ChatGPT's Impact on Education: Increasing Student's Learning Interest

Evaristus Didik Madyatmadja, Bina Nusantara University, Indonesia
Debri Pristinella, Atma Jaya Catholic University of Indonesia, Indonesia
Edbert Kurniawan, Bina Nusantara University, Indonesia
Dharmawan Elmadya, Bina Nusantara University, Indonesia
Priscillia Utama Christy, Bina Nusantara University, Indonesia
Rolando Krisnanto, Bina Nusantara University, Indonesia

The Asian Conference on Education 2024
Official Conference Proceedings

Abstract
ChatGPT has become a popular tool because of the ease it offers to obtain a variety of information. However, the decision of users such as students to use ChatGPT in the world of education and increase interest in learning can be influenced by several factors. In this research, researchers want to test variables in the Unified Theory of Acceptance and Use of Technology research model which consists of Performance Expectancy (UTAUT), Effort Expectancy, Social Influence, Facilitating Conditions, Behavioral Intention, and Decision to Use ChatGPT with the aim of determining variables which is a positive influencing factor that supports students to use ChatGPT in education which increases interest in learning. This research was carried out by distributing an online questionnaire in the form of a Google form containing 30 questions with each research variable having 5 indicators which received 322 respondents. The data obtained were analyzed using Smart PLS 3 and the research results found that the use of ChatGPT by students in education to increase interest in learning was most influenced by the Facilitating Conditions variable, but the Performance Expectancy variable was an insignificant variable in influencing students to use ChatGPT in education and increase interest in learning. To help understand the interactions between the variables being tested and find out the factors that influence students to use ChatGPT in education and increase interest in learning, further research is needed that is more in-depth and uses a larger number of respondents to get accurate results.

Keywords: ChatGPT, Study, Education, UTAUT

Introduction

The development of technology has become a means to simplify human life. Lately, there has been a lot of discussion about AI-based chatbot technology because it can facilitate individuals, especially in seeking specific insights. One of the most popular AI-based chatbots is ChatGPT, an acronym for Generated Pre-trained Transformer, discovered and developed by OpenAI. (Kartono et al., 2021). The reason this technology is widely discussed is due to its ease in helping find information. There is a statement suggesting that ChatGPT might surpass Google's search engine in one or two years (Ahuja et al., 2021). ChatGPT can answer user queries in human language, eliminating the need for users to search for keywords. With this convenience, it's not surprising that ChatGPT is widely used in various fields of life, including education. The utilization of ChatGPT in education has its strengths and weaknesses. While ChatGPT can assist learners in finding answers and getting online advice, the data may not be accurate (Li et al., 2020). The existence of these pros and cons underscores the importance of employing the right strategies for ChatGPT in education. Educators and students must understand the limitations of this technology when using it as a tool to provide guidance and insights. It is also essential to validate and scrutinize all information provided. Educators should help students develop critical and analytical thinking skills with ChatGPT so that they can distinguish between right and wrong information. The role of educators in assisting students in using ChatGPT requires an understanding of how ChatGPT operates, ensuring that its usage enhances the learning experience (Cho et al., 2019).

In the digital era where almost every aspect of life has been modernized, education also indicates the need for awareness in utilizing technology for positive impacts on life, to align the fundamental direction of technology development that positively facilitates human life. This can be applied in education with the use of ChatGPT. The presence of ChatGPT, which facilitates its users, including students, in searching for specific information and answers, does not automatically make ChatGPT a tool resulting from technological development that has a positive impact. The existence of drawbacks such as the lack of data validation from ChatGPT requires users to double-check the data generated by using ChatGPT (Madyatmadja et al., 2020).

A. Research Problem

Certainly, the process of data validation assurance can influence the use of ChatGPT, such as its impact on students' learning interests. The possibility exists that the development of ChatGPT could enhance the learning experience, potentially increasing students' interest in learning. However, due to the mentioned drawbacks, ChatGPT may not be sufficiently capable of boosting this interest. In line with this specific research aiming to test ChatGPT in education associated with students' learning interests, the following are the problem formulations in this study:

A. Does Performance Expectancy have a positive effect on Behavioral Intention in the use of ChatGPT regarding student learning interests?
B. Does Effort Expectancy have a positive effect on Behavioral Intention in the use of ChatGPT regarding student learning interests?
C. Does Social Influence have a positive effect on Behavioral Intention in the use of ChatGPT regarding student learning interests?
D. Does Facilitating Conditions have a positive effect on Decision to Use in the use of ChatGPT regarding student learning interests?

E. Does Behavioral Intention have a positive effect on Behavioral Intention to Decision to Use in the use of ChatGPT regarding student learning interests?

B. Research Objectives

The objective of this research is to examine the impact of using ChatGPT in education, specifically on students' learning interest, while testing the following aspects:

A. To understand the impact of Performance Expectancy on Behavioral Intention in the use of ChatGPT regarding students' learning interests.
B. To understand the impact of Effort Expectancy on Behavioral Intention in the use of ChatGPT regarding student learning interests.
C. To understand the impact of Social Influence on Behavioral Intention in the use of ChatGPT regarding student learning interests.
D. To understand the impact of Facilitating Conditions on Decision to Use in the use of ChatGPT regarding student learning interests.
E. To understand the impact of Behavioral Intention on Behavioral Intention Decision to Use in the use of ChatGPT regarding student learning interests.

Background Study

A. Friendship With ChatGPT: A Transformation in Education

ChatGPT is a tool that plays a significant or beneficial role in the field of education. ChatGPT has the potential to assist individuals in the educational realm by personalizing learning development, making it easier by providing specific assessments, feedback, and accuracy that aid in alleviating cognitive load. However, it also has drawbacks and challenges related to plagiarism, which poses a threat to the integrity of education (Gavilan et al., 2020).

B. The Use of ChatGPT in the World of Education for Students

ChatGPT, based on Artificial Intelligence (AI) and developed by OpenAI, is now widely accepted in various fields, including education. Students can learn about ideas and theories using this technology while generating content with ChatGPT (Tandon et al., 2021). ChatGPT provides highly useful benefits in the field of education, particularly in delivering more personalized learning experiences, offering broad and affordable accessibility, providing highly interactive learning resources, and assisting in problem-solving tasks.

C. UTAUT (Unified Theory of Acceptance and Use of Technology)

The Unified Theory of Acceptance and Use of Technology (UTAUT) is one model that aims to understand and examine user behavior toward the use of information technology (Prasetyo, Y. T., 2021). Within UTAUT, there are four core determinants: performance expectancy, effort expectancy, social influence, and facilitating conditions.

D. Performance Expectancy

Performance Expectancy is a measure of an individual's belief in the ability of an information system technology to enhance job performance (He et al., 2018). Based on this explanation, Performance Expectancy is related to users' expectations regarding the use of information system technology, such as AI ChatGPT, to enhance students learning interests.

E. Effort Expectancy

Effort Expectancy is a measure that gauges the level of effort or exertion from users regarding the use of a system or technology. Within this measure, there are two dimensions: complexity and ease of use. Complexity measures the user's perceived level of difficulty in using the technology, while ease of use measures the user's perception of how easy it is to use the technology (Prasetyo, 2021). Effort Expectancy is broadly related to the complexity and ease of use of information system technology, such as AI ChatGPT, in enhancing student learning interests.

F. Social Influence

Social Influence is a measure that assesses the extent to which a user or an individual can influence others to believe and be confident in using a technology, such as AI ChatGPT. Within this measure, there are two dimensions: social factor and subjective norm. Social factor measures how much a person is influenced by others using the technology, while subjective norm is related to the importance and influence of significant others on the user's adoption of the technology (Prasetyo, 2021). In broad terms, Social Influence is about measuring how much an individual user can influence others to believe and trust in using information system technology, such as AI ChatGPT, to enhance students learning interests.

G. Facilitating Conditions

Facilitating Conditions is a measure that assesses the extent to which users believe that the resources and technical infrastructure available in the information system technology can support them in using that technology. Within this measure, there are three dimensions: resource, knowledge, and compatibility. The resource dimension helps identify external sources that can influence the use of the information system technology. The knowledge dimension assesses external sources of knowledge to use the information system technology. The compatibility dimension evaluates the alignment of the system with the technology used by the user (Prasetyo, 2021). In broad terms, Facilitating Conditions are about measuring how much users can trust and rely on the technical infrastructure and resources available in the technology. This, in turn, supports users in using information system technology, such as AI ChatGPT, to enhance students learning interests.

H. Behavioral Intention

Behavioral Intention is a measure that gauges the extent of a user's desire to continue using the technology continuously (Puspita, M. et al., 2020). There are two dimensions: intention and continuation. The intention dimension measures the user's level of willingness to continue using the information system technology, while the continuation dimension assesses how far the user plans to continue using the information system technology (Prasetyo, 2021). In broad terms, Behavioral Intention is a measure of how much users desire to continue using information system technology, such as AI ChatGPT, to consistently enhance students learning interests.

Research Method

This research employs a quantitative method that collects respondent data through an online questionnaire distributed and processed using SMART PLS. The study also utilizes various

previous research journals and articles as literature reviews and a Systematic Literature Review (SLR).

The research model used in this study is the Unified Theory of Acceptance and Use of Technology (UTAUT). UTAUT is one of the frequently used research models to explain or describe user acceptance of technology use. In this research, it tests an information system in the form of AI named ChatGPT. When using UTAUT as the research model, several modifications were made to the original model. Based on research conducted by Dwivedi et al. in 2019, it was mentioned that many studies only use the main concepts because researchers found that previous studies might not have used moderators since no differences were found in adoption and usage contexts (He, et al., 2018). The UTAUT model used in this study includes six main constructs: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Behavioral Intention (BI), and Decision to Use (DU). The following is the form of our research model:

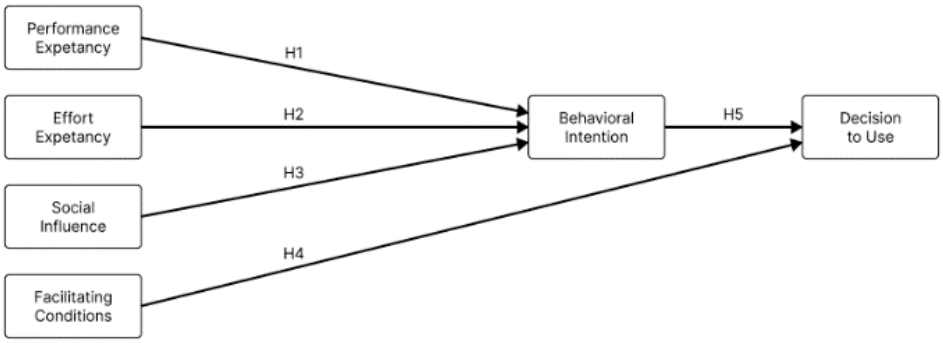

Figure 1: Research Model

A. Hypotheses

1) Performance Expectancy on Behavioral Intention in the use of ChatGPT regarding students' learning interests.

When an AI application of information system technology such as ChatGPT is able to provide a good user experience, it will be able to enhance behavioral intentions about the usefulness of such technology. In this case, behavioral intent refers to the student's desire to behave in a particular way, for the purpose of learning. Based on previous research, Perceived Usefulness Performance Expectancy has a similar relationship with the benefits of a technology. Both are related to the extent to which the use of AI-based information systems such as ChatGPT can help learning (Zhao et al., 2020). From the statement arose the argument that Performance Expectancy could have a positive influence on the Perception of Usability (Perceived Usefulness). To prove the hypothesis, here are the arguments to be tested in this study:

H1: Performance Expectancy positively influences the Behavioral Intention

2) Effort Expectancy on Behavioral Intention in the use of ChatGPT regarding students' learning interests.

The use of AI information system technology such as ChatGPT, should have a good performance and of course easy to access and use by the user, so that the user can directly feel the performance of the information system such as AI such as chatGPT. Based on

research by Menon and Shilpa (2023), if ChatGPT feels comfortable to use, it is likely that users will more often integrate it into their daily activities. This can result in increased use and gain further benefits from such technology (Afrilia, 2018). The argument in the study suggests that Effort Expectancy can have a positive influence on behavioral intentions (Behavioral Intention). To prove the argument, here are the hypotheses that will be tested in this study:

H2: Effort Expectancy positively influences the Behavioral Intention

3) Social Influence on Behavioral Intention in the use of ChatGPT regarding students' learning interests.

When the use of information system technology such as ChatGPT is easy to use by the user, then the technology can surely benefit the user. This can happen because users can explore and exploit it easily. The use of ChatGPT by a person can be influenced socially, especially by young people through social media, because a positive social influence is capable of encouraging a person to use ChatGTP (Lapalelo, 2022). So it can be said that Perceived Ease of Use can have a positive influence on the perception of usability (Perceived Usefulness). To prove the argument, here are the hypotheses that will be tested:

H3: Social Influence positively influences the Behavioral Intention

4) Facilitating Conditions on Decision to Use ChatGPT in the use of ChatGPT regarding students' learning interests.

According to Menon and Shilpa (2023) in the case of ChatGPT, the existence of facilitative conditions such as access to devices with a good Internet connection and adequate technical assistance will have a significant impact on acceptance by users (Afrilia, 2018). Based on this argument, it can be concluded that if access to facilities and technical assistance that a student has sufficient will encourage the intention to use ChatGPT in learning, but otherwise if access is insufficient facilities or technical assistance then it may be an obstacle for students to be able to consistently use the ChatGTP in learning. To prove the argument, here are the hypotheses that will be tested:

H4: Facilitating Conditions positively influences the Decision to Use ChatGPT

5) Behavioral Intention on Decision to Use ChatGPT in the use of ChatGPT regarding students' learning interests.

ChatGPT is a technological development in the field of AI that has many benefits for its users. It does not exclude the possibility of making ChatGPT a friend and more than just a tool to encourage the use of ChatGTP over a long period of time (Maretha et al., 2020). Through the statements of the previous research, the argument arises that the Behavioral Intention has an influence on the decision to use of ChatGPT. To prove the argument, here is the hypothesis tested:

H5: Behavioral Intention positively influences the Decision to Use ChatGPT

Results and Discussion

In our research on the impact of ChatGPT on education: increasing student learning interest, we used SmartPLS 3 to process data collected through online questionnaires. The results of the calculations for the relationship between variables that represent each hypothesis on this study in the research model used:

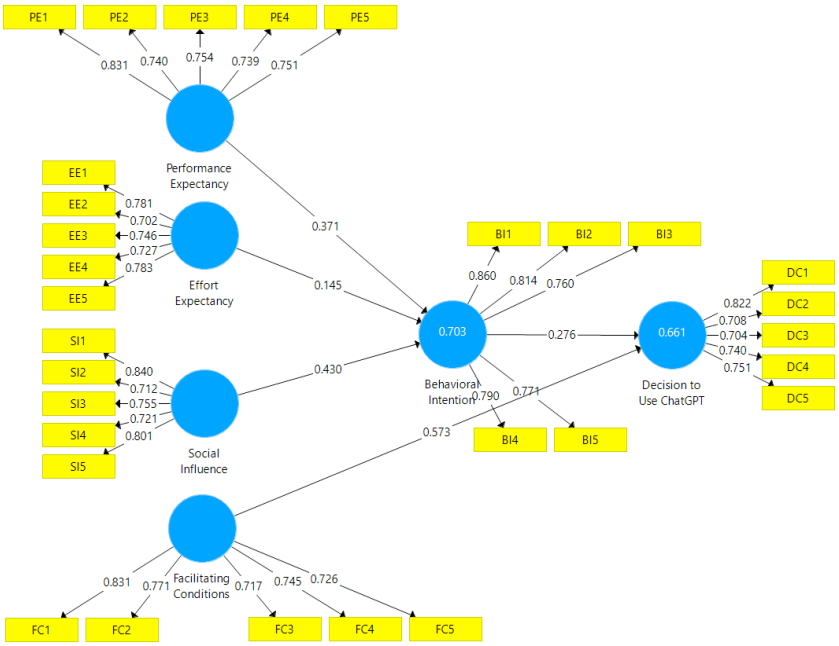

Figure 2: Calculation Result

A. Indicator and Construct Validity

In the process of validation of indicators and constructions, the method used is outer loading. Outer loading exceeding the value of 0.6 indicates that the indicator formed has a high significance and can effectively reflect the design in question. Conversely, if the outer loading value is below the minimum limit, the recommended step is to eliminate the indicator by deleting it. Here are the results of our research that reflects indicator and construct validity.

B. Reliability

To assess the validity of a structure and to measure its reliability, the method that can be used is the Average Variance Extracted (AVE). A structure is considered valid if its AVE value is equal to or greater than 0.50. Meanwhile, to assess the reliability of the structure in the study, it can be done by considering the Cronbach alpha value on each factor. A factor is considered to have good reliability if its Cronbach Alpha value exceeds 0.70 (Prasetyo et al., 2021).

Table 1: Reliability Scores

Variables	Cronbach's Alpha	AVE	Reliability
Performance Expectancy	0,822	0,583	Reliable
Effort Expectancy	0,803	0,560	Reliable
Social Influence	0,824	0,589	Reliable
Facilitating Conditions	0,816	0,576	Reliable
Behavioral Intention	0,859	0,640	Reliable
Decision to Use ChatGPT	0,800	0,557	Reliable

C. Path Coefficients

In path analysis, the calculation of a path coefficient involves the use of original sample data and a p value. A path model is considered significant if its p value is less than 0.05 (Prasetyo et al., 2021). This indicates that the probability of the result being found is due to coincidence less than 5%. The value of the initial sample reflects the extent to which the total variability in the dependent variable can be explained by the set of independent variables in the model.

Table 2: Path Coefficients

Hypotheses	Original Sample	Sample Mean	Standard Deviation	T Statistics	P-Value
BI>DC	0,276	0,279	0,076	3,655	0,000
EE>BI	0,145	0,138	0,100	1,457	0,145
FC>DC	0,573	0,571	0,078	7,387	0,000
PE>BI	0,371	0,375	0,095	3,905	0,000
SI>BI	0,430	0,435	0,077	5,593	0,000

D. Discussion

To evaluate whether a hypothesis can be accepted or rejected, the original sample data and p-values obtained from bootstrapping results need to be examined. This Hypothesis Testing is conducted with the assistance of the SmartPLS 3 application, and the results can be seen in the table showing path coefficients in the previous section.

1) Performance Expectancy positively influences the Behavioral Intention

It tests whether Performance Expectancy can have a positive effect on Behavioral Intention. Based on the test results, the Original Sample Data shows a value of 0.371 and P Values of 0.000. According to these results, it can be considered significant as it has P Values <0.05, so the fourth hypothesis is accepted. This proves that Performance Expectancy can have a positive effect on Behavioral Intention. According to the research findings, Performance Expectancy positively influences Behavioral Intention by 37.1%, related to the use of ChatGPT to enhance students' learning interest. The recommendation is to conduct further research related to the benefits and productivity derived from the use of ChatGPT for students, specifically concerning improving learning interest. Productivity and performance of ChatGPT can be influenced by various factors such as information sources affecting the quality of information provided by ChatGPT to students.

2) Effort Expectancy positively influences the Behavioral Intention

In the second hypothesis, it tests whether Effort Expectancy can have a positive effect on Behavioral Intention. The test results show that the Original Sample Data has a value of 0.145 and P Values of 0.145. These results are considered not significant as they have P Values >0.05, so the second hypothesis is rejected. This indicates that Effort Expectancy cannot have a positive effect on Behavioral Intention when related to increasing learning interest with the use of ChatGPT. The recommendation is to conduct further research on factors influencing Effort Expectancy not having a positive effect on Behavioral Intention, which can be done by changing the research target and adding supportive factors related to the positive influence of Effort Expectancy on Behavioral Intention, such as usage guidelines.

3) Social Influences positively influences the Behavioral Intention

In the third hypothesis, it tests whether Social Influence can have a positive effect on Behavioral Intention. The test results show that the Original Sample Data has a value of 0.430 and P Values of 0.000. These results are considered significant as they have P Values <0.05, so the fifth hypothesis is accepted. This proves that Social Influence can have a positive effect on Behavioral Intention. According to the research findings, Social Influence positively influences Behavioral Intention by 43%, related to the use of ChatGPT to enhance students' learning interest. The recommendation is to conduct further research to identify supportive factors for Social Influence that can strengthen the positive influence on Behavioral Intention in the use of ChatGPT by students to enhance learning interest. Some supportive factors that can be considered include the type of social influence and social experience. The type of social influence relates to the source of influence obtained, and social experience is related to the actual use of ChatGPT, which can socially influence students to use ChatGPT and enhance their learning interest.

4) Facilitating Conditions positively influences the Decision to Use ChatGPT

In the fourth hypothesis, it tests whether Facilitating Conditions can have a positive effect on Decision to Use ChatGPT. The test results show that the Original Sample Data has a value of 0.573 and P Values of 0.000. These results are considered significant as they have P Values <0.05, so the third hypothesis is accepted. This proves that Facilitating Conditions can have a positive effect on Decision to Use ChatGPT. According to the research findings, Facilitating Conditions positively influence Decision to Use ChatGPT by 57.3%. The recommendation is to conduct further research focusing on the long-term use of ChatGPT, considering the ease of obtaining devices or technological facilities that can be used by users, especially students, in using ChatGPT to enhance students' learning interest in the long term.

5) Behavioral Intention positively influences the Decision to Use ChatGPT

In the fifth hypothesis, it tests whether Behavioral Intention can have a positive effect on Decision to Use ChatGPT. The test results show that the Original Sample Data has a value of 0.276 and P Values of 0.000. These results are considered significant as they have P Values <0.05, so the first hypothesis is accepted. This proves that Behavioral Intention can have a positive effect on Decision to Use ChatGPT, meaning that the more someone intends to use something in an activity such as learning with ChatGPT, the more it supports their decision to use it. Based on the hypothesis testing results, it can be concluded that Behavioral Intention positively influences Decision to Use ChatGPT by 27.6%, related to the use of ChatGPT to

enhance students' learning interest. The recommendation is to increase focus on identifying supportive factors for users, especially students, in using ChatGPT to enhance learning interest, such as psychological factors and the impact resulting from the use of ChatGPT in student learning.

Table 3: Hypothesis Testing Results

Hypotheses		Result	Explanation
H1	*Performance Expectancy positively influences the Behavioral Intention*	Original Samples = 0,371 P-Values = 0,000	Accepted
H2	*Effort Expectancy positively influences the Behavioral Intention*	Original Samples = 0,145 P-Values = 0,145	Rejected
H3	*Social Influence positively influences the Behavioral Intention*	Original Samples = 0,430 P-Values = 0,000	Accepted
H4	*Facilitating Conditions positively influences the Decision to Use ChatGPT*	Original Samples = 0,573 P-Values = 0,000	Accepted
H5	*Behavioral Intention positively influences the Decision to Use ChatGPT*	Original Samples = 0,276 P-Values = 0,000	Accepted

In addition to the recommendations that can be given above based on each hypothesis, there are also other recommendations when referring to the results of the test of hypotheses by taking the value of the original sample data with the highest value and the lowest value. The hypothesis that Facilitating Conditions may have a positive influence on Decision to Use ChatGPT is the hypotheses with the highest original sample value of 57.3%. This suggests that a statement that indicates that when a user is a student it is easy to get a device to use ChatGTP then it is the most influential positive factor in determining the use of chatGPT for learning and increasing interest in learning. This hypothesis could be the highest percentage because it could be influenced by the respondents answered by the majority of 19-20 years of age who are a generation of rapid technological developments, so respondents have a habit of using technology in everyday life that also supports the real use of such technology when using it because ChatGPT is part of the latest technological development that uses AI to make it easier for its users to obtain a variety of information simply by writing the questions they want to ask and ChatGTP can provide answers based on the source of information.

Meanwhile, there is a second hypothesis that the Effort Expectancy may have a positive influence on the Behavioral Intention becomes a rejected hypothesis. If linked with respondents to this study, it shows that the ease of using ChatGPT is not significant in supporting the use of ChatGTP in learning that enhances student learning interests. This may be because generally the generation between the ages of 19 and 20 is a Z gene that is still in the adolescent phase and may have a high level of curiosity and competitiveness so that it is more interested in using things that require a more complex process of understanding in their use so that they can adapt well.

Conclusions

In this study, six variables were used, consisting of Performance Expectancy (PE), Effort Expectance (EE), Social influence (SI), Facilitating Conditions (FC), Behavioral Intention (BI), and Decision to Use ChatGPT. (DC). A total of five hypotheses were tested using the SmartPLS 3 application to answer the research question with the following results.

First, to test whether Performance Expectancy can have a positive influence on Behavioral Intention. Based on the results, it was demonstrated that Performance Expected has an influence over Behavioral Intentions, so this hypothesis is acceptable. The result is because students who have a goal or a task feel that using ChatGPT will be more effective and help them in achieving the goal or completing the task.

Second, to test whether the Effort Expectancy can have a positive effect on the Behavioral Intention. The result is because students feel that their efforts in using ChatGPT are not in line with their expectations, in which case they may not want to use ChatGPT and switch to other software like ChatGPT.

Third, test whether Social Influences can have a positive effect on Behavioral Intention. Based on the results, it is shown that social influences can positively influence behavioral intention, so this hypothesis is acceptable. The result is because students gain a strong influence from several things, such as the influence of friends, social media influence, and the student's personal experience in using ChatGPT.

Fourth, to test whether Facilitating Conditions can have a positive impact on Decision to Use ChatGPT. Based on the results, it has been demonstrated that facilitating conditions can positively influence the decision to use ChatGPT, so this hypothesis is acceptable.

Fifth, testing whether Behavioral Intention can have a positive influence on the Decision to Use ChatGPT. Based on the results, it has been shown that Behavioral Intentions have an influence over the decision to use ChatGPT, so this hypothesis is acceptable. The result is because students who are willing and accustomed to using ChatGPT in education encourage the use of ChatGPT in the world of education and increase interest in learning.

Acknowledgements

This work is supported by Research and Technology Transfer Office, Bina Nusantara University as a part of Bina Nusantara University’s International Research Grant 2024.

References

Afrilia, A. M. (2018). Digital Marketing Sebagai Strategi Komunikasi Pemasaran "Waroenk Ora Umum" Dalam Meningkatkan Jumlah Konsumen. *Jurnal Riset Komunikasi*, 1(1): 147-157.

Ahuja, K., Chandra, V., Lord, V., & Peens, C. (2021). Ordering in: The rapid evolution of food delivery Succeeding in the fast-growing food-delivery ecosystem will require understanding how overlapping economic forces affect a complex web of stakeholders. *Technology*.

Cho, M., Bonn, M. A., & Li, J. J. (2019). Differences in perceptions about food delivery apps between single-person and multi-person households. Int. J. Hospit. Manag. 77, 108–116. https://doi.org/10.1016/j.ijhm.2018.06.019

Gavilan, D., Balderas-Cejudo, A., Fernández-Lores, S., & Martinez-Navarro, G. (2021). Innovation in online food delivery: Learnings from COVID-19. *International Journal of Gastronomy and Food Science*, *24*(September 2020). https://doi.org/10.1016/j.ijgfs.2021.100330

He, Z., Han, G., Cheng, T. C. E., Fan, B., & Dong, J. (2018). Evolutionary food quality and location strategies for restaurants in competitive online-to-offline food ordering and delivery markets: an agent-based approach. Int. J. Prod. Econ.

Kartono, R., & Tjahjadi, J. K. (2021). Investigating Factors Affecting Consumers' Intentions to Use Online Food Delivery Services During Coronavirus (COVID-19) Outbreak in Jabodetabek Area. *The Winners*, *22*(1), 1–14. https://doi.org/10.21512/tw.v22i1.6822

Lapalelo, P. A. (2022). The Pseudo-Low Price' Trap by "Go-Food and Grab Food" Online Food Delivery Services. *Jurnal Spektrum Komunikasi*, *10*(1), 78–91. https://doi.org/10.37826/spektrum.v10i1.274

Li, C., Mirosa, M., & Bremer, P. (2020). Review of online food delivery platforms and their impacts on sustainability. *Sustainability (Switzerland)*, *12*(14), 1–17. https://doi.org/10.3390/su12145528

Madyatmadja, E. D, Nindito, H., & Pristinella, D. (2020). Citizen Attitude: Potential Impact of Social Media Based Government. In Proceedings of the 2019 3rd International Conference on Education and E-Learning (ICEEL 2019). Association for Computing Machinery, New York, NY, USA, 128–134. https://doi.org/10.1145/3371647.3371653

Prasetyo, Y. T., Tanto, H., Mariyanto, M., Hanjaya, C., Young, M. N., Persada, S. F., Miraja, B. A., & Redi, A. A. N. P. (2021). Factors affecting customer satisfaction and loyalty in online food delivery service during the COVID-19 pandemic: Its relation with open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(1), 1–17. https://doi.org/10.3390/joitmc7010076

Puspita, M., & Aprilia, A. (2020). Faktor-Faktor Pendorong Konsumen Surabaya Membeli Makanan Dan Minuman Melalui Aplikasi Gofood Dan Grabfood. *Jurnal Manajemen Perhotelan*, *6*(2), 88–98. https://doi.org/10.9744/jmp.6.2.88-98

Zhao, Y., & Bacao, F. (2020). What factors determining customer continuingly using food delivery apps during 2019 novel coronavirus pandemic period? *International Journal of Hospitality Management*, *91*(March), 102683. https://doi.org/10.1016/j.ijhm.2020.102683