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Harnessing AI for Enhanced Student Learning and Performance in Higher Education: A Multinational Collaboration

Ramila Devi Ram Sing[1], Segufta Yasmi Abdul Rahman[2], Praveen Kumar[3], R. Arasu[4], Mostafa Ali Beigi[5] and Renne Pramila[6*]

[1]UNITAR Intenational University, Malaysia
[2]INTI International University, Malaysia
[3]Bharath University, Tamil Nadu, India
[4]University of Madras, Tamil Nadu, India
[5]MPRH Institute, Iran
[6*]UNITAR Intenational University, Malaysia
E-mail: [1]ramila@unitar.my, [2]yasmi.arahman@newinti.edu.my, [3]praveenkumar.mba@bharathuniv.ac.in, [4]profarasu@unom.ac.in, [5]mostafaalibeigi@gmail.com, [6]renne.punadi@unitar.my
ORCID: [1]https://orcid.org/0000-0003-1480-4993, [2]https://orcid.org/0009-0003-8126-3020, [3]https://orcid.org/0000-0002-6158-4420, [4]https://orcid.org/0000-0002-5768-0313, [5]https://orcid.org/0000-0002-5034-5571, [6]https://orcid.org/0009-0009-7055-9647
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Abstract - **Purpose: Integrating technology into instruction in the ever-emergent landscape of tertiary education has become germane for ensuring quality and relevance in both research and instruction. Particularly in higher education within the field of social sciences and humanities, there exists a pressing need for inventive learning methods that can precisely deliver student learning outcomes. Besides facilitate personalized learning experiences and optimize instructional strategies. Artificial Intelligence (AI) presents a promising opening for addressing these challenges by offering sophisticated analytical tools capable of providing actionable acumen and processing huge volumes of data. The purpose of this research is to assess the impact of AI on students' learning behaviours in tertiary education. Additionally, the study examines moral responsibility in use, ethical obligations, effectiveness, and scalability in AI adoption across three nations Malaysia, India, and Iran.**

Design/methodology/approach – This research uses qualitative methodology, thematic analysis which is regarded as the most evident approach that delivers a single interpretation. Respondents for this study were postgraduate students, and purposive sampling was employed to select the participants. A total of 29 DBA and MBA students were selected to contribute to this study. Data was analyzed using NVivo software.

Findings – The findings for this study shows that AI-powered student learning pathways are influenced by the following factors: (i) students' anticipation of learning, (ii) execution, the actual learning process (i.e., (iii) symbiotic metamorphosis), cognitive abilities, technological skills, and educational tools (i.e., (iv) socio-technical capital). Furthermore, moral principles, such as utilitarianism and ethical considerations, serve as mediating factors that ensure transparency and freedom from bias. These key variables are essential for enhancing student learning and performance. These findings support foundational AI theory, which was conducted from an employee perspective.

Practical implications – The body of knowledge from this research contributes to SDG 4, recognized by the United Nations (2015) as part of the 2030 agenda for Sustainable Development. The findings align with the goal of providing quality education across nations to address global challenges, particularly inequality.

Keywords: **Artificial Intelligence (AI), Higher Education, Teaching Pedagogy**

I. INTRODUCTION

AI has swiftly transformed how we work, study, and live our daily lives. AI has created a huge opportunity in educational settings to generate learning experiences (Srinivasa et al., 2022). In today's classroom environment, adaptive learning offers greater flexibility by leveraging technology to tailor instructions to students' preferred learning approach, pace of comprehension, and academic development (Alam, 2023). With this, we may conclude that AI has entirely transformed the formal education landscape (Khodjaev et al., 2024).

Some frequently raised in AI-based learning include data collection and utilization, which refers to how data is acquired, kept, used, and shared. Inadequate data protection can result in breaches of student privacy and the abuse of personal information. Moreover, students may feel obligated to consent to data gathering without fully comprehending the ramifications or may not necessarily be aware of how their data is being used and vulnerable to cyberattacks, leaks or unauthorized access. Some of the potential identified common obstacles of AI usage such as fairness and impartiality, data protection and cybersecurity, and the dynamics of teacher-student engagement (Kamalov et al., 2023). When these AI systems are trained based on biased data, they may even further exacerbate or inadvertently maintain discrimination or inequality. This can result in discriminatory treatment of some student groups based on

color, gender, socioeconomic position, or other factors. The bulk of current AI models focus on increasing and augmenting the accurateness of AI algorithms rather than utilizing them. This to provide students with real-time, continuous feedback and to enhance their learning quality (Ouyang et al., 2023). Furthermore, inordinate reliance on AI for learning might stifle the growth of critical thinking and problem-solving competences, as students may become too reliant on technology for answers.

The widespread use of AI in education also raises ethical concerns, such as determining culpability for AI-driven decisions ensuring that AI is utilized in ways that benefit all students. Numerous AI algorithms function as "*black boxes*", compelling it difficult for teachers and students to comprehend how decisions or suggestions are made. This lack of openness may damage confidence (I.e. trust) in AI systems. Simultaneously, educational institutions may be hesitant to implement AI due to cultural resistance, a lack of resources, or a fear of change (Ozuem et al., 2022). The aim of this study is to look into the efficacy and scalability of AI adoption among tertiary education students in Malaysia, India, and Iran. In addition, Akgun & Greenhow, (2022) stated that stated that there are ethical and societal consequences of using AI in learning. The goal of this study is to help practitioners to harness the benefits of AI integration in tertiary education while also navigating the associated challenges through an exploratory study.

Objectives of the Study

1. To examine the effect of integrating AI technologies on student's learning outcomes within tertiary education.
2. To examine the development and customization of AI algorithms, incorporating both utilitarian and ethical considerations, to converge the specific needs of learners' adaptive learning pathways.

II. LITERATURE REVIEW

AI has the prospective to change tertiary education by posing students more personalized and adaptive learning capabilities. Lee & Ko (2020) argue that individualized learning by AI has the capability to substantially boost student learning outcomes. Improvements are made regularly in emerging areas such as virtual reality (VR) education and educational game design such as gamification (Kalthoff, 2022). According to a recent study, the introduction of AI results in job polarization as learning is becoming more redundant. High-skill jobs are increasingly driven by AI innovation and management thus causing the economy to face higher inequality and social tension. Industries are keenly revolutionizing tasks by mechanizing, producing predictive insights, and adapting to varying settings (Vinuesa et al., 2020).

Harnessing Artificial Intelligence in Tertiary Education

A study analyzing the effect of AI on each of the UN 17 Sustainable Development Goals indicated that AI integration has both positive and negative consequences (Vinuesa et al., 2020; Prasannaet al., 2024; Aswathy, 2024). Moreover, it requires careful reflection of the ethical considerations to maximize its positive contributions toward realizing sustainable development (Subbaiah et al., 2024; Zhu & Sheng, 2024). In the domain of education, tertiary institutions are identifying the potential of AI and preparing to personalize it (Hassooni, 2024; Wu & Margarita 2024). This enhances individual student's learning experiences besides developing the efficiency of teaching courses using AI (Gallagher et al., 2020; Idowu et al., 2020; Shetty & Nair, 2024).

Challenge

AI-integration in the education field presents both advantages and challenges. The key advantage is the 24/7 availability without needing a break to operate round the clock. Primary challenge comprises issues such as high data privacy, data protection, high implementation cost, lack of digital literacy, the risk of algorithm bias, and equity in access. Other challenges include lack of willingness for students to adopt AI integration due to not being fully aware how the tool works and lack of emotional support. It is the same scenario for many educators' resistance to change due to fear of job displacement, lack of necessary skills to adopt AI, over-reliance on automation, academic integrity, language and cultural barriers (Akinwalere & Ivanov, 2022). Nevertheless, AI offers customized learning, adaptive feedback, smart tutoring systems, inclusive learning and enriched educational outcomes (Crompton & Song, 2021). Thus, it is crucial to maintain an equilibrium between leveraging the potential of AI and the mitigating challenges associated with its implementation, while also considering the pedagogical implications of AI. Ethical considerations, and their impact on student experiences is important to create a fair, respectful and empowering learning environment (Slimi, 2021).

Benefit

In today's education arena, the application of AI has transformed traditional syllabus models into more adaptive and flexible curricula. Wang et al., (2024) highlighted AI's capacity to evaluate vast datasets and to identify patterns. This enables the customization of curriculum aligning to students' learning habits and their constraints especially for students with learning difficulties or disabilities. Similarly, Abbasi et al., (2024) highlighted in their research that AI-enabled curriculum improvement fosters a student learner-centric approach, facilitating a shift from traditional methods of passive learning to more adaptive and individualized educational models.

Foundational Theory on AI

There are numerous theories presented in relation to technology adoption namely Technology Adoption Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), Diffusion of Innovation Theory (DOI), Theory of Planned Behaviour (TPB), Innovation

Resistance Theory (IRT) and others. Nevertheless, these theories are examined with a focus on reading the acceptance behaviors among the users. Besides, most research studies centered on harnessing AI for promoting student learning and performance, and use of GenAI tools in tertiary education through the lens of the above-mentioned theories (Ivanov et al., 2024; Chai et al., 2020; Wang et al., 2024; Roy et al., 2022; Assegid & Ketema, 2023). Therefore, to further comprehend the use of AI among students, this research assumes the Theory of AI Socialization by Makarius et al., (2020). Originally, this theory was employed to examine employees' anticipation and learning capacity in integrating AI into their daily routines, particularly in respect to its scope and novelty.

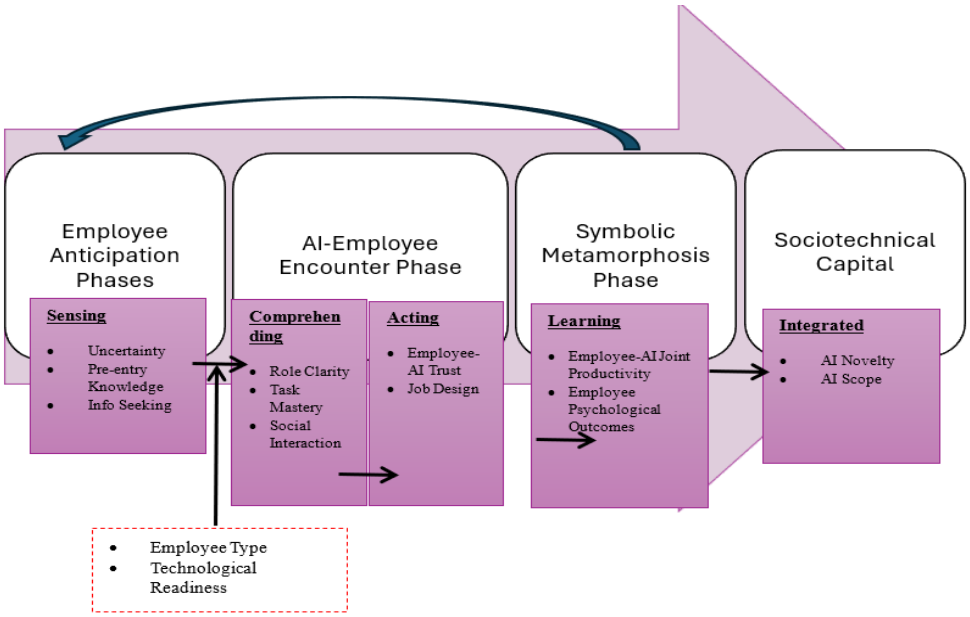

Fig. 1 AI Socialization Model by Makarius et al., 2020

AI socialization model examines to "*the process where employees make the transition from being able to integrate-AI at their workplace*" (Fig. 1). The socialization process helps employees to understand AI-integration especially when dealing with AI systems which are laden with ambiguity (Frey & Osborne, 2017). AI systems must undergo some level of adjustment to their processes and procedures to cater for the unique operating environment. Similarly, this study examines the adaptive nature of AI in the student learning process, exploring how AI systems personalize learning experiences based on individual needs and educational contexts. There are 5 components introduced by Makarius et al., (2020) which will be assimilated into students' AI learning environment.

Making Sense of AI Systems

"*Sensing*" refers to the competence and processes of capturing information (Ramos et al., 2008). Before AI was introduced in organization, administrators require to help employees to make sense of AI systems. For example, introducing automation for a process requires employees to understand how and why it is done. Similarly, in today's educational landscape, AI has the potential to address various learning disabilities and generate lessons within minutes (MacDorman & Ishiguro, 2006). However, this raises apprehensions about its implications for learning integrity and underscores the need for adaptive learning behaviors to ensure meaningful and equitable educational experiences.

Comprehending and Acting

In organizational context Markius et al., (2020) highlighted that administrators must aid employees in terms of their "*comprehension"* and "*actions*" incorporating AI at workplace. Comprehension refers "*to implementation factors, such as clarifying roles, determining task mastery, and figuring out social interactions*" (Bauer et al., 2007). Whereas action refers "*to changing factors relating to trust development and job design*" (Morgeson & Humphrey, 2006). Similar factors such as comprehension, trust, and job design plays an important role in harnessing AI for improved student learning. This warrants that students develop clarity in AI-assisted learning processes, engage in meaningful interactions with AI systems, gain proficiency in AI-driven tasks and build trust in AI as an educational tool. By carefully designing and communicating AI-driven learning experiences, educators can facilitate a smoother transition, enabling students to leverage AI effectively while sustaining analytical expertise and academic integrity.

Symbiotic Metamorphosis

Another key constituent discussed in this theory is Symbiotic Metamorphosis, which focuses on the actual learning process (Pereira et al., 2020) that takes place through AI integration. Based on Makarius et al., (2020), AI Socialization model, this phase highlights the mutual adaptation between users and AI, facilitated by continuous engagement. It means a transformative and evolving process which thrives between

AI systems and humans. As individuals interact with AI, they gradually shift from uncertainty to trust, recognizing AI's value in developing their productivity (Kammeyer-Mueller & Wanberg, 2003). In addition, AI automates monotonous tasks, allowing humans to focus on strategic problem-solving, higher-order thinking and creativity, ultimately increasing productivity. From a psychological perspective, the use of AI also helps address concerns regarding transparency and bias. In education, Symbiotic Metamorphosis in learning accentuates continuous modification, trust-building, and transformation in how students engage with AI. As students interact with AI-driven learning tools, they refine their problem-solving skills, develop AI literacy, and transition from passive AI users to active collaborators in the erudition progression. This phase highlights the potential of AI to individualize learning, enhance critical thinking, and support a dynamic, evolving educational experience besides, influencing their career satisfaction and emotional states (Brougham & Haar, 2018).

Sociotechnical Capital

In the context of AI adoption, sociotechnical capital advocates that for AI to augment competence and innovation, staff must have a positive attitude toward technology, right skills and reinforced by a technological environment that facilitates collaboration and interoperability (Bauer & Green, 1998). Sociotechnical capital here refers to the combination of students' cognitive abilities, technological skills, and educational tools that collectively support and improve learning outcomes. Therefore, organizations must invest in both upgrading technological systems and training employees, ensuring that both elements are supported together to maximize the value of AI integration. This concept also emphasizes the reciprocal adaptation between human (social) and AI (technological system), with the understanding that both the technology and the workforce evolve through continuous ethical interaction, ultimately driving long-term success, innovation and sustainability. As for students to fully benefit from AI-powered learning systems, it is cardinal that they acquire not only the skills to engage with technology but also a positive attitude toward using these systems as learning aids in an ethical manner (Bostrom & Yudkowsky, 2018). Just as in the workplace, the social dynamics within educational environments play a critical task to seek teacher support, peer collaboration, and trust in AI technologies. The interaction between the AI systems and learners (sociotechnical capital) is important to improve learning.

Moreover, Makarius et al., (2020) recognize different types of employees that influence how individuals interact and adapt to AI in the workplace. These types are identified typically based on the individual's technological readiness, willingness to adopt new tools, and openness to AI integration. The specific employee types discussed in their research are generally outlined to capture how each employee group traverses the AI adoption process.

Employee Type / Student Type

The employee anticipation phase results from the AI employee encounter phase which is influenced by both employee type and technological readiness. Employees with high technological readiness and adaptability are more likely to acknowledge AI integration, while those with lower readiness may refuse or resist with adoption. These employee types help organizations segment their workforce and tailor their AI adoption strategies to match different levels of technological readiness and engagement. The understanding of employee types can also be extended to the educational context, where student type and student's readiness to engage with AI tools for learning may similarly vary based on their familiarity with technology, openness to change, and perceived benefits.

Technological Readiness

Technological readiness refers to firm-level capacity in relation to the use of technological assets (Parasuraman, 2000). It encompasses the context and readiness to value the technology which analogous to "*willingness to learn*" (Ray et al., 2005). Technological readiness moderates the relationship between comprehending and sensing phases within the socialization model. Workers who belong to institutions with higher levels of technology-readiness acceptance will be more persuaded to act upon information provided by or with an AI system. Technological readiness in the context of student learning refers to how prepared students are to integrate and effectively engage with AI-powered tools and platforms in their educational experience.

Utilitarianism Theory

The utilitarianism theory referred to as "*consequentialist's theory*", which are associated with the overall ethical consequences derived from a particular action. The utilitarianism theory "*is one of the most mutual approaches in making ethical decisions. It involves decisions especially with consequences that concern big groups of people. It ultimately instructs us to weigh the aggregate of good and bad outcomes that will be produced by our action*" (Bonde et al., 2013). The first three aspects of Utilitarianism are: it offers an obvious and simple framework for developing and evaluating policies. Second, utilitarianism provides an objective and appealing technique to resolving conflicts of self-interest. Third, utilitarianism offers a yielding, outcome-focused approach to ethical decision-making, allowing organizations to make practical and effective moral choices.

The Difference between Ethical Consideration and Utilitarianism Theory

Ethical considerations encompass a wide range of moral principles that guide decision-making and behavior across various domains. Ethical considerations often involve addressing concerns like fairness, justice, privacy, equity and respect for autonomy. They require individuals or organizations to mirror on the potential impacts of their decisions on stakeholders, including society at large. These

considerations are generally context-dependent and reflect the norms and moral values within a given society or cluster. For instance, in the context of AI, ethical considerations normally focus on ensuring that AI systems are bias-free, transparent, and respect individual privacy while avoiding harm to vulnerable groups (Binns, 2018; Selter et al., 2022). It is shaped by institutional guidelines and professional code "do's and don'ts". Whereas in utilitarianism theory, moral duties refers to personal sense of obligation where moral rights are central. The fundamental tenet of utilitarianism is the "greatest happiness principle", which posits that actions should aim to maximize overall happiness or well-being for all individuals (Bentham, 1970). For example, when applying AI in education, respecting students' privacy and ensuring data protection are ethical imperatives that go beyond mere outcomes or utility (Binns, 2018). Focusing instead on the inherent values and rights of individuals are known as virtue ethics, the principal of morality. Utilitarianism is a specific principle that assesses the morality of an action based on its consequences or effects. In the context of AI, utilitarianism would assess decisions based on the benefits they provide to the majority. Even if it means that some individuals or smaller groups may experience harm or less benefit. For example, a decision to implement AI in educational systems might be justified from a utilitarian perspective if it increases learning outcomes for most students, even if it leads to challenges for some individuals. This approach often requires quantifying benefits and harm in a way that allows for decision-making based on net positive outcomes. Based on these two theories, the following theoretical framework developed in order to investigate AI for Enhanced Student Learning and Performance across three countries.

Theoretical Framework

Fig. 2 depicts the suggested theorethical framework for this resercah based on the discussed AI Socialization Model, Makarius et al., 2020; Ethical Consideration & Utilitarianism Theory (Bentham, 1789)

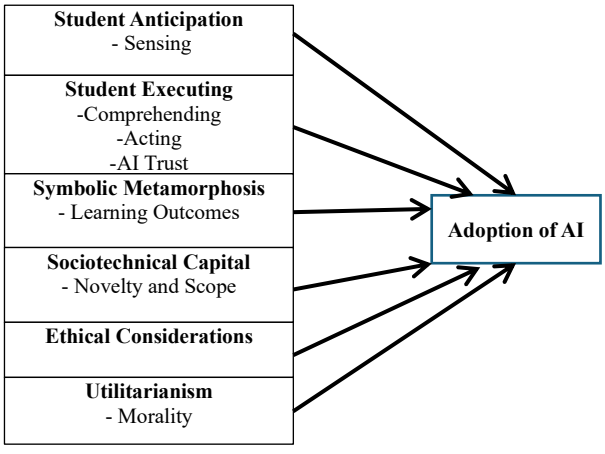

Fig. 2 Theoretical Framework AI Adoption for Enhanced Student Learning and Performance

III. RESEARCH METHODOLOGY

This study used a qualitative methodology, sending a self-administered questionnaire via Google Forms for empirical study. These approaches generate detailed data that standardized questionnaires cannot provide (Dahan & Bedos, 2010). The questionnaire was designed to target students who met the following criteria, using the purposive sampling approach. The respondents are currently enrolled in tertiary education, either undergraduate or postgraduate, and actively utilizing AI tools for learning. This study included 29 students, as stated in table I below. The saturation principle was used to calculate the sample size, which allows for the termination of new participant recruitment when the most recent interviews provide no new insight or information, implying that more interviews are unlikely to provide new information.

TABLE I STUDENT PARTICIPATION

Country	University	Respondents
Malaysia	UNITAR International University	10
India	Bharath University	5
	Madras University	5
Iran	MRPH	4
Total		**29**

Research Design

Based on the research objectives an open-ended structures questionnaire is administered as shown in Table II. The design of the questionnaire as follows was adopted form the AI Socialization Model (Makarius et al., 2020) for RO1 and Ethical & Utilitarianism Theory for RO2. Questions were posed across Malaysia, India and Iran regarding the use of AI for enhanced student learning and performance in higher education field.

TABLE II OPEN-ENDED STRUCTURED QUESTIONNAIRE

RO1	Sensing (S1)	What is your understanding of sensing technology in AI?
	Sensing (S2)	How do you think these sensing technologies in AI can help you in your learning?
	Sensing (S3)	In your opinion, what impact does this sensing technology have on teaching practices and learning outcomes?
	Comprehending (C1)	To what extent are you able to comprehend the integration of AI in your learning?
	Acting (A1)	Explain how far you trust the integration of AI design in your learning?
	Learning (L1)	Are you able to learn effectively through the integration of AI?
	Integrated (I1)	Explain if the AI technology **scope and novelty** help you to integrate your learning effectively?
RO 2	Ethical considerations (EC1)	What is your understanding of **ethical considerations** in AI technologies?
	(EC2)	Do you think the AI algorithms used for your adaptive learning are designed with ethical considerations?
	Utilitarianism (U1)	You feel morally satisfied using AI technology for your learning.

To analyze the data and create themes, the thematic analysis was used. This method combined with an abductive approach is useful to derive broader meaning and implications.

IV. Data Analysis

Through the NVivo application, data is analyzed through three stages. The first stage is coding, the second is category and the third is theme. For the first stage, all interview results, namely codes, are sent to the NVivo application as raw data to develop coding. The second stage is developing categories. All coding is separated according to the categories of sensing, comprehending, acting, AI trust, learning outcomes, novelty, scope, ethical and morality. The third stage is developing themes. All categories are placed under themes such as student anticipation, student executing, symbolic metamorphosis, sociotechnical, ethical considerations and utilitarianism.

Result Analysis

The results of theme analysis through the Nvivo application can answer the study objectives as follows:

1. To examine the effect of integrating AI technologies on student's learning outcomes within tertiary education

The influence of integrating AI technologies on student's learning outcomes telah di analisis melalui student anticipation, student executing, symbolic metamorphosis, sociotechnical. Four themes were identified from the participants' responses, namely *student anticipation, student execution, symbolic metamorphosis*, and *sociotechnical factors*.

Student Anticipation

The analysis is carried out through sensing. All three countries state AI as a tool that has the ability and process to capture information.

Based on the feedback "Student Anticipation" is revealed as a key emergent theme in integrating AI technologies in tertiary education. Students expressed varying level of awaremenss and expectations regading AI's capability in enhancing learning experiences.

In **Malaysia**, students stressed the importance of AI as the underlying technology. Most students claimed *"Fundamental to the development of intelligent systems that interact with and interpret the real world"*. This emphasizes the students expectation that AI will provide contextual intelligence and decision-making in education.

In **India**, students were excited about AI's ability. They expressed *"Sensing technologies in AI can help me learn better by providing more accurate and personalized information and improving my understanding and retention of knowledge"*. This higlightes the expectation of AI to provide learning experiences tailored to them and make learning expedient and effective.

In **Iran**, students showed a general awareness of AI's potential. They expressed "*I don't know much about sensors, but I know that artificial intelligence can be used very effectively for learning, one example is learning software"*. This explains that students recognized the potential of AI in enhancing learning, and edged their expectations in relation to the existing AI-enabled learning technologies.

The findings indicated that students' anticipation regarding the future use of AI in tertiary education emerges from their expectations of greater interactivity, personalization, and intelligent in learning systems. Nonetheless, variations in technological awareness points the need for targeted learning interventions to support students' understanding of AI's potential in higher education.

Student Executing

Across these three countries, Student execution was analyzed through comprehending, acting and AI trust. All three countries agreed that through AI they can improve and strengthen their understanding of knowledge, facilitate the learning process and a high level of trust in AI helps them obtain quality learning outcomes.

Student feedback from Malaysia, India, and Iran revealed **Student Executing** as a key emergent theme in the integration of AI technologies in tertiary education

In **Malaysia**, students highlighted the practical execution of AI technologies in daily activities. Expressing *"So far, I can comprehend well with AI when it comes to daily activities. It helps on recording and analyzing lectures. Save time and efficient"*. This shows that students are engaged with and executing AI tools in their academic process.

In **India,** AI is valued for its ability to enhance learning. As most students claimed *"Yes, AI integration enhances my ability to learn effectively by providing personalized feedback, adaptive learning paths, and engaging content"*. This demonstrates that students are executing AI to enrich learning and improve mastery of subject.

In **Iran,** students trust in the role of AI in education. Students expressed *"I have a high level of trust in the integration of AI design in my learning"*, which indicates that students are confident in executing AI in their academic activities.

These findings indicates that students in these countries execute AI technologies actively in learning. The level of execution varies as some countries focus on the functional aspects (e.g., analysis of lectures) while others execute AI in advantageous learning pathways and show trust in its role. Higher learning Institutions needs to further support this movement by increasing AI literacy and usage among tertiary students.

Symbolic Metamorphosis

Feedback from all the three countries indicated that **Symbolic Metamorphosis** as emergent theme in the integration of AI technologies into tertiary education.

In **Malaysia**, students recognized AI has transformed learning experience. Students expressed that "*It makes learning more interactive and personalized, which helps me understand and remember things better*". This symbolizes the metamorphosis that has occurred in learning-from the conception of AI merely as a tool to that of an agent that changes the way students view, relate, and engage themselves with learning material.

In **India**, the students expressed that AI technologies enhance their learning. Students claimed that "Sensing technology improves my learning outcomes by making my learning more accurate, efficient and effective leading to better performance and understanding". This reflects that the metamorphosis from traditional learning to an AI-enabled environment where learning is more precise and tailored to learners requirement.

In **Iran**, students were less knowledgeable about the AI technologies but recognized their potential. As they articulated that *"I have no idea, I just know that if this sensor technology is used in my field of work, which is data estimation, it can really have a very positive effect on learning".* This demonstrates students are aware of AI in revolutionizing learning and indicates the shift in how students envision the future of education.

The findings indicate that there is a symbolic transformation in students' perception of learning, with AI as an agent that reconfigures educational experiences to be more interactive, personalized, and effective. This suggests that AI is not just a tool but acts as a catalyst for change in how students think about and approach the process of learning. This metamorphosis should be nurtured by higher education through deeper integration of AI into curricula and the encouragement of students to embrace it, creating wide interdisciplinary use.

Sociotechnical Capital

All the three countries indicated that the emergent theme integrating AI technologies into tertiary education is Sociotechnical Capital.

In Malaysian, students claimed that "*AI will make assessments more dynamic and much less static".* Students uses AI as a transformative tool for asssessment, that shifts from static to adaptive evaluation leading to a personalized learning experience. This means that every learner is guaranteed a uniquely relevant and challenging experience. This brings a balance-the sociotechnical balance of capability in AI regarding the educational technological structure able to support such advancements.

In **India**, AI broadened the scale of information to be studied. Where most students expressed *"It effectively integrates into learning as it gives a wider scope of information on a particular topic that is being studied".* This shows that AI closes the gap between technological developments and pedagogic strategies that provide concentrated educational content.

In **Iran**, students claimed that *"The innovative features, such as virtual tutors, interactive simulations, and predictive analytics, keep the learning process dynamic and engaging".* This virtual tutors and simulated features enable students to have an interactive process of learning. Such advanced technologies would thus help in realizing social and educational goals by increasing student participation in class interactions and improving the learning process.

However, the overall results highlight the fact that the integration of AI in higher education is fundamentally sociotechnical and needs striking a balance between new technologies and institutional structures, educational goals, and students' needs. The sociotechnical perspective thus underlines the critical link between technical capabilities and social systems that frame their adoption in learning contexts. This means universities will have to approach both the technological and social dimensions of AI throughout the adoption process if the full potential of AI is to be achieved within the varied educational setting.

2. To examine the development and customization of AI algorithms, incorporating both utilitarian and ethical considerations, to converge the specific needs of learners' adaptive learning pathways.

Two themes were identified from the participants' responses, namely *Ethical considerations,* and *Utilitarianism*.

Ethical Considerations

Analysis of ethical considerations is through ethical. All three countries stated that the use of AI should take into consideration all levels of life: a) acting ethically as individuals, b) creating accountable institutions and regimes, and besides making our society as a whole more principled. It is proved by the following statements:

Student feedback from Malaysia, India, and Iran revealed *Ethical Considerations* as a significant emergent theme in the integration of AI technologies in tertiary education.

The students in **Malaysia** expressed "*At the moment, I do not have a definite answer for this. However, AI algorithm should be transparent and fair. It should not have any discriminations when implementing AI in learning. AI should also maintain a level of privacy so that data provided can be".* This revealed that that students expect AI use to be oriented towards ethics and standards, without personal information leakage and safeguards against any leak.

Students from **India** narrated that "Yes, I believe the AI algorithms used for my adaptive learning are designed with ethical considerations in mind, prioritizing fairness, transparency, and student data privacy, to provide a safe and effective learning experience". Which indicates that students expect AI with ethical design that makes them feel safe and confident in processing of data.

Iranian students expressed *"Ethical AI also means considering the potential societal impacts and ensuring that AI benefits everyone equitably, without reinforcing existing inequalities"*. This indicates that students cared on individual privacy and fairness. particularly with regard not to increasing social disparities through AI-driven learning.

As a result, the prominence of Ethical Considerations as a theme across student perceptions about AI in higher education. Students from all three countries reflected concerns about issues of fairness, transparency, data privacy, and potential impacts of AI on students. These ethical dimensions highlight the significance of paying careful attention in the design and implementation AI systems both to individual based on their rights and societal equity. Tertiary education institutions had to addressed the deployment of AI technologies by establishing clear guidelines on ethics and promote transparency to foster trust and ensure positive educational outcomes for students.

Utilitarianism

Student feedback from Malaysia, India, and Iran revealed that *Utilitarianism* as the emergent theme in the integration of AI technologies in tertiary education. This is because the theme suggest that as long as the harnessed technology benefits teachers, students, instituitions and societies at large, the overall impact will be broader.

In **Malaysia**, there is an emphasis on privacy age, nd fairness in AI use for learning. Most students claimed *"Yes, as long as AI respects my privacy and is used fairly, I feel good about using it for learning"*. This indicates a utilitarian perspective that AI are considered acceptable if the technology upholds fundamental ethical principles that maximimizes greatest happiness.

In **India**, students were morally satisfied with the way AI enriched learning experiences. They expressed *"Yes, I feel morally satisfied using AI technology for my learning, as it enhances my experience and helps me achieve my goals, while being designed with ethical considerations that prioritize my well-being and privacy"*. This reflects utilitarian view where the overall benefit of AI in improves learning, while ensuring privacy, and balaced against its ethical implementation.

In **Iran**, students felt morally satisfied in using AI, provided it is bound within ethical standards. Students expressed *"Yes, I feel morally satisfied using AI technology for my learning, as long as it is developed and implemented with ethical standards in mind."* This suggest that students are willing to embrace AI if they perceive its use as aligned with moral and ethical guidelines that maximize its positive outcomes for learning.

The overall findings highlights that a utilitarian approach toward AI in education, in which students would accept and embrace AI technologies to improve learning, provided their contribution to the well-being and involves ethical standard, mainly concerning privacy. Therefore, this suggest that institutions of higher education emphasize the need for the development and ethical practice of open AI technologies that ensure students reap maximum benefit while their rights are fully protected.

Emergent Model for AI-Powered Learning Pathways to Enhance Student Learning and Performance in Higher Education as shown in Fig. 3. This visually illustrates the AI's role in tracking student performance, analyzing patterns, and recommending targeted interventions that support individual growth, ultimately promoting higher retention rates and improved academic results.

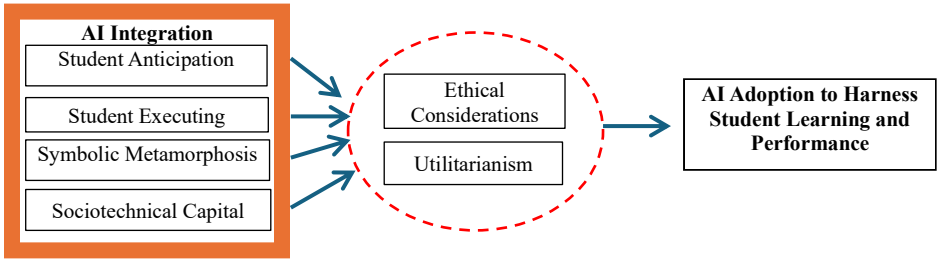

Fig. 3 AI-Powered Learning Pathways to Harness Student Learning and Performance

V. DISCUSSION

It is crucial for students to anticipate the specific type of information they seek from AI, as this insight directly influences the outcomes they would like to achieve. This is evident from responses across Malaysia, India, and Iran, where students expressed assurance and confidence in AI's capabilities, affirming that it has significantly supported their intellectual pursuits. However, AI learning is perceived differently by different generations due to varying learning preferences. Gen X, Millennials, Gen Z, Gen Alpha are enthusiastic AI adopters. A study examining Gen Z highlighted students keen to adopt AI to maximize their utility in their educational endeavors (Singh et al., 2024). On the other hand, baby boomers found AI is disruptive and loss of personal touch. Based on this research study, students across these three nations acknowledged that they must first comprehend its true purpose and functionalities, particularly regarding the type of information they wish to acquire before they harness the AI. They must be clear about their objectives and ensure they are using AI for the right purposes. Subsequently, students from these three countries mentioned that they need acquire the necessary skills in order to harness the AI effectively.

Additionally, students in these regions displayed a high level of trust in AI, believing that the information it provides can significantly aid their studies. However, the ethical implications of AI use remain an important consideration. A study of 399 students in Hong Kong highlighted concerns regarding ethical issues and the possible impact of AI on, collective values, career aspirations and self-evolution (Chan & Hu, 2023). When students trust AI-generated information and understand its role in supporting their learning, they tend to experience positive educational outcomes. Moreover, they recognize that AI's scope is vast, and they must ensure its novelty in their learning while remaining mindful of the ethical and moral considerations (Bonde et al., 2013) involved in its use.

VI. Conclusion and Contribution

The results obtained from this study support the suggestion of two integration models AI Socialization Model by Makarius et al., 2020 and Utilitarianism Theory by Jeremy Bentham (1748-1832). These two models reveal how students anticipate Student Executing, Student Executing, Sociotechnical, Ethical considerations and Utilitarianism can influence integrating AI technologies on student's learning outcomes and customization of AI algorithms (Ghanbarian, 2023), with ethical considerations, to tailor the specific requirements of students' adaptive learning pathways. Besides that, this research can also contribute to Sustainable Development Goal (SDG) 4, which focuses on equitable education. It aims to enhance student learning and performance through AI, aligning with the goal of ensuring inclusive, fair and excellent education, as well as cultivating a culture of lifelong learning opportunities for all. By utilizing AI, this research can help personalize learning experiences and improve educational outcomes.

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