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Examining factors of student AI adoption through the value-based adoption model

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Abstract

This research paper delves into student perspectives on the adoption, impact, and future expectations of generative AI technologies within academic settings, employing the Value-Based Adoption Model (VAM). Data were gathered through focus group interviews with university and college students, revealing multifaceted factors that drive both adoption and resistance towards these technologies. Students articulated that the primary benefits of generative AI include its usefulness as an academic aid—facilitating homework and idea generation—and its capacity to enhance enjoyment by simplifying complex tasks. Conversely, apprehensions regarding the technical challenges and potential errors associated with AI use, as well as the implicit costs of premium features, were identified as significant barriers. These concerns, categorized as sacrifices, play a crucial role in shaping students' perceived value of generative AI tools. The perceived value, in turn, influences their intentions to adopt such technologies. Importantly, the study highlights a strong inclination among students to embrace AI tools when perceived benefits outweigh the perceived sacrifices. This paper offers valuable insights into the factors influencing student engagement with AI technologies and suggests directions for future technological enhancements and educational policies to maximize positive outcomes and mitigate drawbacks.

Keywords: Generative AI, student adoption, value-based adoption model, AI in education, technology resistance, future expectations

Introduction

This study employs the Value-Based Adoption Model (VAM) to investigate how generative AI technologies are perceived and utilized by students within higher education. Through a series of focus group interviews with students from universities and colleges, this research illuminates the complex interplay of factors that influence both the enthusiastic embrace and cautious resistance of these advanced tools. Students highlighted the significant advantages of generative AI, such as its utility in streamlining homework processes and fostering creative thought, which substantially enhances their academic experiences. Nonetheless, the research also uncovers substantial concerns—technical complexities, potential inaccuracies, and the financial burden of advanced features—highlighting the barriers that may deter adoption.

The Value-Based Adoption Model (VAM) is suitable for exploring generative AI technology adoption within academic settings. This model's unique focus on perceived value, incorporating both benefits and sacrifices, aligns perfectly with the multifaceted nature of technology use in education. In academic

environments, AI tools are valued not only for their practical utility in enhancing study efficiency and creative thinking but also for the enjoyment they provide by easing complex academic tasks. VAM allows for a comprehensive evaluation of these benefits against potential sacrifices such as the complexity of technology use and any associated costs.

This dual consideration is crucial as it reflects the real decision-making processes students face, which include weighing the immediate and tangible advantages of AI tools against possible risks and expenses. By capturing this balance, VAM provides deep insights into the factors that drive students' adoption intentions. Employing VAM facilitates a more nuanced understanding of how perceived benefits can outweigh perceived costs, which is pivotal in crafting educational policies and technology designs that maximize beneficial outcomes while minimizing drawbacks. Thus, VAM is not only a fitting but a compelling choice for analyzing student engagement with AI technologies in educational settings.

By examining these elements within the framework of VAM, where benefits are balanced against potential sacrifices, this study provides nuanced insights into the decision-making processes of students regarding AI technologies. The analysis reveals a notable trend: students are inclined to adopt AI solutions when the perceived advantages decisively outweigh the drawbacks. This paper not only maps out the current landscape of AI adoption in academia but also proposes strategic directions for educational leaders and policymakers to amplify the benefits and minimize the impediments of AI integration in educational settings. This approach aims to harness the full potential of AI to transform educational outcomes, preparing students for an increasingly digital future.

Literature Review

Technology Adoption Models

There have been many models proposed to explain user adoption of new and emerging technologies. Many of these models are built upon psychological and sociological models of understanding human action. While this work is not meant to summarize all the models explaining IT usage behavior, we highlight three of the more commonly cited models (see Taherdoost (2018) for a summary of alternative models).

TAM

The Technology Acceptance Model (TAM), devised by Davis in 1989 and generally regarded as one of the most cites adoption models, provides a robust framework to predict and explain user behavior in technology adoption, specifically within information systems. Central to TAM are two determinants: perceived ease of use and perceived usefulness. Perceived ease of use refers to the degree to which users believe that employing a technology will be free of effort, while perceived usefulness is the extent to which a user believes that the technology will enhance their job performance (Davis & Davis, 1989; Musa et al., 2024), See Figure 1.

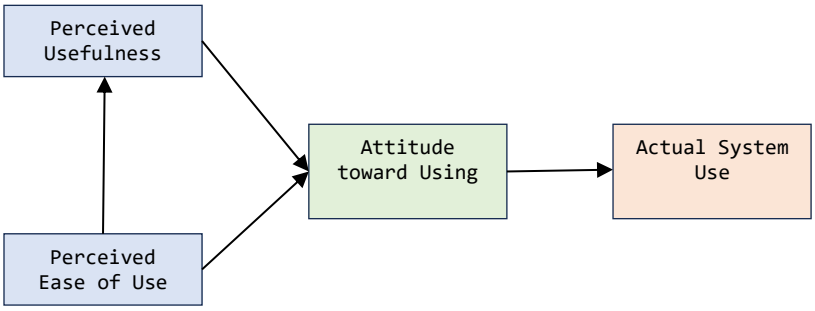

Figure 1: TAM Model.

TAM has been studied extensively in IS research. Rauniar et al. (2023) used TAM to highlight that perceived usefulness and trustworthiness of sites were important factors in evaluating social media adoption. Ibrahim et al. (2017) used TAM to show that perceived ease-of-use is important in adopting e-learning tools.

UTAUT

The Unified Theory of Acceptance and Use of Technology (UTAUT) model is used to understand and predict technology adoption and usage behavior. It emphasizes that technology adoption is not solely based on the technology's features but is also significantly influenced by performance benefits, ease of use, social context, and the available support infrastructure (Venkatesh et al., 2003). The four constructs are performance expectancy, the degree to which one believes that using the technology will help them in their job performance; effort expectancy, the extent to which one believes the technology will be easy to use; social influence, the extent to which one believes it is important that they should use the technology; and facilitating conditions, the extent to which one believes that organizations support the use of the technology.

The UTAUT model also considers age, gender, voluntariness, and experience as variables impacting the four main constructs (Venkatesh et al., 2003, p. 44). These four variables influence the strength and direction of the four core constructs on intention and usage. See Figure 2.

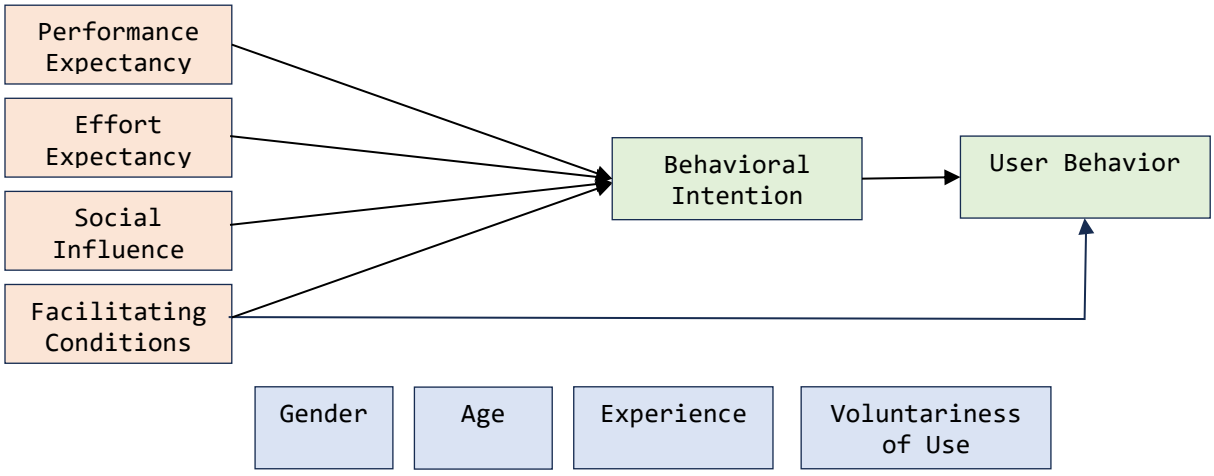

Figure 2: UTAUT Model.

Value-Based Adoption Model (VAM)

The Value-Based Adoption Model (VAM) advances the Technology Acceptance Model (TAM) by integrating a wider array of factors that influence consumer adoption decisions. VAM emphasizes the significance of benefits, sacrifices, and perceived value in shaping consumers' willingness to embrace new technologies (Kim et al., 2017). The model particularly focuses on the necessity for the perceived benefits of a technology to substantially outweigh any sacrifices involved, which plays a critical role in the decision-making process of consumers. See Figure 3.

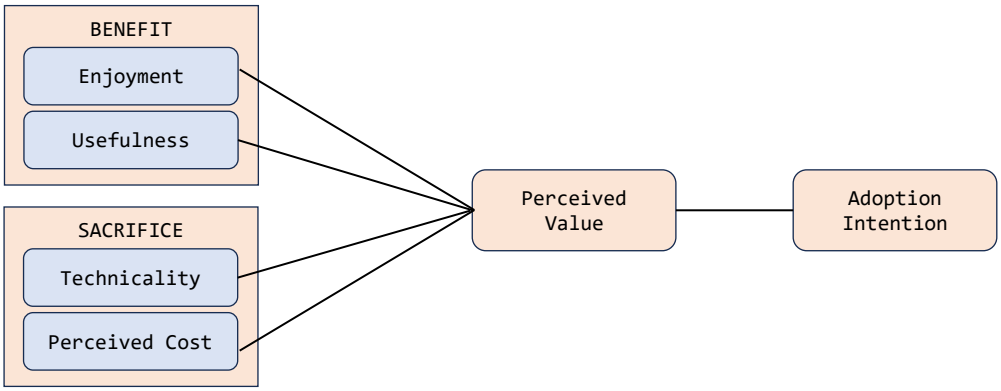

Figure 3: Value-Based Adoption Model (VAM).

VAM has been effectively applied to examine the adoption of various technologies across different domains. For instance, Kim et al. (2017) utilized VAM to explore the adoption of IoT smart home services. Their study highlighted how the balance between perceived benefits, such as enhanced home automation and security, and perceived sacrifices, such as cost and privacy concerns, impacts consumer decisions. Similarly, in the context of e-commerce, Rihidima et al. (2022) applied VAM to understand the adoption of the Cash on Delivery (COD) payment method. Their research emphasized how consumers weigh the convenience and trust associated with COD against potential risks like fraud or product non-delivery. These studies demonstrate the versatility of VAM in providing insights into the dynamics of technology adoption, reinforcing its value in academic and practical applications for understanding and enhancing user acceptance of new technologies.

Model Selection

The selection of the Value-Based Adoption Model (VAM) for this study is substantiated by its comprehensive approach, which is particularly suited to investigating the multifaceted aspects of AI tool adoption among first-year students. VAM provides a structured framework that encompasses both the tangible benefits and the subjective perceptions associated with technology use, including functional, emotional, and social values. This model is particularly apt for examining how AI tools align with or diverge from the students' values and needs, a central aspect of understanding technology adoption in educational contexts. Furthermore, VAM's inclusion of external influences and facilitating conditions allows for a thorough assessment of environmental and contextual factors that impact adoption decisions. Thus, employing VAM ensures a holistic exploration of the factors influencing students' acceptance and use of AI tools, offering valuable insights that can inform strategies to enhance technology integration in educational settings.

The Value-Based Adoption Model (VAM) critically assesses both the perceived benefits and the costs associated with adopting new technologies, such as Generative AI. This balanced evaluation is essential for understanding student adoption patterns.

- **Perceived Benefits**: VAM explores how students perceive the advantages of Generative AI, which might include increased efficiency in academic tasks and enhanced creative capabilities. These benefits must be significant and relevant to students' needs to encourage adoption.
- **Associated Costs/Sacrifices**: Conversely, VAM also considers the potential drawbacks, such as the learning curve of new technology, privacy concerns, or time investment required. These costs represent barriers to adoption and must be perceived as manageable relative to the benefits for students to proceed with using the technology.

By integrating these assessments, VAM provides a comprehensive framework for understanding both the motivating factors and the challenges involved in adopting AI technologies. This approach ensures a thorough analysis of why students might choose to adopt or reject generative AI, guiding the development of strategies to enhance effective technology integration in educational environments.

VAM considers the enjoyment and usefulness of an application, from the user's experience interacting with it to the value that the user receives from doing so. Studies have shown that college students use AI applications for a variety of purposes, from personalized tutoring and helping with homework, to assistance with letter writing and career-related tasks.

It also acknowledges the technical and other challenges that a user may encounter when interacting with a technology. While the perceived costs of using generative AI tools may not be monetary, relevant costs include time spent learning the technology, considering ethical implications of using AI tools, verifying that the results generated by AI are correct, and staying current on updates and new features as they become available.

Generative Artificial Intelligence

Generative Artificial Intelligence (GenAI) encompasses a suite of machine learning algorithms designed to create data samples that accurately mimic existing datasets. Two foundational techniques in GenAI are Variational Autoencoders (VAE) and Generative Adversarial Networks (GANs). VAEs are neural networks adept at encoding and decoding data while preserving its essential characteristics (Kingma & Welling, 2013). Meanwhile, GANs involve two neural networks competing to generate realistic data samples, a method introduced by Goodfellow et al. (2014). GenAI's capability to learn patterns and generate novel content such as text, images, and sounds has led to its application across diverse fields including education, healthcare, and media.

The release of tools like ChatGPT, Google Gemini (formerly known as Bard), and Dall-E, and Stable Diffusion has significantly influenced the adoption of GenAI in higher education, where its ability to handle complex prompts and produce human-like responses is particularly valued (Chan & Hu, 2023).

Benefits and Challenges of GenAI in Higher Education

The utilization of GenAI in higher education enhances the learning experience by enabling the generation of original content and providing real-time academic assistance. Chan & Lee (2023) highlight how text-to-text AI generators like ChatGPT assist students, especially those who are non-native English speakers, by offering writing support and enabling idea brainstorming. Similarly, text-to-image generative AI tools such

as DALL-E and Stable Diffusion are instrumental in teaching complex concepts in arts and design (Dehouche & Dehouche, 2023).

However, the integration of GenAI within academic settings is not devoid of challenges. Issues related to ethics, plagiarism, and the quality of AI-generated content raise significant concerns. While AI-generated texts are mostly original, they often lack personal perspective and may contain inappropriate references (Kumar & Mindzak, 2024). Moreover, the potential biases and inaccuracies in AI-generated content necessitate stringent human oversight (Harrer, 2023).

Student Perceptions of GenAI Usage in Higher Education

The acceptance and integration of technological innovations in educational settings hinge significantly on user perceptions (Davis & Davis, 1989). Students' perceptions of their learning environment, including technological tools like GenAI, profoundly influence their learning approaches and outcomes (Chan & Hu, 2023). Research indicates that students perceive GenAI tools like ChatGPT as beneficial for tasks such as idea generation and writing assistance, yet there is also apprehension regarding overreliance on these tools, which could impede the development of essential academic skills (Mizumoto & Eguchi, 2023; Warschauer et al., 2023).

Moreover, the impact of GenAI on academic integrity and the potential for misuse in generating assignments are prominent concerns. Peres et al. (2023) discuss the difficulty in detecting AI-generated content with traditional plagiarism tools, which complicates the enforcement of academic honesty.

Student AI Adoption

AI adoption in higher education has been of high interest to educators and researchers. Wang et al. (2021) examined AI adoption from a teachers' perspective finding that perceived ease of use and their attitude toward AI played a significant role in adoption. Other Paper et al. (forthcoming, citation redacted to preserve anonymity of authors) show that AI usage amongst college students has increased significantly to the point where if students are now not familiar with AI, they would be considered laggards in the technology.

Methodology

This study explores motivations to explain the rapid adoption rate of generative AI tools among college students. The methodology employed focus group interviews, guided by the Value-Based Adoption Model (VAM). Focus group interviews are recognized for their effectiveness in yielding qualitative insights that are essential for understanding complex behaviors and decisions (Krueger & Casey, 2015; Morgan, 1996). By mapping each question to specific elements of the VAM, the study structured the discussions in a way that directly aligned the collected data with the theoretical framework, enhancing the relevance and depth of the findings.

In total, there were 38 participants spread across seven focus groups of students from two business-focused universities in New England. Group sizes ranged from two to five participants. Participants in the study were volunteers, selected to represent a diverse range of experiences with AI technology. The interviews were conducted via Zoom, facilitating an interactive exploration of their perceptions and experiences. We utilized Zoom's transcription service to record the conversations. The session transcript was analyzed, and responses were coded based on the four core components of VAM.

The focus group questions were strategically designed to probe into the critical dimensions of the Value-Added Model (VAM) that influence the adoption and utilization of AI technologies in educational contexts. Each question is tailored to uncover insights into distinct components of the model, providing a comprehensive understanding of students' interactions with AI tools:

1. **Enjoyment**: "How do you feel about using AI?" — This query evaluates students' emotional engagement with AI technologies, aiming to capture the pleasure and satisfaction they derive from their interactions, thereby assessing the enjoyment factor.
2. **Usefulness**: "How do you use AI tools, and for what purposes?" — This question investigates the practical applications and effectiveness of AI in fulfilling academic and personal needs, offering insights into the perceived utility of these technologies.
3. **Technicality**: "Which AI tools do you use, and specifically, what do you use them for?" — This inquiry delves into the specific AI technologies employed by students, focusing on any technical complexities or challenges they encounter, thereby evaluating the technicality involved in their use.
4. **Perceived Cost**: "Who in your social community influences your use of AI?" and "How did you find out about AI tools?" — These questions explore the social influence and the channels through which AI knowledge is disseminated among students, assessing the perceived costs associated with social dynamics and the acquisition of information.

Participants were encouraged to share and reflect on their stories and those of their peers, which facilitated a rich exchange of ideas and deepened the understanding of adoption factors.

Results

This section categorizes and analyzes student responses from focus group discussions using the Value-Added Model (VAM) framework, which segments perceptions into 'Benefits' and 'Sacrifices' related to the use of AI in educational environments. By delineating these categories, this paper aims to offer a balanced view of how AI technologies are perceived to enhance value through increased enjoyment and usefulness, while simultaneously introducing potential costs associated with technical complexities and perceived ethical concerns. For each characteristic of VAM, we provide relevant quotes from student focus groups. These sentiments reflect how students perceive AI tools in terms of their enjoyment using them, the practical benefits they offer, the technical challenges and functionalities, and the associated potential costs or drawbacks.

Enjoyment

- "I can usually come up with ideas."
- "I really like using AI, and I'm trying to make it part of my academic life in that correct way."
- "When I think of like what topic should I do for my speech I just put into ChatGPT, and it gives you like 10 topics related to that word, and it actually works very well."

In the context of student experiences, the aspect of enjoyment derived from using AI technologies is not just about pleasure but also about engagement and motivation. Students report a sense of excitement and novelty when using AI tools, which adds a layer of modernity to their academic pursuits. This enjoyment is partially due to the interactivity and responsiveness of AI systems, which can transform routine tasks into more dynamic and stimulating activities. For instance, the ability to quickly generate creative content or solve complex problems with AI can provide a significant boost to a student's morale and interest in the

subject matter. Enjoyment, thus, is closely linked to the increased engagement and satisfaction that students feel when they can use cutting-edge technology to enhance their learning experiences.

Usefulness

- "How much more efficient was like that my classmates were using it."
- "Like an article like the evidence like what I'd be going to say and basically, I just highlight, copy, paste."
- "When an article is really long, and I don't have a quick time to read for class. Throw it in the chat and it gives you like a quick little summary."
- "I use it a lot for like quizzes and stuff, because I think it's pretty useful."
- "When I need to write an essay."
- "I was just looking for like main like bullet points. Kind of that I would like to cover."
- "I want to open a business in the future, and I'm trying to look into the industries that are like small business industries that are more most likely."
- "In my CS class, they encourage us to use it to develop HTML code or to make sure our code is correct."
- "I use ChatGPT mostly for writing and brainstorming, or sometimes for like Excel, or like general, like usage of like everyday use."
- "When ChatGPT first came out, you could scan documents and PDFs. I found it very useful. When we have multiple PDFs that we have to read simultaneously, and you want to find a connection between those."
- "Some professors are okay with us using it as long as we cite it, while other professors are just no AI at all."
- "But if it gives you like a topic idea that you are interested in, you have to do your own research to delve deeper into it."

Usefulness is the cornerstone of students' positive perceptions of AI technologies. Across various responses, students consistently highlight how AI tools aid in efficiency, comprehension, and the execution of complex tasks. AI's ability to analyze large volumes of data, provide quick summaries, and assist in generating content allows students to manage their time more effectively, especially under tight deadlines. Furthermore, AI applications in areas like coding, research, and creative projects are seen as invaluable aids that can offer suggestions, correct errors, and inspire new ideas. This practical utility is perceived as a significant enhancement to academic productivity, transforming AI from a mere technological advancement to an essential academic partner. The emphasis on usefulness also reflects a pragmatic recognition of the pressures and challenges of modern educational environments, where efficiency and effectiveness are paramount.

Technicality

- "It’s just too expensive to work with images with ChatGPT. I think I should try to look into alternatives."
- "I asked it to give me specific instructions on how to perform a task on Excel."
- "I use like an AI to generate images sometimes for presentations. It is really hard to find a specific image online. So now with AI, you can just put a prompt in it, and AI generates an image that you want specifically for your prompt."
- "When ChatGPT first came out, you could scan documents and PDFs. It scans them very well and draws connections that would otherwise take hours to realize."

- "Asking it to create formulas for dangerous things like, for example, TNT or bombs, and ChatGPT in the beginning could give you answers to those if you gave the right prompts."
- "Professors really encourage us to use it and use it correctly, and I think, rather than being something that you must run away from or fear."

The technical aspects of AI involve both its functionality and the user's ability to effectively engage with this technology. Some students' express concerns about the learning curve associated with these tools, indicating that not all users may initially benefit equally from AI due to varying levels of tech proficiency. This barrier can create a divide between those who can harness the full potential of AI and those who might struggle with basic functionalities. Furthermore, the complexity of AI systems can sometimes intimidate users, potentially leading to underutilization or misuse. Addressing these technical challenges is crucial for ensuring equitable access to the benefits of AI, suggesting a need for educational programs that focus on building digital literacy and technical skills.

Perceived Cost

- "I feel like it's just going to become like the new modern thing to use in the education system, which can be good and can be bad."
- "The only difference will be is, do kids understand it, because everyone will be able to get the right answers like that."
- "I personally think there is a very fine line between, like when you can use it to generate ideas, and when you use it to actually like get grades and stuff like that, because then you start like not learning. You are just copying and pasting stuff."
- "I was just using basically someone else's kind of brain. I don't know to do my work."
- "But also, I think it's very scary with the evolving AI that now it's video generating."
- "Because I don't want AI to replace my abilities."
- "Make our lives easier, but not to replace some of the skills we have."
- "Should kind of focus on how to still appreciate the knowledge."
- "I've become way too dependent on it. So, whenever I'm faced with a problem that I need to solve, I'm like, okay, I'm just gonna ask ChatGPT."
- "You do have to be careful about over-dependence on AI, because sometimes it minimizes your ability for critical thinking."
- "AI sometimes generates false information."
- "My major concern about AI is data privacy, because AI is like a model. So you have to train it. The more data you put into it, the more it knows. But like, as you put it, like the information, does it actually go into a database that specifies that data is directly related to you?"
- "I have to double check with my professors. It's just more work, so I just want to do it myself and get it over with."
- "I think AI in general hallucinates a lot. And I think some people don't recognize that. And I think that can be harmful to people and just create bad work."
- "I think it can also make people less hardworking because they rely on it too much."
- "I don't feel that much fear about AI taking my job, but I know it will change the coursework of it. So sometimes when I think about how I'm applying things from my school to my work life, that might not be the same thing 5 years down the road just because of the advance of AI."
- "I think algorithms tend to affect children's growth, especially people who grew up in the media or spend a lot of time in it. It just doesn't have any ethics. AI doesn't really have any emotions."

While the direct financial cost of accessing AI tools is a consideration, the broader concept of perceived cost encompasses several intangible elements, most notably the impact on students' cognitive and ethical

development. Concerns about becoming overly reliant on AI point to a potential devaluation of critical thinking and problem-solving skills, as students might opt for AI-generated solutions rather than developing their own insights. Additionally, ethical dilemmas arise from issues such as data privacy and the authenticity of AI-generated work, which can affect academic integrity. These perceived costs highlight the need for a balanced approach to AI integration, where the benefits of convenience and efficiency are weighed against the potential for skill erosion and ethical conflicts. Such considerations are vital for developing policies and practices that maximize the positive impacts of AI while safeguarding against its potential downsides.

In the traditional application of the Value-Added Model (VAM), each element—Enjoyment, Usefulness, Technicality, and Perceived Cost—is weighted equally, assuming a uniform impact on the user's decision-making process. This assumption posits that each factor contributes equally to the overall value perceived by users.

However, the findings from our focus group analysis reveal a different distribution of weights, suggesting a nuanced understanding of how students perceive and value AI technologies in educational settings. The weights assigned in our study are based on the approximate amount of time that focus groups spent discussing each theme.

- Enjoyment: 19%
- Usefulness: 45%
- Technicality: 17%
- Perceived Cost: 19%

This allocation indicates a deviation from the traditional equal weighting scheme of VAM. "Usefulness" emerges as the most heavily weighted factor at 45%, reflecting its significant influence on students' adoption and ongoing utilization of AI technologies. This highlights that students prioritize practical and tangible benefits in their educational tools, valuing AI primarily for its ability to enhance academic performance and efficiency.

Conversely, Enjoyment, Technicality, and Perceived Cost received weights 19%, 17%, and 19% respectively, indicating that while these factors are important, they are secondary to the utility that AI provides. This disparity in weighting suggests that for effective integration of AI in education, stakeholders should focus more on enhancing the practical benefits and addressing the technical and cost-related barriers, rather than merely focusing on making AI tools enjoyable or minimizing their perceived cost.

The comparative analysis between the conventional assumptions of the Value-Added Model (VAM) and the findings from this paper strongly emphasizes the need for customizing the model to suit specific user demographics and contexts. This study highlights a significant skew in students' value perceptions towards functionalities that directly enhance academic performance, diverging from the equal weight traditionally assigned to each VAM factor. This critical insight is indispensable for educators and technology developers, steering the development of AI tools towards better alignment with the practical needs and priorities of students. Such tailored AI solutions are poised to address and fulfill the specific demands and challenges faced by the educational sector more effectively.

Discussion

The discussion around the use of the Value-Added Model (VAM) for evaluating AI adoption in educational settings is both timely and critical. The integration of General AI (GenAI) into higher education not only offers profound opportunities to enhance educational practices and efficiency but also presents significant

ethical and practical challenges that necessitate careful consideration. The diverse student perceptions revealed through focus group interviews underscore the need for educational institutions to thoughtfully manage GenAI integration, ensuring that it aligns with educational goals while addressing potential drawbacks. Table 1 summarizes conclusions drawn from focus groups and perceived findings from other studies and helps to deepen our understanding of how GenAI is perceived and utilized in academic settings. This information aims to inform strategies for its effective integration to maximize benefits and mitigate risks.

Table 1: VAM for GenAI in Higher Education

Component	Description	Examples/Details
Perceived Benefits	Benefits that students believe GenAI offers in their academic environment.	• Academic assistance (e.g., writing help, idea generation) • Educational efficiency (e.g., automated grading, data synthesis) • Enhanced learning for complex concepts (e.g., visual aids for arts and sciences)
Perceived Sacrifices	Potential negative impacts or costs perceived by students due to GenAI adoption.	• Academic Integrity: Concerns such as plagiarism and reduced insight (e.g., plagiarism, lack of personal insight). • Ethical Issues: Potential biases from flawed data (e.g., flawed data training). • Skill Development: Risks to critical thinking and creativity (e.g., critical thinking, creativity). • Costs: Fees and time required for AI tools (e.g., fees for premium services, time to learn and manage AI tools).
Perceived Value	Overall assessment of GenAI's utility, balancing benefits against sacrifices and costs.	• Evaluation of whether the educational and efficiency gains outweigh the ethical and integrity concerns, plus the associated costs.
Adoption Intention	Decision to adopt GenAI based on the perceived value.	• Higher perceived value typically leads to stronger intentions to adopt GenAI tools.
Moderating Factors	External factors that can influence the perceived value and adoption intention.	• Institutional support (e.g., AI usage guidelines) • Technology literacy (e.g., user proficiency in AI) • Cultural and social influence (e.g., peer perceptions and societal norms)

The Value-Added Model (VAM) is extensively employed as a framework to explore the factors influencing student adoption of AI technologies within educational environments. Conventionally, VAM evaluates distinct elements such as perceived benefits and sacrifices, providing a structured perspective on student decision-making regarding technology adoption. However, recent findings from our focus group analysis suggest a nuanced deviation from this traditional approach: not all VAM components impact decision-making equally.

These insights necessitate a recalibration of the VAM to incorporate differential weighting for its components, thereby aligning the model more closely with real-world student experiences and preferences. Specifically, our analysis underscores the predominant influence of 'Usefulness' in the decision to adopt AI tools, suggesting that this factor should be assigned a greater weight relative to others like 'Enjoyment' or 'Technicality.'

By adjusting the weights of these components in the VAM, stakeholders—ranging from educational policymakers to technology developers—can achieve a more accurate understanding of the critical drivers behind AI adoption. This refined approach allows for the development of targeted strategies that not only

highlight the practical benefits of AI but also effectively mitigate perceived drawbacks. Consequently, such strategic adjustments can facilitate a more effective and efficient integration of AI technologies into educational frameworks, ensuring that their deployment is both strategic and beneficial, geared towards enhancing educational outcomes and student engagement.

From the data extracted, an analysis was performed not only by humans but also by ChatGPT. The analysis performed by ChatGPT on the extracted data from our scripts reveals a significant divergence from the weightings concluded by human analysis. According to ChatGPT, the weights are as follows:

- Enjoyment: 8%
- Usefulness: 32%
- Technicality: 16%
- Perceived Cost: 44%

This disparity in findings leads to a crucial discussion on the methodology and the interpretation of data within the VAM framework. The pronounced difference, especially in the perceived cost and enjoyment factors, suggests that the AI may be capturing subtleties or biases not immediately evident to human analysts. The higher weighting of perceived cost in the AI analysis might indicate that students feel the economic impact of adopting new technology more acutely than educators or developers anticipate. Similarly, the lower enjoyment score could reflect a pragmatic approach to technology adoption, where practicality supersedes pleasure.

Both analyses underscore the necessity to adjust the weights of various VAM components, but they also highlight the need for further investigation into how these weights are determined. It prompts several additional questions that could be explored in future research:

- **Methodological Variance**: How do different analytical methods (AI vs. human judgment) impact the interpretation of data in educational technology research?
- **Impact of Enjoyment**: How does the lower prioritization of enjoyment affect long-term engagement with AI technologies in educational settings?
- **Cross-Sectional Analysis**: Would similar weight distributions arise if the study were replicated in different educational contexts or across different demographic groups?

Exploring these questions can help refine the VAM further, ensuring it not only reflects theoretical accuracy but also practical applicability in diverse educational environments.

The insights derived from this analysis are pivotal for shaping educational strategies and technology integration policies, ensuring that AI deployment in education effectively supports student needs and mitigates adverse effects. This structured examination provides a critical foundation for understanding key factors that influence student engagement with and attitudes towards AI in academic contexts.

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