

Utilizing ChatGPT for Teaching Computer Networking

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Abstract

ChatGPT has taken the world by storm in recent years with its ability to interact and respond in a ‘human way’ form. Despite the warm reception, there are also concerns regarding integrity, plagiarism and worry about too much reliance on ChatGPT. Nevertheless, just like with other technologies, resistance is futile, yet its benefit must be embraced while maintaining some guidelines to be adhered. This paper presents the implementation of ChatGPT in teaching and learning theoretical parts of Introduction to Networking course. Though this is a laboratory-embedded course, the cognitive skills part still contributes to 40% of the assessment. It is challenging to maintain engagement and attract the attention of students during lecture sessions compared to laboratory sessions. Therefore, ChatGPT is utilized in various techniques to achieve the mentioned objective.

Keywords: ChatGPT, Education, Teaching, Learning, Networking

INTRODUCTION

The usage of technology in education, in particular the teaching and learning process is not something new. Transitioning from simply utilizing software or gadget, Artificial Intelligence (AI) has also been incorporated into educational methods. ChatGPT (Generative Pre-trained Transformer) however has been garnering special attention in recent years.

ChatGPT is created by OpenAI by employing AI to produce text that resembles human writing. It is beneficial for a variety of activities thanks to its friendly way in responding to prompts. It can also be taught to carry out particular duties, such as finishing a conversation you've started or responding to inquiries. Higher education especially benefits from ChatGPT as it could assist with brainstorming and writing. The model can learn about the required styles and formatting of a paper. Consequently, it will be able to offer suggestions and adjustments to enhance the writing's coherence and clarity [1].

Another attractive feature of ChatGPT is the ability to cater personalized or individualized learning. Anyone can learn at their own pace and still be able to obtain immediate response from ChatGPT. Technology is used in personalized learning to adapt education to the specific requirements and skills of each student, including those with disabilities; making the learning process faster and more successful [1, 2].

This paper tackles the challenging aspect to ensure engagement and capture the attention of students during the lecture session. The lecture session is important to convey the theories for cognitive skills. For the theoretical part, instead of just going through slides and doing tutorials the conventional way, ChatGPT is used as an alternative medium. Instead of exploring the dos and don'ts of using ChatGPT, this paper focuses on how to utilize it for interactive teaching and learning process.

LITERATURE REVIEW

Reference [3] summarizes five primary advantages of ChatGPT which include the ability to create learning assessments, improve pedagogical practice, provide virtual one-on-one coaching, develop outlines, and brainstorm ideas. However, there are some potential concerns such as academic integrity, unfair evaluation, incorrect information, and excessive dependence on AI. However, [4] argued that evolution in assessment methods is inevitable. Universities have witnessed the implementation of online exams, indicating preparedness to handle AI which has become more prevalent. Just like there was unnecessary concern that people's numeracy skills may deteriorate when calculators came into the picture, students and academics have been using online grammar checkers, encyclopedias, and dictionaries for quite some time.

ChatGPT possesses significant potential for educators and educational institutions to enhance the instruction and evaluation of second and foreign languages, One instance is that it can be a personal language tutor with instant feedback compared to human tutors who could take more time to respond [5]. Productivity and efficiency can also be increased in the educational process through ChatGPT. According to the data obtained by interviews conducted in [6], ChatGPT could assist users find ideas and information online, translate written content, and provide different questions to help them comprehend a topic better.

A study conducted in [7] aims to examine the perspectives of various stakeholders, such as students and educators, on the use of artificial intelligence namely ChatGPT in teaching mathematics. ChatGPT's ability was tested to solve mathematic equations, the limit of functions, and geometry. Meanwhile, various methods for measuring and evaluating education are examined in [8]. The methods include test purpose specification and determination, test blueprint development, test item generation/development, test item assembly/selection, test administration, test scoring, interpretation of test results, test analysis/appraisal, and reporting.

An electrical magnetism class in the United Arab Emirates was specifically selected to investigate the perceptions of eleventh-grade students about ChatGPT. Two groups were randomly selected, one experimental group having access to ChatGPT and the other control group without having any access to ChatGPT. The findings have shown that ChatGPT improved student performance and views of their electrical magnetism education [9].

METHODOLOGY

Based on the literature review, teaching and learning activities that are suitable to the nature of the subject are identified. The related classroom activities are then applied or planned. Evaluation can be done based on the instructor's or student's perception. For the time being, this work currently does not investigate the students' perceptions; therefore, this will become the future works. All the processes are done continuously as the related works will keep emerging over time and need to be studied. The methodology employed is shown in Fig. 1 below.

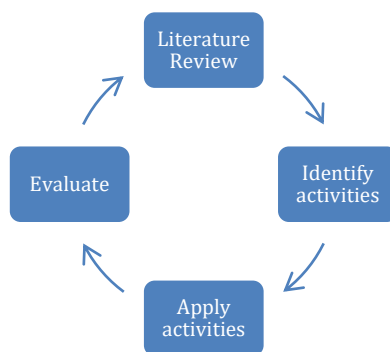


Fig. 1 Methodology

RESULT AND DISCUSSION

This section outlines the identified teaching and learning activities for teaching computer networking by using ChatGPT.

Asking Question for Expected Answer

The first implemented activity is about manipulating the response by ChatGPT. Instead of directly asking ChatGPT, the students should have the initial knowledge and ability to verify the facts. Students are required to ask questions that will provide the desired answer. For the first chapter, which is about Open Systems Interconnection (OSI) Seven Layers, students aim for ChatGPT to answer a specific OSI layer. The students need to be able to come up with a question that gives the expected answer. For instance, students can ask: What is the lowest OSI layer to obtain Physical Layer as the response. Some of the questions designed by the students are shown in Table 1 below:

Table 1 Designed questions for ChatGPT

Expected Response	Question
Physical Layer	Could you please explain and give name about the first layer of OSI Model?
Data Link Layer	What is the name of layer that uses protocol to describe methods for exchange data frames between device in OSI model?
Network Layer	What is the name of the layer that exchanges the data between identified devices?
Transport Layer	Talking about OSI model, which layer is responsible for delivery a data between devices?
Application Layer	What is the layer that is closest to the end user?

The students shared their designed questions in the assigned Padlet as shown in Fig. 2.

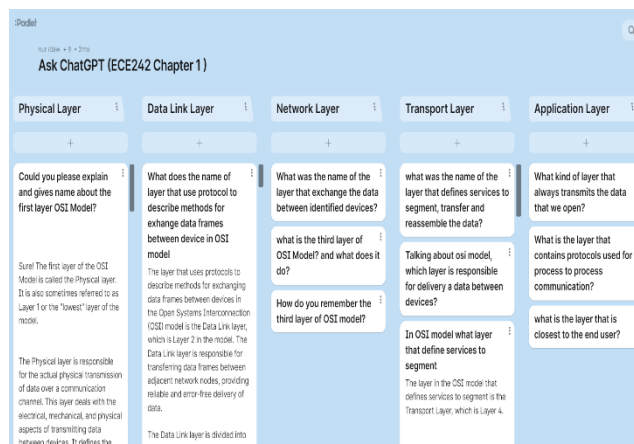


Fig. 2. Padlet for asking ChatGPT activity

Meanwhile Fig. 3 shows one of the responses given by ChatGPT to a designed question.

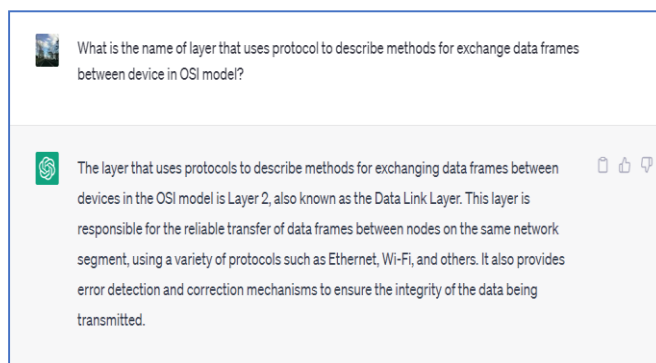


Fig. 3. Sample of ChatGPT's response

As shown in Fig. 3, the response given by ChatGPT is quite lengthy instead of just stating the OSI layer's name. This helps reaffirms the students' understanding of the related content. This activity is in line with the reverse searching technique mentioned in [10]. Reverse searching allows students to attempt to use outputs to locate references and supporting data for ChatGPT-generated content.

Suggestion of Games

The second activity is closely related to ChatGPT's ability to generate lesson plans. The Introduction to Networking course contains many protocols that are quite abstract to grasp. Analogies are often given during lecture to help the students visualize the operation of the protocol. With ChatGPT, the instructor could ask suggestion of games for teaching certain protocol, for instance Carrier Sense Multiple Access / Collision Detection (CSMA/CD). The answer given is very interesting and practical as shown in Fig. 4.

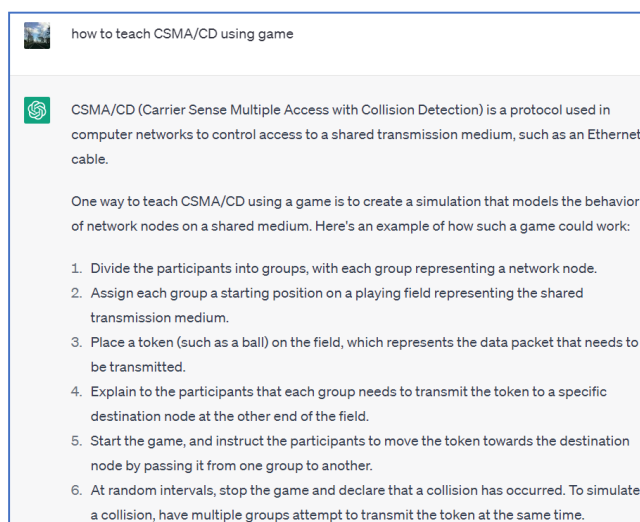


Fig. 4. Suggested game for teaching CSMA/CD

The instructor also prompted ChatGPT about suitable games to teach OSI model. The response is depicted in Fig. 5.

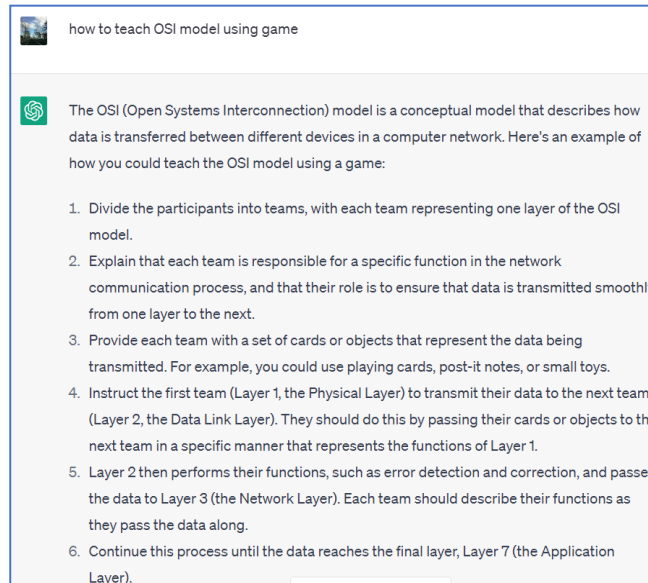


Fig. 5. Suggested game for teaching OSI model

Before ChatGPT, the instructor used Google search engine to discover possible games for lessons. However, the instructor needed to explore many websites and devised the game on their own compared to having detailed suggestion in single response generated by ChatGPT. This certainly makes the preparation for teaching and learning easier. It is really important for teachers to develop and include interactive classroom activities to enhance pedagogical practices [3].

Suggestion for Group Activities

ChatGPT can also be utilized to propose group activities during lesson. The following prompt was given: "Create group activities to discuss about real world issue in computer networking." ChatGPT responded with three options: case study analysis, simulation exercise and debate. The details are shown in Fig. 6. Sometimes the instructor is at loss to come up with idea for making the class more interesting. The suggestions serve as starting point which can be expanded by instructor.

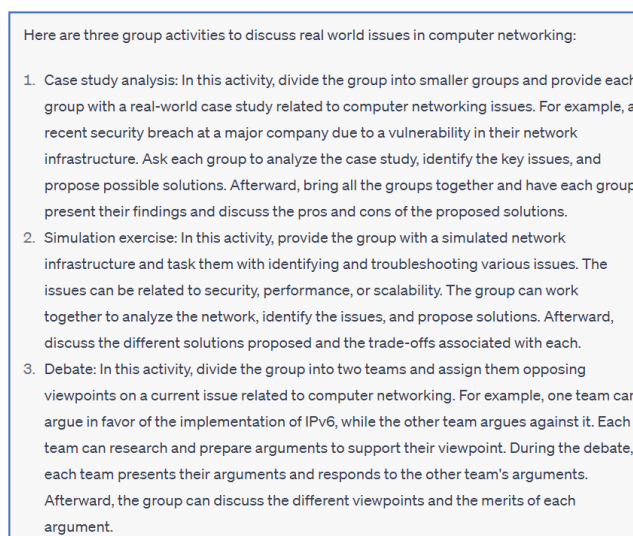


Fig. 6. Suggested group activities

Certainly, ChatGPT can be used to promote collaboration and teamwork between participants with the help of effective teaching tactics. It has the potential to be used as a tool for creating various scenarios in which students collaborate to solve problems and accomplish objectives. Students can support and learn from one another in this way, helping to develop a sense of community [4].

Assessment Component

Assessment is also another potential aspect that can be handled by ChatGPT [11]. However, Introduction to Networking course relies heavily on designated Course Outcome-Program Outcome alignment for its assessment. Therefore, should ChatGPT be used, careful and clear setup must be given before proceeding. For instance, Introduction to Networking course involves group project which includes project management and financial skills. ChatGPT could assist in designing rubrics for this particular evaluation. As shown in Fig. 7, ChatGPT is requested to create an assessment rubric for project management and financial skills.

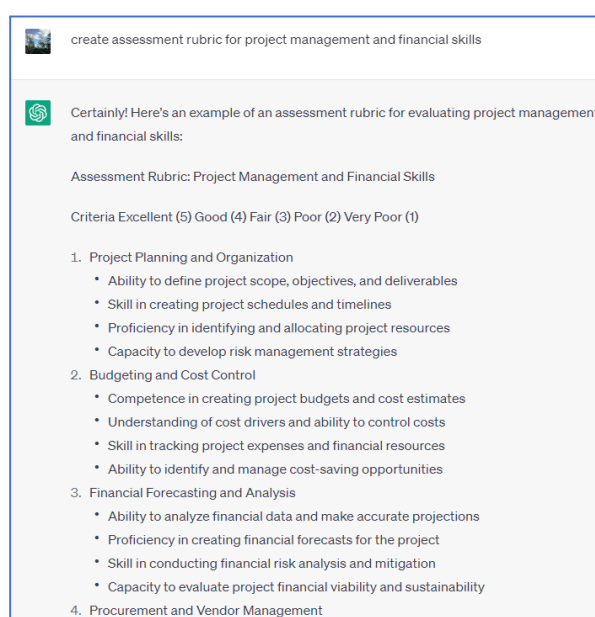


Fig. 7. Sample assessment rubric

ChatGPT lists possible criteria to be evaluated along with the scales. Only the suitable criteria are selected by the instructor with respect to the project question and marks allocations.

To avoid plagiarism and integrity issue, students can also be assigned with tasks of checking the answers provided by ChatGPT. To gather complete and appropriate information, students must conduct numerous searches, thus they must have the essential abilities to come up with satisfactory results. Every checking process must be documented as evidence of the students' efforts. On the other hand, the instructor could generate texts for certain assignment using ChatGPT. The students are expected to analyse the text (i.e., information), check its accuracy, criticise it, look for more relevant texts, synthesise it, and build on it [10].

Despite the capability of ChatGPT to assist students and educators in a variety of ways, it cannot totally replace human connection [12]. Even though ChatGPT may ease the task for instructors in creating lessons, rubrics, and quizzes; any AI-generated resource still needs to be verified and customized to their own instructional situations [13].

However, simply banning the usage of ChatGPT is not a practical option. It is widely available and very easy to access and obtain. As ChatGPT is an AI-based tool that has unprecedented availability and level of sophistication, rules and regulations must be identified carefully. The rules must be customized accordingly based on a person's role. For example, a student may have different code of conduct compared to an instructor or a personnel [14].

CONCLUSION

To improve students' cognitive skills for Introduction to Networking course, some activities are derived through assistance of ChatGPT. In addition, these activities are also expected to make the teaching and learning process more interactive and engaging. The plan for implementation of these activities is outlined in this paper. However, the effectiveness with respect to students' grades has not yet been evaluated. Further study can be conducted after the semester concludes and the final marks are obtained.

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REFERENCES

- [1] S. Atlas, "ChatGPT for higher education and professional development: A guide to conversational AI," 2023.
- [2] E. Opara, A. Mfon-Ette Theresa, and T. C. Aduke, "ChatGPT for Teaching, Learning and Research: Prospects and Challenges," *Opara Emmanuel Chinonso, Adalikwu Mfon-Ette Theresa, Tolorunleke Caroline Aduke (2023). ChatGPT for Teaching, Learning and Research: Prospects and Challenges. Glob Acad J Humanit Soc Sci*, vol. 5, 2023.
- [3] S. Sok and K. Heng, "ChatGPT for Education and Research: A Review of Benefits and Risks," *Available at SSRN 4378735*, 2023.
- [4] J. Rudolph, S. Tan, and S. Tan, "ChatGPT: Bullshit spewer or the end of traditional assessments in higher education?," *Journal of Applied Learning and Teaching*, vol. 6, no. 1, 2023.
- [5] W. C. H. Hong, "The impact of ChatGPT on foreign language teaching and learning: opportunities in education and research," *Journal of Educational Technology and Innovation*, vol. 5, no. 1, 2023.
- [6] R. Firaina and D. Sulisworo, "Exploring the usage of ChatGPT in higher education: Frequency and impact on productivity," *Buletin Edukasi Indonesia*, vol. 2, no. 01, pp. 39-46, 2023.
- [7] Y. Wardat, M. A. Tashtoush, R. AlAli, and A. M. Jarrah, "ChatGPT: A revolutionary tool for teaching and learning mathematics," *Eurasia Journal of Mathematics, Science and Technology Education*, vol. 19, no. 7, p. em2286, 2023.
- [8] V. J. Owan, K. B. Abang, D. O. Idika, E. O. Etta, and B. A. Basse, "Exploring the potential of artificial intelligence tools in educational measurement and assessment," *EURASIA Journal of Mathematics, Science and Technology Education*, vol. 19, no. 8, p. em2307, 2023.
- [9] S. Alneyadi and Y. Wardat, "ChatGPT: Revolutionizing student achievement in the electronic magnetism unit for eleventh-grade students in Emirates schools," *Contemporary Educational Technology*, vol. 15, no. 4, p. ep448, 2023.
- [10] M. Halaweh, "ChatGPT in education: Strategies for responsible implementation," 2023.
- [11] S. Jalil, S. Rafi, T. D. LaToza, K. Moran, and W. Lam, "Chatgpt and software testing education: Promises & perils," *arXiv preprint arXiv:2302.03287*, 2023.
- [12] F. Fauzi, L. Tuhuteru, F. Sampe, A. M. A. Ausat, and H. R. Hatta, "Analysing the Role of ChatGPT in Improving Student Productivity in Higher Education," *Journal on Education*, vol. 5, no. 4, pp. 14886-14891, 2023.
- [13] G. Cooper, "Examining science education in chatgpt: An exploratory study of generative artificial intelligence," *Journal of Science Education and Technology*, pp. 1-9, 2023.
- [14] M. Sullivan, A. Kelly, and P. McLaughlan, "ChatGPT in higher education: Considerations for academic integrity and student learning," *Journal of Applied Learning and Teaching*, vol. 6, no. 1, 2023.

