the area computation bounded by the curve and the co-ordinate axes as well as the accumulation of extents, while differential calculus is focuses on the instantaneous frequencies of change of curve gradients. Calculus is widely used in all round the world to solve complex problems such as engineering challenges, social science disciplines, and science.

Previous studies were used several methods were used with the calculus course in different countries round the world. Initially, the calculus was deals with the calculations that are no longer performed by algebra, simple arithmetic, and indirect arguments in order to solve problems in which the student is confronted with the Limit concept. However, the mathematics students with these methods of calculus often misunderstand the notion of function due to misunderstand Basic Calculus concepts. Hence, this is in line with the previous studies which reported that the students perform satisfactorily in Basic Calculus. This study revealed that the difficulties of mathematics students in which is based on learning Basic Calculus. It helps Mathematics teachers to understand the problems and difficulties facing of their mathematics students' situation. Moreover, this serves helps Mathematics teachers to be aware of and consider the needs of the students in learning Basic Calculus.

Now that the introduction has been detailed, a brief overview of artificial intelligence and their applications followed by the research method will be detailed. Then, the results and discussion of this research will be analysed as well as the conclusion will be given at the end of this research.

### **The Artificial Intelligence (AI)**

It is intelligent machines (i.e. computer programs) that has been made by the science and engineering in order to understand human intelligence. Many people started to work, after World War II, on intelligent machines, independently. For example, Alan Turing is the first English mathematician worked on intelligent machines. In 1947, he gave a lecture on intelligent machines in order to explain the idea of the AI in terms of programming computers. In the late 1950s, many of researchers were worked on AI, especially on intelligent programming computers. Based on the history books, in the 1960s and 1970s, the AI was the earliest applications in the medical field. The AI in the medicine was divided into two separate branches: the physical and the virtual. The physical branch is mainly used for robots, while the virtual branch is mainly used for mathematical algorithms.

In recent decades, artificial intelligence (AI) has adapted in many areas of society. The AI has placed itself at the pioneering research fields extending from medicine and autonomous driving as well as robotics to education. The application of AI in education has had a significant influence in terms of effectiveness and efficiency, evidenced by improvements in the promotion of global learning, the creation of more intelligent content, the efficiency of the educational process and the optimisation of educational management.

### **The applications of AI**

Chatbot is one of the applications of generative AI. The idea of Chatbots is to think as humanity. Several companies such as DeepMind, Meta, Google and OpenAI have worked on developing chatbots. The OpenAI Company has released the ChatGPT user interfaces publicly available with language models. Figure 1, is the system structure of ChatGPT. Left side of Figure 1 is given three step dialogues. In the middle of the Figure 1 is a flowchart. The detailed process is showed in the right part of the Figure 1.

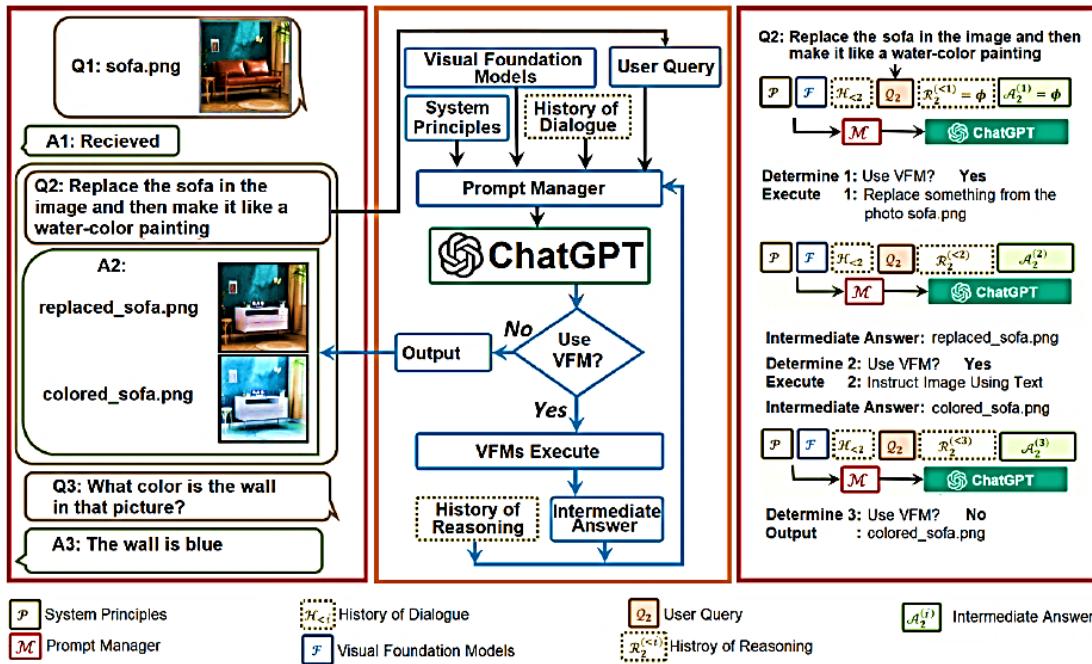


Figure 1. ChatGPT System (adapted from Wu et al., 2023).

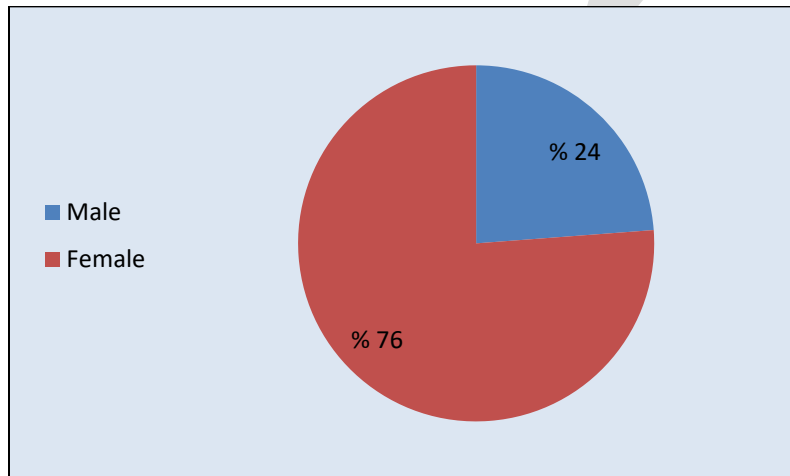
### The Use of ChatGPT in Education

It is an interest application in education for students due to has a potential to develop the learning experience of students. The ChatGPT is able to address individual student needs, offer personalised and quick responses as well as providing facilitate and feedback in order to understanding of complex concepts. This application of ChatGPT has a promising tool which can be promotes a student's of their active participation and cognitive advancement by offering continuous support in to their knowledge and adapting to their learning pace. Therefore, several studies have been conducted about ChatGPT tool for students in education in order to explore the potential impact of artificial intelligence. As a result, it showed that the ChatGPT is an incredible potential to both students and teachers due to provide personalised educational support and develop learning efficiency. Its influence over the last year has sparked a growing interest in education. This technology of ChatGPT tool is as a disruptive technology that is support and encouraged the students in academic environments. In this sense, the educational centers are rethinking on how to improve the learning and teaching process of educational agents to this technology.

In addition, the ChatGPT tool is must be approach by teachers in the classroom and it as an additional learning process. However, the study by García-Peñalvo in 2023 were highlighted that the ChatGPT tool does not replace the cognitive processes such as articles, books, or interactions with others. Therefore, this paper aims to evaluate the use of ChatGPT tool in calculus material for undergraduate students in Kuwait. The objective was to gather the data from a wide range of undergraduate students were only selected from the classrooms of calculus material covers differentiation and integration of functions in Kuwait. This was achieved through a questionnaire survey and face-to-face interviews directed to undergraduate students from the classrooms of calculus material in Kuwait.

## Research Methodology

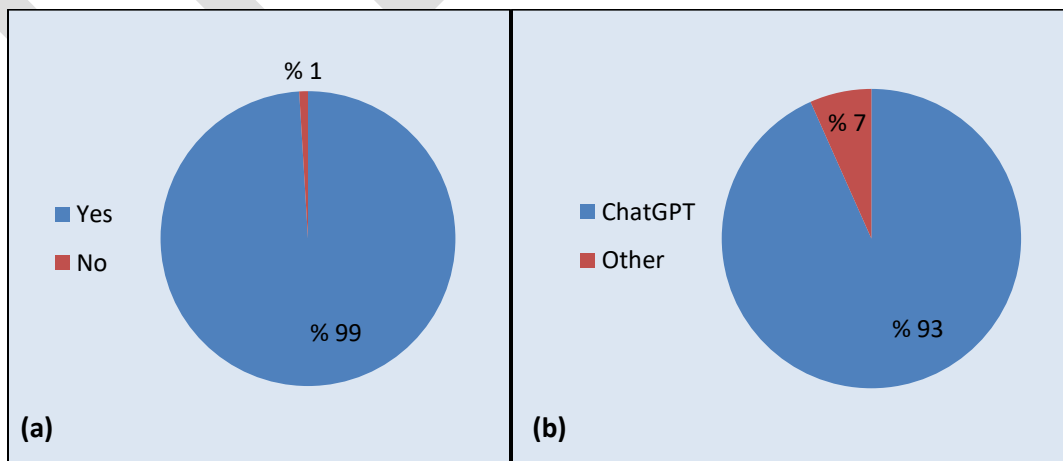
Given that the use of ChatGPT in education is still being evaluated, the questionnaire survey is useful in collecting quantitative and qualitative data from a wide range of mathematic students. The questionnaire was given to 105 of male and female for undergraduate students, as shown in Figure 2. Hence, the undergraduate students were only selected from the classrooms of calculus material covers differentiation and integration of functions. The questionnaire was launched between the Full semester 2024 to 2025 and the Summer semester 2025 to 2026. The age of students responses were from: 18 to 25 and 26 to 35 years old. The face-to-face interviews for undergraduate students were also conducted between the Full semester 2024 to 2025 and the Summer semester 2025 to 2026.



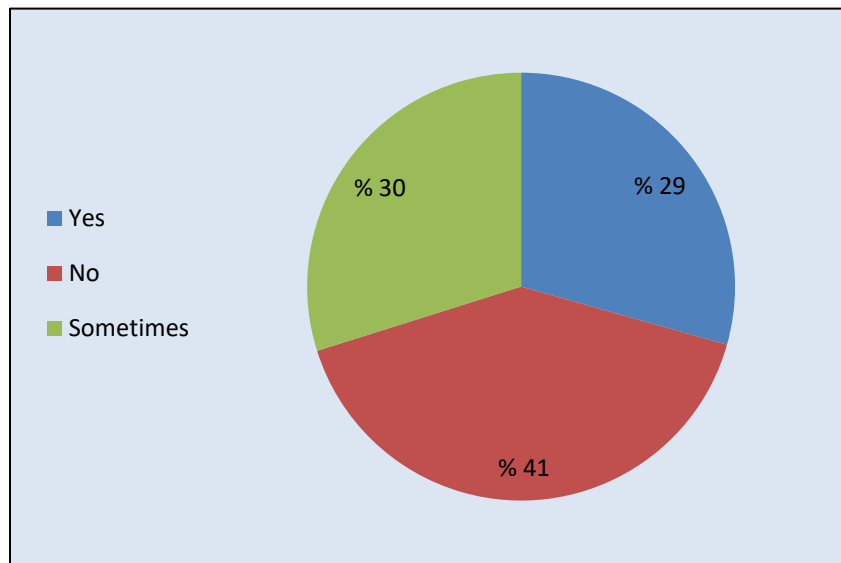
**Figure 2.** The total respondents of male and female for undergraduate students.

## Findings

The majority of the undergraduate students (99%) studied in calculus material were used the applications of AI, as shown in Figure 3(a). The results were also showed that the majority of the respondents (93%) are familiar with ChatGPT tool, as shown in Figure 3(b). Moreover, almost of respondents (41%) indicated that the ChatGPT tool is not helpful in the calculus material, as shown in Figure 4.



**Figure 3.** The total percentage of undergraduate students used the applications of: (a) AI (b) ChatGPT tool in Calculus material in Kuwait.



**Figure 4.** The total percentage of undergraduate students with regards of helped, not helped or sometimes helped, after using the ChatGPT tool in Calculus material in Kuwait.

## Discussion

In Figure 4, it can be observed that almost of respondents were not happy, after using the ChatGPT tool for calculus material, this was because (41%) of them were responses that the ChatGPT tool is not helpful in the calculus material. This may be related to the previous studies reported that the mathematics students in calculus material were often misunderstand the basic Calculus concepts.

Moreover, the face-to-face interviews revealed that the most of undergraduate students were struggling to understand the results as well as the feedback after using the ChatGPT tool for calculus material. Furthermore, the face-to-face interviews revealed that the most of undergraduate students were prefer to ask lecturer of calculus material, social medial such as YouTube and colleagues instead of using the ChatGPT tool to figure out their issue regards to the calculus material. From this, it may be possible related to the previous studies reported that the mathematics students in calculus material were often misunderstand the basic Calculus concepts. However, further research is required to explore the main issue regards to their knowledge of the basic calculus concepts and the results as well as the feedback after using the ChatGPT tool for calculus material.

## CONCLUSION

The undergraduate students in Kuwait has been used the artificial intelligence (AI) by themselves in the educational field. ChatGPT tool is one of the main applications of AI used by the most of undergraduate students for calculus material in Kuwait. The results from a questionnaire survey revealed that the most of undergraduate students are not happy, after using the ChatGPT tool for calculus

material. Moreover, the face-to-face interviews revealed that the most of undergraduate students can not understand the results and the feedback after using the ChatGPT tool for calculus material. This was because the most of undergraduate students have not enough knowledge to understand the results and the feedback after using the ChatGPT tool for calculus material.

Clearly, further research is required to develop a better understanding. For example, face-to-face interviews with individuals for undergraduate students to figure out their issue after using the ChatGPT tool for calculus material. Further research is also required to supporting and encouraging researchers in various materials within the mathematic field in order to collect more information that can help the educational for undergraduate students.

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