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Gender Disparities in Artificial Intelligence Acceptance in Sabah

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ABSTRACT

The education landscape in Malaysia has undergone a comprehensive transformation with Industrial Revolution 4.0 technologies such as artificial intelligence (AI). However, unequal AI acceptance based on gender reduces diversity in classroom AI practices and limits the positive impact of AI use among teachers. Therefore, the purpose of this study is to investigate the moderating effects of gender on AI acceptance among secondary school science teachers in Sabah based on the Unified Theory of Acceptance and Use of Technology (UTAUT). A quantitative study of 345 science teachers from secondary schools selected through a simple random sampling technique. Data were collected using a questionnaire of 48 items. Subsequently, pls structural equation modeling (PLS SEM) which involve Multi-Group Analysis (MGA) and slope analysis were used to evaluate the theoretical model. The findings confirmed that gender moderates the relationship between social influences and facilitating condition with behavioral intention. These findings provided helpful information for stakeholders and educational institutions to design specific program in order to reduce the gender gap in AI acceptance in science teaching.

1. Introduction

Along with the rapid development of the world of technology, the use of artificial intelligence (AI) involves almost all levels of education [1]. Although the application level of AI is still in its early stages, this technology has been identified as having great potential in the field of education [2]. Thus, AI is classified as a future technology that has capabilities different from routine or common technology [3]. In Malaysia, the emphasis on the AI adoption at the school level has been clearly stated in the MOE Strategic Plan 2024-2030 and the Digital Education Policy. In reality, the use of AI in education has been proven to improve the quality of teaching, especially in helping teachers implement teaching more effectively and efficiently.

Al-Mughairi and Bhaskar [4] emphasized that AI has great potential in transforming science education. In order to ensure that the study discussion fits the context of science education in Malaysia, in this study, the discussion of artificial intelligence applications in science teaching

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strategies is guided by the Science Curriculum and Assessment Standard Document (DSKP). In general, teaching strategies in the science curriculum focus on reflective learning, which is learning that involves the process of acquiring and mastering scientific skills through an inquiry approach, constructivism, contextual learning and mastery learning.

Referring to the Science DSKP, the inquiry approach is referred to as an approach that emphasizes learning through experience. Generally, this approach prioritizes learning through experience. Therefore, students can only master science concepts and skills if they are involved in the process of building the experience [5]. Basically, inquiry discovery requires students to find information and investigate science phenomena around them. In addition to experiments, now teachers can also implement the inquiry approach through the use of AI applications [6].

Since the trend of using AI in science education is being actively promoted, it is relevant to discuss science teachers' perceptions of AI acceptance. Although there are various studies related to AI acceptance, research on the role of moderator in the context of science education in Sabah is still limited. Thus, to fully comprehend this matter, the role of moderator that affect the relationship between the factors must be taken into account [7]. In general, the objective of this study is to identify the role of gender as moderator in the relationship between independent variable or factors with intention to use AI or AI acceptance.

2. Literature Review

2.1 Theoretical Framework

The model developed by Venkatesh *et al.*, [8] includes four constructs that determine technology acceptance (adoption) namely (i) performance expectancy (PE) (ii) effort expectancy (EE) (iii) social influence (SI) and (iv) facilitating conditions (FC). Based on this model, all these factors have a significant positive influence on the construct of BI. In addition, this theory also examines the impact of several moderating variables such as (i) age, (ii) experience, (iii) gender. However, to ensure that the study conducted is more detailed, the assessment of the moderator effect only involves the gender of the teacher.

Since there are various models and theories referred to in a study on the acceptance of AI, thus, the researcher needs to choose a main model or theory that can be referred to for the purpose of determining dimensions in the acceptance construct. Therefore, in this study, UTAUT is used as the main reference source because according to Venkatesh *et al.*, [8] the UTAUT model is a technology acceptance model that has been proven to be able to explain the variance of BI more accurately compared to other models and theories such as Technology Acceptance Model (TAM) that can only explain 17% to 53% of the variance of BI in using a new technology. In addition, this model is identified as being able to discuss the aspects of an individual's technology acceptance clearly because the factors or dimensions of the study and BI are connected briefly compared to other acceptance models [9]. Figure 1 show the proposed model for this research. Based on Figure 1, gender has expected moderates relationship of PE, EE, SI and FC with BI.

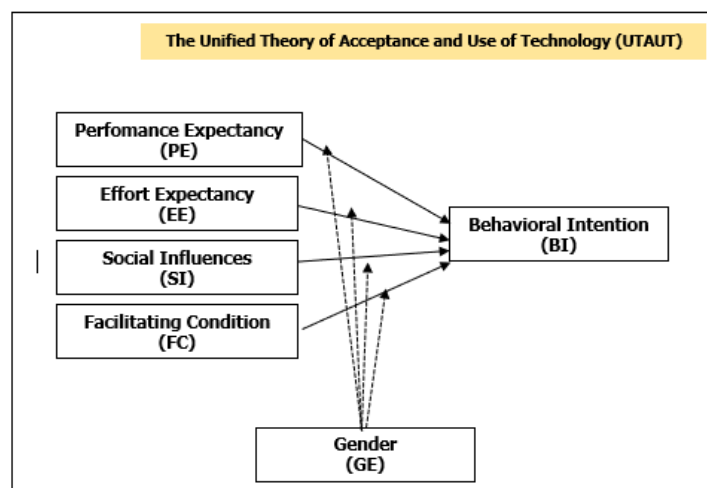


Fig. 1. Factors and moderators of AI acceptance

2.2 Gender as Moderator

When a moderator influences the strength or direction of a relationship between a dependent and independent variable, this is referred to as a moderating effect [10]. Moderation refers to a situation where the relationship between two constructs is not fixed, but is instead influenced by a third construct known as the moderator. In the context of this study, gender is assumed to moderate and change the strength and direction of a relationship. Since gender has a categorical moderating effect, the assessment of the difference in the relationship between the constructs will be assessed through Multi-Group Analysis (MGA) and slope analysis.

Previous studies have shown that gender plays a moderator role in the relationship between predictor factors and behavioral intentions, which is the focus of most studies [11]. Based on the UTAUT model, gender is assumed to be a moderator that has a significant impact on the relationship between all predictor factors and behavioral intention (BI) for the use of technology in education. From the perspective of performance expectancy (PE), past research confirms that the positive influence of PE on BI is stronger among men [12]. For instance, Abbad [13] confirmed that the moderation effect is positively strengthened among men. Meanwhile, based on the study by Park *et al.*, [14] it was found that gender acts as a moderator in the relationship between social influences (SI) and BI. As expected, women are identified as being more sensitive and easily influenced by the views of others, especially colleagues [7].

However, these findings are inconsistent with the findings of Park *et al.*, [14]. The findings of the study confirm that gender does not act as a moderator in the relationship of all factors of technology acceptance based on the UTAUT model. According to Xu *et al.*, [15], both male and female teacher have similar perceptions regarding the AI acceptance in science teaching. This diversity of findings raises interest in examining the true impact of gender as a moderator in AI acceptance.

3. Methodology

This study uses a quantitative study design through a cross-sectional survey method where data collection only occurs once. In this study, the perspectives of the respondents will be collected, analyzed and interpreted accurately and comprehensively. In general, the study population involved is 1432 science teachers who teach in daily secondary schools in Sabah. Through the determination of the sample size of Krejcie and Morgan [16], it was found that the number of respondents involved

was 345 teachers. Next, the sample was selected from the population based on the proportional stratification sampling approach. The instrument used a questionnaire that included 62 items and was adapted from instrumen develop by An *et al.*, [17]. In this study, the researcher used a five-point Likert scale, which was 1= Strongly Disagree (STS) to 5= Strongly Agree (SS). Next, based on reliability analysis, it was found that the Cronbach's Alpha coefficient value for this questionnaire was .920. Therefore, this questionnaire is assumed to have good internal stability and consistency and is ready to use. This investigation utilised two different application software to collect, analyse, and evaluate the gathered data. By using SPSS version 26, descriptive analysis was conducted to identify the respondent profile and frequency distribution. Then, Partial Least Squares Multigroup Analysis (PLS-MGA) is utilised to evaluate the moderating influence of gender, and the approach proposed [10] for evaluating continuous moderators is implemented.

4. Findings

This research was conducted to obtain a more holystic analysis of AI acceptance among science teachers. The demographic profile of the respondents is presented in Table 1. As demonstrated in Table 1, most of the respondents were female which was at 53 percent whereas 47 percent of them were male.

Table 1
Profile respondent

Variable	Item	Frequency	Percentage
Gender	Male	163	47
	Female	182	53

4.1 Gender as Moderator

Based on Table 2, it is clear that gender merely has a moderating influence on the relationship between SI and FC to BI. On the other hand, based on the significant value, gender did not provide any moderating effect on the relationship between PE and EE with BI. These findings illustrate that the influence of PE and EE on the formation of BI does not differ based on gender.

From data in Table 2, path coefficient value for male teacher ($\beta = 0.229$) whereas for female teacher ($\beta = 0.432$). Compared to the male teacher, the path coefficient for the female teacher was found to be much greater where the difference in path coefficient between the male and female groups was estimated to be 0.203. The p-value for the gender effect on SI and BI is 0.009, indicating that the impact is statistically significant. This finding demonstrates that gender moderates the relationship between SI and BI, and indicates that the relationship strengthens among female teachers. To reconfirm the finding, slope analysis was carried out as shown in Figure 2.

Table 2
PLS_MGA result for gender's moderating effect

Paths	Male		Female		Male vs Female			
	p ⁽¹⁾	Se p ⁽¹⁾	p ⁽²⁾	Se p ⁽²⁾	p ⁽¹⁾ – p ⁽²⁾	t- values	p-values	Sig. Level
PE -> BI	0.053	0.075	0.006	0.037	0.047	0.587	0.372	Not supported
SI -> BI	0.229	0.061	0.432	0.051	0.203	2.560	0.009	Supported
EE -> BI	0.340	0.078	0.365	0.045	0.025	1.071	0.492	Not supported
FC -> BI	0.310	0.081	0.179	0.061	0.489	2.332	0.014	Supported

Note: Behavioral Intention (BI), Performance Expectancy (PE), Effort Expectancy (EE), Social Influences (SI), Facilitating Condition (FC), Gender (GE)

$p^{(1)}$ = Path Coefficient (Male), $p^{(2)}$ = Path Coefficient (Female), Se= Standard Error

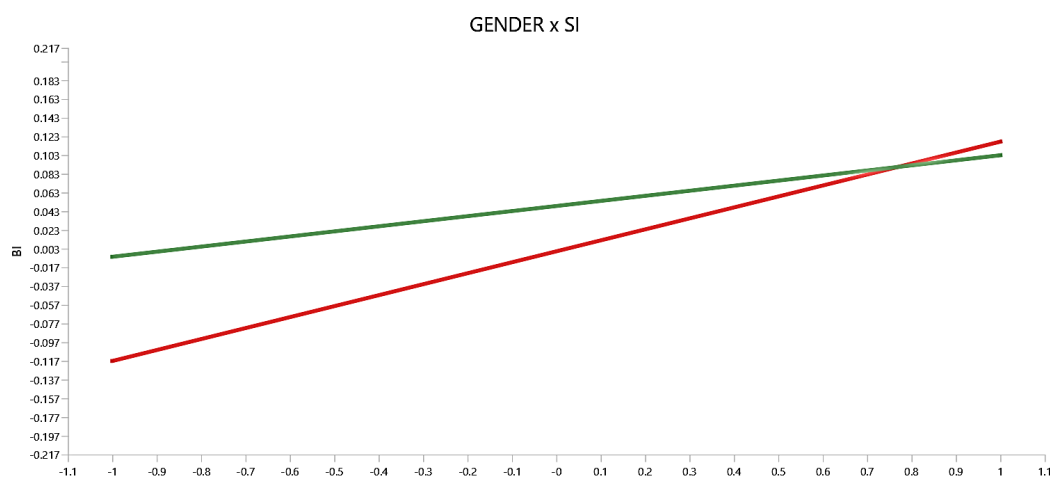


Fig. 2. Slope analysis gender moderating relationship between SI and BI

Based on Figure 2, red line represents female teachers while green line represents male teachers. Red line has a steeper slope, indicating that the relationship between the SI and BI is stronger among female teachers. This finding confirmed that the AI acceptance among female teachers will increase if SI increases.

Apart from that, the outcomes show that gender moderates the relationship between FC and BI. Based on the data, the path coefficient value for male teachers 0.310 is higher compared to female teachers, which is 0.179. The p-value for the effect of gender on FC and BI is 0.014, indicating that the effect is statistically significant. This finding confirms that gender moderates the relationship between FC and BI, where the relationship is strengthened among male teachers. Slope analysis, as shown in Figure 3, was conducted to provide a visual representation of the moderating effect of gender.



Fig. 3. Slope analysis gender moderating relationship between FC and BI

Based on Figure 2, red line represents female teachers while green line represents male teachers. Green line has a steeper slope, indicating that the relationship between the FC and BI is stronger among male teachers. This finding confirmed that the AI acceptance among male teachers will increase if FC increases.

5. Discussion

5.1 Gender Moderates Relationship between SI and BI

Based on the results, it can be seen that gender has a moderating effect between SI and BI, where the relationship is strengthened among female teachers ($\beta=0.432$). This study's outcomes are consistent with those reported by Ramnarain *et al.*, [18]. In general, this finding is fully supported by the UTAUT model. Referring to the model, Venkatesh *et al.*, [8] confirmed that the female group is more likely to accept and adapt to social norms or work culture than the male group. Social norms or work culture are usually fully supported by female teachers. In the educational lens, this finding illustrates that female teachers are more obedient in implementing an educational policy or policy than male teachers. Furthermore, the effect of social influence is greater on women because researchers believe that women are more sensitive and easily influenced by the views of people around them, especially colleagues [7]. This finding reflects that, when female teachers perceive strong and positive social support from peers and administrators, the intention to use AI will increase. Therefore, efforts to strengthen the support system, especially among colleagues, need to be given due attention.

5.2 Gender Moderates Relationship between FC and BI

Meanwhile, the study findings confirmed that the relationship between the FC and BI was strengthened among male teachers ($\beta=0.310$). These findings are fully supported by several previous studies such as the study by Li and Zhang [7]. The researchers confirmed that men are more likely to have positive perceptions regarding the availability of technical facilities compared to women. These technical facilities include internet access and conducive usage spaces [5]. In the context of this study, male teachers believed that the available internet access was sufficient and capable of supporting the use of AI. In addition, the male teachers were also identified as having a more positive view of the readiness of devices to support the use of AI. This perception may exist because the level of ownership of devices to access the internet is higher among men than women. This statement is in line with statistical data provided by Suruhanjaya Komunikasi dan Multimedia Malaysia [19] show that the percentage of ownership of devices such as smartphones per individual in 2024 in Sabah is higher among men (97.2%) than women (95.9%). Therefore, the acceptance of AI can be increased if facilities such as internet access and access to devices are provided adequately, especially for male teachers.

5.3 Limitation and Future Research Direction

In this study, there are two main limitations should be acknowledged. Firstly, future studies should adopt an experimental design as the cross-sectional nature of this study did not allow the causality of the relationship between the variables. Secondly, the respondent is mainly composed of secondary school science teacher, limiting the generalizability of the results to other contexts and different ages. Therefore, it might be relevant to imitate the study involving respondents from primary school.

5.4 Implications

This study explores the moderating effects of gender in AI acceptance among secondary school science teachers in Sabah. By using UTAUT model, this study offers a comprehensive understanding the role of gender as moderator. The empirical results significantly support the UTAUT model, affirming the significance role of gender as moderator in AI acceptance among teacher. The impact of SI on the BI can be strengthened among female teachers. Indirectly, the importance of social support systems should be given due emphasis, especially among female teachers. In addition, it is proposed that the Ministry of Education monitors digital culture in every school, so that the social norm of using AI can be strengthened, especially among female teachers. the findings suggest several strategies that should be interesting to educational experts, policymakers, instructors and school administrators. For instance, facilities condition especially internet access and access to device should be a priority in strengthening the use of various technologies including AI especially among female teacher. Furthermore, to enhance teachers' comprehension and understanding about AI acceptance in science teaching, educational experts and policy makers should ensure all facilities are ready and able to support the use of AI.

6. Conclusion

In general, relevant authorities such as the Ministry of Education need to design and implement more professionalism development programs such as workshops and mentoring to ensure that all teachers, especially female teacher, can offer social support for the use of AI in science teaching. In addition, internet access and access to quality devices need to be provided, especially to male teachers, in order to increase the level of AI acceptance. Indeed, with the right approach and comprehensive action, issues related to gender differences in the context of AI acceptance can be best addressed.

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References

- [1] Zawacki-Richter, Olaf, Victoria I. Marín, Melissa Bond, and Franziska Gouverneur. "Systematic review of research on artificial intelligence applications in higher education—where are the educators?." *International journal of educational technology in higher education* 16, no. 1 (2019): 1-27. <https://doi.org/10.1186/s41239-019-0171-0>.
- [2] Ghoni, R. 2025. "AI dalam Pendidikan: Transformasi dan Masa Hadapan." *Dewan Masyarakat*, February 2025. Dewan Bahasa dan Pustaka
- [3] Burger, Bastian, Dominik K. Kanbach, Sascha Kraus, Matthias Breier, and Vincenzo Corvello. "On the use of AI-based tools like ChatGPT to support management research." *European journal of innovation management* 26, no. 7 (2023): 233-241. <https://doi.org/10.1108/EJIM-02-2023-0156>
- [4] Al-Mughairi, Habiba, and Preeti Bhaskar. "Exploring the factors affecting the adoption AI techniques in higher education: insights from teachers' perspectives on ChatGPT." *Journal of Research in Innovative Teaching & Learning* (2024). <https://doi.org/10.1108/JRIT-03-2024-0012>.
- [5] Al Darayseh, Abdulla. "Acceptance of artificial intelligence in teaching science: Science teachers' perspective." *Computers and Education: Artificial Intelligence* 4 (2023): 100132. <https://doi.org/10.1016/j.caeai.2023.100132>.
- [6] Li, Wei, Xiaolin Zhang, Jing Li, Xiao Yang, Dong Li, and Yantong Liu. "An explanatory study of factors influencing engagement in AI education at the K-12 Level: an extension of the classic TAM model." *Scientific Reports* 14, no. 1 (2024): 13922. <https://doi.org/10.1007/s10639-023-11851-z>.

- [7] Li, Min, and Heng Zhang. "A study on the behavioral intention of primary and secondary school teachers using generative artificial intelligence in teaching." In *Proceedings of the 2024 9th International Conference on Distance Education and Learning*, pp. 35-41. 2024. <https://doi.org/10.1145/3675812.3675870>.
- [8] Venkatesh, Viswanath, Michael G. Morris, Gordon B. Davis, and Fred D. Davis. "User acceptance of information technology: Toward a unified view." *MIS quarterly* (2003): 425-478. <https://doi.org/10.2307/30036540>.
- [9] Adelana, Owolabi Paul, Musa Adekunle Ayanwale, and Ismaila Temitayo Sanusi. "Exploring pre-service biology teachers' intention to teach genetics using an AI intelligent tutoring-based system." *Cogent Education* 11, no. 1 (2024): 2310976. <https://doi.org/10.1080/2331186X.2024.2345678>.
- [10] Hair, J. F., Hult, T. M., Ringle, C. M., and Sarstedt, M. 2017. *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. 2nd ed. SAGE Publications.
- [11] Chen, X. 2020. "The Role of Virtual Laboratories in Science Education." *Education and Information Technologies* 25 (6): 4887-4903. <https://doi.org/10.1007/s10639-020-10194-1>.
- [12] Wang, Shan, Fang Wang, Zhen Zhu, Jingxuan Wang, Tam Tran, and Zhao Du. "Artificial intelligence in education: A systematic literature review." *Expert Systems with Applications* 252 (2024): 124167. <https://doi.org/10.1016/j.eswa.2024.124167>.
- [13] Abbad, Muneer MM. "Using the UTAUT model to understand students' usage of e-learning systems in developing countries." *Education and information technologies* 26, no. 6 (2021): 7205-7224. <https://doi.org/10.1007/s10639-021-10502-6>.
- [14] Park, Joonhyeong, Tang Wee Teo, Arnold Teo, Jina Chang, Jun Song Huang, and Sengmeng Koo. "Integrating artificial intelligence into science lessons: Teachers' experiences and views." *International Journal of STEM Education* 10, no. 1 (2023): 61. <https://doi.org/10.1186/s40594-023-00454-3>.
- [15] Xu, Si, Pengfei Chen, and Ge Zhang. "Exploring Chinese university educators' acceptance and intention to use AI tools: An application of the UTAUT2 model." *Sage Open* 14, no. 4 (2024): 21582440241290013. <https://doi.org/10.1177/21582440241290013>.
- [16] Krejcie, R. V., and D. W. Morgan. 1970. "Determining Sample Size for Research Activities." *Educational and Psychological Measurement* 30 (3): 607-610. <https://doi.org/10.1177/001316447003000308>.
- [17] An, Xin, Ching Sing Chai, Yushun Li, Ying Zhou, Xi Shen, Chunping Zheng, and Mengyuan Chen. "Modeling English teachers' behavioral intention to use artificial intelligence in middle schools." *Education and Information Technologies* 28, no. 5 (2023): 5187-5208. <https://doi.org/10.1007/s10639-022-11286-z>.
- [18] Ramnarain, Umesh, Ayodele Abosede Ogegbo, Mafor Penn, Segun Ojetunde, and Noluthando Mdalose. "Pre-service science teachers' intention to use generative artificial intelligence in inquiry-based teaching." *Journal of Science Education and Technology* (2024): 1-14. <https://doi.org/10.1007/s10956-024-10159-z>.
- [19] Suruhanjaya Komunikasi dan Multimedia Malaysia. 2024. *Broadband Quality of Experience Survey 2023*. Malaysian Communications and Multimedia Commission. <https://www.mcmc.gov.my/skmmgovmy/media/General/Resources/BQOES-2023>.