

Empowering Educators in IPTS in Sabah Through AI-Powered Pedagogy for Innovative Teaching Practices

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Received: 5 October 2024 | Accepted: 6 December 2024 | Published: 20 December 2024

DOI: <https://doi.org/10.55057/ajress.2024.6.7.5>

Abstract: *The study focuses on the integration of Artificial Intelligence into teaching methodologies in private higher education institutions in Sabah, Malaysia. It is expected that this integration will afford educators new opportunities to innovate in the classroom. As the educational landscape continues to change, AI becomes integral to transforming teaching for professional development. This study adopts a qualitative approach in exploring educators' experiences with AI-enhanced teaching tools to shed light on how technology influences engagement and instructional strategies. Data was obtained from semi-structured interviews with educators from selected institutions of higher learning in Sabah. Although educators hope that AI will create a more personalized learning environment and increase creativity, many challenges remain regarding the lack of training and awareness of this resource. This study highlights the continuing support and professional development needs, which are deemed critical for educators to maximize the benefits related to the integration of AI, making the teaching process more interactive and engaging. The findings developed are meant to help policymakers and other educational stakeholders integrate artificial intelligence strategies in the classroom.*

Keywords: Artificial Intelligence, Educator Empowerment, Teaching Practice, Private Higher Education Institution, Qualitative Approach

1. Introduction

The current development in AI binds the learning environment into new dimensions, especially among private institutions of higher learning in Malaysia. It means a breakthrough toward serving the varied needs of the students through engagement in different learning experiences, especially for states like Sabah, which has its own uniqueness culturally and educationally. As these technologies advance, they enable a shift from traditional, lecture-based methods to more interactive, student-centered approaches, where lessons can be adapted in real-time to match student performance and engagement levels (Alharbi & Hossain, 2021; Holmes et al., 2019; Siau & Yang, 2017). Through AI-powered platforms, educators can nowadays customize lessons according to the learning pace and style of the students. All of this helps make a teaching environment more inclusive and responsive (Kim, 2021; Zheng et al., 2020).

On the other hand, the integration of AI in educational contexts means a paradigmatic shift from active use in learning holistic to freeing up time for educators to devote to more routine activities and to more meaningful interactions with their students. It enriches educational experiences in such varied ways. As cited by Devaney (2020); Tabesh et al. (2019). It may

involve, for instance, analysis of students' performances, enabling the teacher to give timely feedback or deliver extra resources where needed. The potential herein exists to make AI not only a tool but even an active agent of transformation that will alter teaching methodologies for diverse learning needs. Moreover, AI's role in education offers students a platform where they can engage in self-directed learning, exploring concepts in more depth and at their own pace, which ultimately cultivates a more motivated and involved student body.

The successful integration of AI in education does not come so easily. There could be some limitations in accessing robust infrastructures in regions like Sabah; there is a lack of formal training among educators regarding AI, including those who are opposing these unusual technologies that are hindering the effective usage of AI inside the classrooms (Vygotsky, 1978; Piaget, 1970; Siau & Yang, 2017). Educators may find the learning curve on integrating AI steep, with concerns about how to fit in the AI tools into already set curricula seamlessly. Further, these barriers demonstrate a need for supportive structures-including training programs, technological investments, and administrative support-that would help educators become familiar with the functionality of AI to maximize its educational benefits. Exploring IPTS educators' experiences using AI in Sabah, therefore, becomes an urgent imperative in uncovering these challenges and the type of support required.

It will also investigate both practical and theoretical barriers to the integration of AI by IPTS educators into their practice in Sabah. It is through an investigation of such experiences that this research both details the setbacks and opportunities brought by adopting AI within this cultural context and, as such, illuminates exactly how AI will serve educators and students best to further instructional effectiveness. Clearly, it is in line with Holmes et al. (2019), Baker and Inventado (2019), and Shoham and Perry (2020). Addressing these will eventually provide a suitable platform for educators to switch over to AI. This would ensure that the transition to an even more interactive, enriching, and technologically advanced experience of education is smooth and easy. From them, we learn what needs to be done to make this technology fit and how transitions of teaching practices can be made smooth, effective, and sustainable to keep pace with the ever-changing requirements of today's demanding educational scenario.

Problem statement

Though AI was adopted around the world in educational settings, the readiness of educators at IPTS in Sabah is more specific and presents a particular knowledge gap. Most educators in the region have inadequate experience with AI which hinders effective utilization of intelligence in teaching practices. This is supported by works of Holmes et al., 2019; Alharbi & Hossain, 2021; Devaney, 2020. Unlike in other regions, probably more endowed with infrastructure and other forms of resources, Sabah's educators must bear with several challenges, including lack of training opportunities, absence of comprehensive understanding of the benefit packages provided by AI, and technologically related ones like obsolete infrastructure. These reflect broader systemic issues that make it hard for educators to investigate and subsequently use new tools. Thus, there is an urgent need for strategic support and interventions to bridge this gap in readiness.

One of the main barriers to AI is insufficient training and outdated technology create significant barriers to AI use in Sabah's private education institutions. Put together, these factors become part of a vicious circle: even willing educators are not able to use AI in their classroom because of lack of resources and knowledge. Again, this brings up the need for training programs in demystifying AI and making it relevant in concrete ways that teachers can understand.

Even Gura (2020) argues that such barriers may be overcome with targeted support strategies that consider specific conditions and resource limitations in each setting. Another imperative strategy needed to make a path toward AI adoption more feasible for IPTS institutions in Sabah is tailoring solutions to suit the unique cultural and technological landscape of the region. Studies confirm that when teachers are better trained and technologically well-set, they show more predispositions to consider AI an ally in making learning environments more interactive and engaging than ever: Zheng et al. (2020), Kim (2021), Tabesh et al. (2019). In other words, through strategic responses that address contextual realities, such as increased access to training, infrastructure upgrade resources, and an enabling community of practice, AI adoption would indeed be viable and effective within IPTS institutions. This is necessary to ensure that not only the technical capacity but also the optimistic and open mind of educators are shaped in adopting AI as an enabling teaching tool (Siau & Yang, 2017; Vygotsky, 1978; Piaget, 1970).

2. Research Objectives

- To identify the experiences of IPTS educators in Sabah regarding AI integration in their teaching practices (Davis, 1989; Baker & Inventado, 2019).
- To identify the perceived challenges and opportunities educators face when utilizing AI-powered tools in classrooms (Holmes et al., 2019; Alharbi & Hossain, 2021; Kim, 2021; Shoham & Perry, 2020).
- To identify AI's impact on the professional development and engagement of IPTS educators (Vygotsky, 1978; Rogers, 2003; Tabesh et al., 2019; Gura, 2020).

3. Literature Review

3.1 Research Gaps

Research highlights that AI adoption in Malaysian private institutions faces contextual challenges, particularly in Sabah (Holmes et al., 2019; Alharbi & Hossain, 2021). While their study provides important lessons on the barriers to AI integration, the context primarily covers broader situations without delving into the unique circumstances of IPTS (Davis, 1989). This neglect suggests a strong need for further research into how educators in these private institutions can navigate the complexities of adopting AI tools into their teaching practices to ensure context-sensitive approaches to technology integration (Rogers, 2003).

3.2 Advantages of AI Integration

Evidence has shown that AI can enrich personalized learning experiences where educators have the facility to instruct students on a very personalized level. It is this particular aspect of personalization that is found quite engaging for the students and which brings forth better educational outcomes (Vygotsky, 1978). Correspondingly, Baker and Inventado (2019) also identified that AI technologies support teachers in effectively analyzing voluminous sets of student data, hence facilitating insightful feedback to inform instruction finally. This research builds on such findings by focusing on the real-life experiences of IPTS teachers in Sabah and showing how AI-driven pedagogical tools would serve the work of teachers and the learning of students better (Piaget, 1970).

3.3 Empowering Educators and Practical Implications

The assumption is that it would be one positive way of empowering educators with knowledge in the experience of AI technologies, moving them to take up tools for professional development. As Holmes et al. (2019) note, the seamless integration of AI in education depends

not only on the technological aspect alone but also on the issue of training and support for educators. This study seeks to identify the perceived challenges and opportunities that IPTS educators in Sabah face in a manner that allows for targeted professional development initiatives aimed at instilling confidence and competency in using AI (Alharbi & Hossain, 2021). The present study also fills critical gaps in the literature on benefits that result from AI integration in educational empowerment and improvement of educational practices within the private higher education sector in Sabah (Davis, 1989).

4. Theoretical Framework

This article applies the multi-theory framework to understand the integration of AI into teaching practices among educators in IPTS in Sabah. From this research study, several big theories can be outlined: Technology Acceptance Model, Constructivist Learning Theory, and Diffusion of Innovations Theory. Each represents a unique, valuable contribution to shed light on explaining different aspects of the adoption and impacts of AI on teaching and learning. The new theories do not exclude each other but complement one another in explaining such a multifaceted phenomenon under study. A schematic framework is shown in Figure 1.

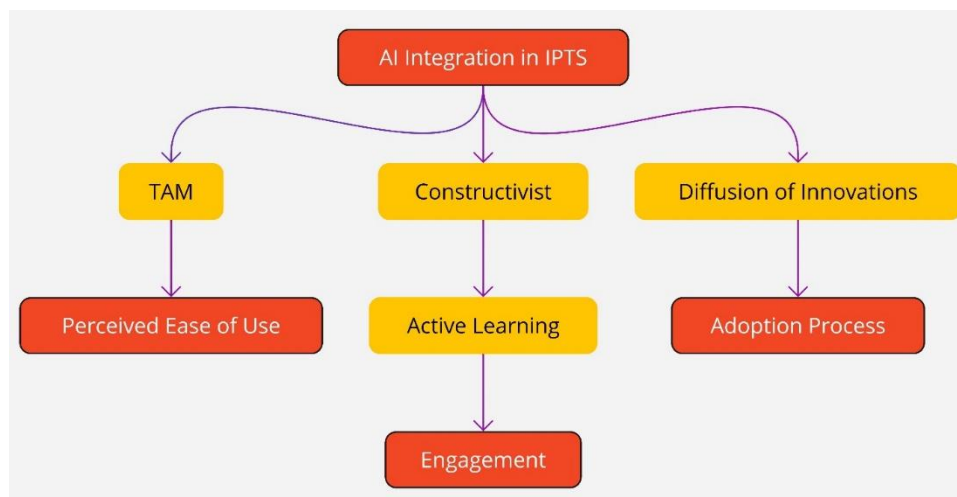


Figure 1: AI integration using TAM theory

Underpinning this research is an integrated multi-theoretic framework incorporating the Technology Acceptance Model, Constructivist Learning Theory, and the Diffusion of Innovations Theory. Each of these three respective theories, taken in themselves, adds something different and complementary to the insights being developed about AI's transformative potential within IPTS education settings. -Davis, 1989; Holmes et al., 2019; Siau & Yang, 2017.

4.1 Technology Acceptance Model (TAM)

The technology Acceptance Model (Davis, 1989) suggests that perceived usefulness and ease to use influence AI adoption among Sabah's IPTS educators. Seeing these perceptions is essential for creating understanding situations that inspire AI application in classrooms (Holmes et al., 2019; Rogers, 2003).

4.2 Constructivist Learning Theory

Piaget (1970) and Vygotsky (1978) developed the constructivist learning theory, which outlines how learners actively construct knowledge through experience and collaboration. Artificial intelligence is likely to support constructivist learning by providing individual

learning routes, supporting collaborative assignments, and enhancing the level of interactivity during learning to enhance understanding. Tabesh et al. 2019, Holmes et al. 2019. Studies have proved that when educators apply AI within a constructivist framework, it can increase student engagement and boost lifelong learning skills (Shoham & Perry, 2020; Kim, 2021). In this research, Constructivist Learning Theory is used in relation to AI tools that will aid student-centered teaching methods that can help educational results (Siau and Yang (2017); Devaney (2020); Gura (2020)).

4.3 Diffusion of Innovations Theory

The novelty of AI in higher instruction-as an application of Rogers' theory, addressing new tools in a social system him a particularly useful tool toward understanding the knowledge elements across educator adoption of AI. Key factors noted include the relative advantage, compatibility with existing processes, and difficulty of AI tools, as cited by Rogers 2003. In this research paper study analyzes these factors to understand clearly how teachers acknowledge benefits and roles associated with AI in the classroom (Holmes et al., 2019).

4.4 Interplay of Theories

These theories give a holistic view of AI adoption issues in IPTS contexts. For example, the perceived usefulness of AI via TAM could result from how well it is integrated into constructivist propositions to enhance active learning principles further, as suggested by Davis (1989) and Vygotsky (1978). In addition, the concept of trialability in the diffusion of innovations could inform the pace and nature of AI adoption and educators' professional development. By integrating these theoretical perspectives, this study provides a comprehensive overview of AI's role in transforming teaching and learning in Sabah's IPTS institutions (Piaget, 1970).

5. Methodology

It thus adopts a qualitative approach in the present study to get a vivid representation of educators' experiences regarding the integration of AI into teaching practices within IPTSs in Malaysia. A qualitative approach, in this perspective, provides an opportunity for the researcher to investigate the complexity and nuance of the participant lived experience. Qualitative approaches give rich descriptions insightfully; hence, it gives a good view of the actual engagement of the participants with the AI tools.

5.1 Research Design

In this behest, this research has adopted a qualitative research design whereby a case study approach is undertaken. It is appropriate since it will allow an in-depth investigation of the phenomenon of integrating AI within a certain context, namely IPTS in Sabah. In this behest, it could provide insights into the richness of complexities and nuances pertaining to integrating AI into teaching practices across diverse settings at institutions. The nature of the research design befits the investigation of the research objectives, as it places the experiences of educators, challenges, and opportunities center-stage and explores in what way AI influences professional development and engagement.

5.2 Participants

Data were gathered from ten educators in several IPTS in Sabah, Malaysia. For this study, participants were purposively selected based on two criteria: one, having prior experience in the use of AI tools in teaching, and two, being willing to participate in semi-structured interviews. The demographic summary of the participants is enumerated in the following table.

Table 1: Participant Demographics

Participant	University	Years of Teaching Experience	Years of AI Experience
1	UNITAR	5	2
2	UNITAR College	8	3
3	North Borneo University College	5	1
4	Cyberjaya College	6	3
5	University College Sabah Foundation	7	2
6	Kolej Teknologi Yayasan Sabah	6	3
7	INTRA International College	9	4
8	MAHSA College	4	1
9	City University Sabah	5	2
10	Geomatika Sabah	8	4

The sample provided a comprehensive indication of AI integration knowledge across the different IPTS backgrounds through its varied university constitution.

5.3 Instruments

The data set was conducted through semi-structured interviews with a total sample of 10 educators from several IPTS in Sabah. This finding is based on the experience of employing AI implements in teaching, as well as revealing personal experiences on professional journeys and experiences with that kind of knowledge. Semi-structured interviews can allow for flexibility in assessing how they comprehend the role of AI in improving teaching practices and the challenges faced during the implementation of these tools.

Experience of Educators in IPTS Regarding AI Integration

Educators experienced initial challenges with AI tools but later reported improvements in student performance and engagement (Davis, 1989; Holmes et al., 2019). Moreover, AI-supported collaborative learning promoted active student engagement in which learners could progress through adaptive content at a self-managed pace (Piaget, 1970). Educators further reported that AI tools facilitated the identification of students who needed supplemental support, thus enabling timely intervention (Rogers, 2003). However, comfort levels have varied, with some feeling confident as educators and others more skeptical; such responses were usually linked to the need for further training and development to maximize the full potential of AI within the classroom (Vygotsky, 1978).

Perceived Challenges and Opportunities in Utilizing AI Tools

While educators seemed very keen on the potential for AI, they also identified several practical issues. Some questioned the accuracy and reliability of the AI tools and, indeed, the effectiveness assessments of them (Alharbi & Hossain, 2021). Turning to access with respect to cutting-edge resources, though some used sophisticated learning management systems, infrastructure limitations prevailed in other schools (Holmes et al., 2019). Technical obstacles, including outdated hardware and limited training resources, also pose significant barriers, limiting AI's effectiveness in some classrooms (Davis, 1989; Rogers, 2003).

Educators highlighted the need for AI to offer immersive learning experiences, such as simulations and interactive assessments, to overcome students' initial resistance to technology (Baker & Inventado, 2019). Additionally, there was a call for stronger institutional support, such as mentorship programs and dedicated AI resource contacts, to aid educators in navigating AI-related inquiries (Vygotsky, 1978). Several instructors understood that AI provided valuable chances for recognizing instruction, thus enabling various student learning needs (Piaget, 1970).

Impact of AI-Driven Tools on Professional Development and Engagement

The combination of AI significantly improved instructors' professional development and engagement. Instructors regularly defined how interaction with AI tools revitalized their concerns in instructional technology and encouraged them to practice extend professional training. AI tools provide an avenue for better communication with students through effective and immediate feedback, which enhances learning outcomes and creates a closer relationship between teachers and students than would be otherwise possible (Rogers, 2003). Some instructors attended some outside training sessions and forums on AI in education. Thus, there was a rationale to improve in AI skill and instruction skills (Holmes et al., 2019).

While many educators experienced increased job satisfaction and empowerment due to successful AI integration, others expressed anxiety over keeping up with rapid technological advancements, underlining a need for consistent support and manageable pacing in AI adoption (Vygotsky, 1978). These findings emphasize the importance of continuous professional development and training resources that allow educators to navigate and capitalize on AI technology effectively (Baker & Inventado, 2019).

6. Results

Qualitative data analysis, through thematic analysis mainly, has been used as a procedure for data processing derived from interviews. This approach allows educators to continuously investigate the repeated themes or patterns in the narrative in detail concerning the perceptions and experiences of the participants. These include the role of AI in promoting engagement among students, the challenges faced by educators in adopting the technologies of AI, and strategies for embedding the technologies into teaching practice. The themes are defined more subtly in this study in the hope that such insights might be valuable enough to inform professional development opportunities and support successful integration within an educational setting. This, therefore, contributes to the emerging debate on the empowerment of teachers and pedagogical transformation through innovation at the IPTS.

The analysis of the experience of educators regarding the inclusion of AI in private higher educational institutions brought keys to show another dimension in their relationship with technology.

Experience with AI Integration

The experience of using these AI tools in teaching varied: for some of the participants, this was really an overwhelming moment because of the steepness of the learning curve. As one educator referred to it, "It was a hard first love, embracing AI, but then when it clicked, I saw how it changed my teaching and perked up my students." Those adaptive learning systems, virtual tutoring systems, and data analytics were also put into use with equal optimism. Other teachers shared experiences about some success stories they came across in improvements among students in their level of engagement and academic performance. In contrast, others did the same regarding challenges associated with overcoming the initial learning curve that always comes along with the introduction of new technologies. This summary will, to this extent, encourage most educators to make informed decisions based on data by modifying lesson plans and pedagogies, keeping in mind the insights gained from the AI tools. It is here that AI stands transformational, opening to novelty in methodologies of teaching, working through challenges and complications within such an integrative effort.

Challenges in Implementing AI

There was another complication of that some educators made mentioned: this had to do with resistance from students and their colleagues. Students and many of their colleagues seemed skeptical of the efficacy of AI, if not downright hostile toward teaching in a manner that was different from the way they originally learned. These challenges serve to underscore the very important needs that educators have for institutional support and resources that are designed to help them address such challenges as the use of AI technologies becomes more universal.

Opportunities Presented by AI

Despite all the challenges pinpointed, educators could still identify some opportunities in the integration of AI. Increased personalization opportunities were some of the more identified opportunities; it was noted that through AI, the contents can be made to suit several students' needs. In fact, this adaptability has presented an opportunity for educators to support learners who struggle in conventional settings. Besides that, there is also one undeniable advantage: AI can automate the routine tasks of an administrative nature that include grading and tracking student progress. Or, as one educator summed it up: "AI helps me focus on teaching, not being buried under a sea of paperwork." This would support the idea that AI enriches educational delivery, while also liberating educators to devote more time to developing contact with students and teaching activities, so some consideration should be given to the possible benefits from AI-enhanced pedagogy.

Professional Development and Empowerment

AI integration increased educators' interest in professional development, emphasizing the need for structured training and collaborative networks. As one respondent cogently captured, "Professional learning with colleagues has made all the difference; we thrive when we collaborate." Because of that, a further implication of the findings will be that supportive conditions to professional learning foster an educator's agency- a source of innovation- and let them effectively integrate AI into their work.

Impact on Job Satisfaction

The combination of AI into lesson practices has had a great impact on educators' job fulfillment. Several educators felt empowered, and experts improved morale due to productive technology execution, reporting that AI sequence clearly inspired their teaching efficiency and job fulfillment (Holmes et al., 2019). The automation of tasks through AI-enabled these educators to focus more on instructional conduct and student participation, thus increasing their job satisfaction (Baker & Inventado, 2019).

However, some instructors conveyed a yearning to keep up with high-tech developments, which often left them experiencing devastation. This anxiety was affected by the burden to constantly adjusting to new tools and practices, demonstrating a requirement for more stable implement systems and an evaluated approach to AI adoption (Davis, 1989). These combined responses underscore the meaning of providing sufficient resources and guidance to help educators navigate and control AI successfully, ensuring that technology improves slightly than hinders job fulfillment.

7. Discussion

The study, well-experienced by the Technology Acceptance Model (TAM), Constructivist Learning Theory, and Diffusion of Innovations Theory, distributes a complete view of AI implementation in teaching effects among educators in IPTS in Sabah (Davis, 1989; Vygotsky,

1978; Rogers, 2003). According to the TAM, the perceived efficiency and improvement of use are critical factors influencing educators' approval of AI tools (Davis, 1989). In this study, various instructors testified that the ease of using AI tools clearly changed their comfort levels and inspiration to absorb such technologies into their teaching practices (Holmes et al., 2019). Furthermore, the Diffusion of Innovations Theory recommends that the adoption of AI in education varies on factors such as comparative advantages, compatibility with active practices, and the ability to research with innovation (Rogers, 2003). Educators in Sabah emphasized the significance of institutional support in affecting obstacles related to communications and practical assistance (Baker & Inventado, 2014). The Constructivist Learning Theory emphasizes the possibility of AI supporting active, student-centered learning surroundings (Vygotsky, 1978; Piaget, 1970).

Educators' Experiences with AI

The first aim of the research was to reveal educators' experiences with AI integration, which also ranged from initial apprehension and steep learning curves to a full circle of appreciation for the benefits. Most of the educators responded that they used AI-powered platforms, analytics platforms, virtual tutoring systems, and language learning applications, according to the TAM emphasis on perceived usefulness and ease of use. Overall, these generally involved increased engagement by the students, better learning results in terms of better scores and increased participation, and fewer headaches regarding administrative tasks. However, comfort levels with AI varied greatly; this still suggests that the perceived ease of use core construct of TAM is a barrier for some educators. The findings are clear in stipulating targeted professional development on account of this variability so that all educators can use the potential of AI with effectiveness.

Challenges and Opportunities in Utilizing AI Tools

A second goal is to identify perceived challenges and opportunities in some key issues, such as technical barriers, which include inadequate infrastructure and outdated hardware. These findings substantiate the Diffusion of Innovations Theory; compatibility and infrastructure are characteristics of innovations that are more easily and universally adopted. Additionally, there is some resistance to AI because of student and faculty reluctance to adopt new technologies. This resistance speaks to the relative advantage component of the theory, whereby obvious benefits derived from the use of AI in education will be necessary to overcome gains derived from maintaining traditional approaches to teaching. Yet, alongside such challenges, great opportunities for personalization and differentiation of instruction- one of the main ideas in Constructivist Learning Theory- were also revealed. The adaptability of AI tools to different learning styles and individualized support answers the emphasis that constructivism places on active learning and student-centered pedagogy, further creating how AI can create immersive learning experiences, along with automating routine tasks.

Impact of AI on Professional Development and Engagement

While trying to address the third objective, the identification of the effect of AI on professional development and engagement, it emerged that with AI integration, professional development was fostered to where educators investigated instructional technology. This has been in keeping with the Diffusion of Innovations Theory's orientation concerning the place of innovation in leading change and professional growth. This, in turn, creates a desire to continue training and support, which further calls for the realization of effective professional development programs that would meet certain needs of such educators who integrate AI tools into their practice. While many educators reported an increase in job satisfaction and a sense of empowerment, others stated anxieties that included keeping up with the pace of technological advancement,

thus indicating a continuous need for support in an approach toward AI integration that is not overwhelming.

Synthesis and Implications

The findings illustrate a complex interplay of technology, pedagogy, and innovation adoption within IPTS institutions in Sabah. The Technology Acceptance Model (TAM) requires visions into individual educators' reactions to AI integration, concentrating on apparent efficiency and ease of use (Davis, 1989). Constructivist Learning Theory focuses on insight into how AI fosters tailored, student-centered learning, integrating with active teaching methods (Piaget, 1970; Vygotsky, 1978). In conclusion, the Diffusion of Innovations Theory focuses on broader universal issues in accepting new expertise, including compatibility with existing practices and organization needs (Rogers, 2003).

IPTS institutions will require addressing individual and institutional challenges, such as enhancing training programs, investing in infrastructure, and promoting a culture of innovation and collaboration. Understanding how these factors interact is crucial for policymakers and educational leaders in supporting educators' efforts to fully utilize AI's potential to enhance teaching practices and learning outcomes (Alharbi & Hossain, 2021).

8. Conclusion

This study highlights the importance of resource and training support for AI integration in Sabah's IPTS institutions, ensuring benefits for all students.

Acknowledgement

The authors thank UNITAR International University for the support of the publication of this research.

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