From Bytes to Books: Navigating the AI Frontier in Postsecondary Education

Andrea Arce-Trigatti, Dorota Silber-Furman, Aimee Klaschus, & Hannah Willis

Abstract

Many scholars agree that there is no consensus between what students and teachers consider as proper use of generative Artificial Intelligence (AI). Further, even if there are a plethora of studies on the topic of AI as technical integration to the curricula and academia, a scarcity of research still exists as it relates to ethical aspects. The purpose of this Conceptual Framework contribution is to offer a new approach to understanding how to integrate AI into postsecondary teaching, learning, and administrative tasks. Specifically, we center this piece around the following question: how do educators, students, and administrators leverage generative AI's expanding capabilities to improve teaching and learning, while minimizing educational risks? In doing so, we offer a combined ADDIE-AIAS framework that may help to mitigate these issues in higher education and pair this framework with examples from the field to illustrate its application in different contexts.

Keywords*: Generative Artificial Intelligence, teaching and learning, administration, efficiency, ethics, ADDIE Framework, AI Assessment Scale*

The introduction of generative Artificial Intelligence (AI) has had several implications for teaching, learning, and administration in the field of education, including the way that students engage with content and the way teachers plan, design, and execute their courses (Bowen & Watson, 2024; Clark, 2023). The purpose of this contribution is to offer a new approach to understanding how to work with and integrate AI into postsecondary teaching, learning, and administrative tasks. As faculty, administrators, and graduate students, we investigate how different strategies leverage generative AI in the contexts that we experience in higher education. Specifically, we center this piece around the following question: how do educators, students, and administrators leverage generative AI's expanding capabilities to improve teaching and learning, while minimizing educational risks?

To do so, we explore examples centered on teaching and learning areas relevant to higher education including faculty, student, accessibility, and assessment processes and how generative AI has been utilized to enhance or diminish resources and efficiency within these areas. In these instances, we offer a discussion regarding pragmatic usage and contrast it with ethical concerns and risks that it can pose with respect to these contexts. As part of this analysis, we apply the Analyze, Design, Deliver, Implement, Evaluate (ADDIE) framework (Larson & Lockee, 2014) – a foundational instructional design methodology that provides a structure for reliably creating effective learning experiences – with the AI Assessment Scale (AIAS) as a lens to analyze common experiences with generative AI and how it can be appropriately integrated into teaching, learning,

and administrative processes to best support student success. Through these examples and analysis, we connect to lessons learned and implications for others navigating similar scholastic terrain.

Context in Higher Education

The Chronicle noted in a recent survey of college officials, that the majority believe that AI will positively influence the fields of teaching, research, career and library service within the next five years (Parnell, 2024). To this end, AI can prove to be beneficial to many postsecondary work responsibilities, but navigating the new technological advancements can also prove challenging. Further, as this relates to applications in postsecondary teaching and learning, there exists a need to address ethical and pedagogical implications of integrating AI into educational assignments, learning environments, and even administrative tasks (Bowen & Watson, 2024). Feisler (2023), an AI and technological and computer scholar, warned:

> I sometimes describe myself as a technology optimist who thinks and prepares like a pessimist. The only way to decrease ethical debt is to take the time to think ahead about things that might go wrong – but this is not something that technologists are necessarily taught to do. (par. 11)

Feisler (2023) defined the ethical debt as anything and everything that could go wrong with the use of AI such as harm to society or any type of consequential effects on or interaction between AI and humans. Many scholars agree that there is no consensus between what students and teachers consider as proper use of AI resources and more research is needed. Also, even if there are a plethora of studies on the topic of AI as technical integration to the curricula and academia, a scarcity of research still exists as it relates to ethical aspects.

Scholars, such as Feisler (2023) point to many complexities connected with AI use, indicating that,

> …public concern about the ethical and social implications of artificial intelligence keeps growing, it might seem like it's time to slow down. But inside tech companies themselves, the sentiment is quite the opposite. (par. 1)

By the same token, when it comes to the use of generative AI, postsecondary educators note concerns which include misinformation or false information, weakening of the content knowledge, and a threat to academic integrity (Clark, 2024; Parnell, 2024). As Chiu (2024) argued, institutions of higher education are being called to provide guidance and direction on AI use for teachers, administrators, and students alike, considering their role in educating future professionals in the use of AI. However, although the need for policies and guidelines at the university level is helpful, scholars take this point further by underscoring the necessity to better understand AI in terms of learning theory and pedagogical practices instead (Xu & Ouyang, 2022).

Conceptual Framework

Existing Frameworks

As with other advances in technology, understanding the use and integration of AI in university level teaching and learning is paramount to providing the guidance needed to better engage with this technology. To this end, several frameworks to understand AI have been developed. For example, Holstein and colleagues (2020) explored AI use in education by focusing on the jointly enacted AI systems and human facilitators (e.g., teachers or peers) dynamic inherent in educational AI (AIEd) systems. Their work builds on frameworks that have explored AIEd through computer-supported collaborative learning, teacher cognition, and classroom orchestration that offer insight into specific aspects of adaptive learning systems (Holstien et al., 2020). Understanding different elements of the human-AI hybrid adaptivity in education, the scholars offer a generalized set of dimensions, including (1) Goal Augmentation, (2) Perceptual Augmentation, (3) Action Augmentation, and (4) Decision Augmentation. Each goal is intended to capture components of adaptive instructional behavior, "suggesting distinct ways in which AIEd systems and human facilitators might augment one another" (p. 35).

Focusing on the learning theory behind the integration of AI into education, Ouyang and Jiao (2021) explored extant literature on the topic to see if, and how, AIEd researchers link AI integration to learning theory. In their work, they found that scholars rarely underscored the purpose and use of AI with relation to relevant learning theories that could help augment the ways in which educators leverage AI in learning. Specifically, the authors contended that the AIEd literature, "[lacked a] critical reflection of theoretical, pedagogical, and ethical implications," and those that did reportedly focus on pedagogy, "..the applied learning theories or educational frameworks had not been reported in most cases, even though the theories played an important role in understanding the context in which a system was implemented" (p. 2). To address this issue, they proposed three paradigms where AI techniques can be used to address educational and learning issues in varied ways: (1) AI-directed (Behaviorism) learner-as-recipient, (2) AI-supported (Cognitive, Social Constructivism) learner-as-collaborator, and (3) AI-empowered (Connectivism, Complex Adaptive System) learner-as-leader. Tied to specific learning theories, each paradigm posits the appropriate ways in which to engage learners with AI as part of the learning process and offer guidance on the design and creation of content (Ouyang & Jiao, 2021).

In a similar vein, Xu and Ouyang (2022) researched AIEd scholarship to explore in what ways AI is positioned with respect to other educational elements. They contend that as a new, emerging, and interdisciplinary field, specifics related to the deep connections between AI integration and learning theory and instructional design principles have not yet been readily established. Leveraging a systematic literature review process, Xu and Ouyang (2022) examined the practical, theoretical and technological uses and implications of AI in various learning environments. From their analysis, they proposed that AI has three primary roles in education including: AI as a new subject, AI as direct mediator, and AI as a supplementary assistance to influence the instructor-student, student-self, and student-student relationship (Xu & Ouyang, 2022).

Providing another perspective on AI use in education, Chaudhry and colleagues (2022) reviewed several existing checklists and frameworks that focus on different dimensions of ethical AI use to better understand the requirements of transparency for different stakeholders of AI in education. They posited that,

> An AI tool built with huge amounts of data and the best performing machine learning algorithms will perform at its best only in certain contexts. Transparency is essential to know in which contexts the tool will not perform at its optimal level. (Chaudhry et al., 2022, p. 4)

To address this issue in education, they proposed a Transparency Index framework that highlights five aspects of transparency that need to be considered when using AI, including: fairness, explainability, safety, accountability, and interpretability. The Transparency Index framework was intended for use in the planning, development, and deployment of AI tools that are used in learning contexts. Chaudhry and colleagues (2022) underscored that this index builds on transparency in AI literature, including frameworks proposed by Felzmann et al. (2020), Richards and King (2013), and Ananny and Crawford (2018).

ADDIE Framework & AI Scale Combination

Albeit just a glimpse of the frameworks that are currently in the AIEd literature, those shared above offer a foundation by which to understand how AI has been thus far explored and integrated into education. Building on this extant literature, it was important for us to situate ourselves as scholars, educators, and learners and leverage tools that are familiar to our discipline to navigate the development of learning environments or administrative tasks with AI. As Ouyang and Jiao (2021) and Xu and Ouyang (2022) posited, the relationship between the integration of AI into educational materials or postsecondary administrative assignments is less developed. In accordance, we gravitated towards the ADDIE framework as a design and planning tool that could be used with an AI scale to help create learning environments that integrate AI in an efficient and ethical manner.

ADDIE stands for Analysis, Design, Development, Implementation, and Evaluation, which are iterative phases or stages described by the literature as pivotal parts of an instructional product (Aldoobie, 2015; Patel et al., 2018). This model intentionally considers principles of various learning theories, the learner's needs and environment, and approaches to training practitioners and educators in continual improvement processes (Patel et al., 2018). Larson and Lockee (2014) contended that the phases are rather activities that emphasize the processes inherent in both teaching and learning that lead to the continual improvement of both. This means that every component of the instruction is governed by student-centered learning processes that are dictated by learning outcomes determined after a thorough analysis of the learners' needs (Larson & Lockee, 2014). Patel and colleagues (2018) further emphasized that the ADDIE model can be utilized as a project management guide to understand the inputs and outputs that make up the efficiency of the learning environment being developed or evaluated.

Although ADDIE has been a beneficial framework to understand course and instructional design, the integration of AI is not fully integrated into the activities/phases of the framework. As AI integration in learning is not a binary yes/no, black/white, good/bad decision because nuances allow for the use of AI in a higher education setting to enhance efficiency in teaching and learning, it is valuable to use a scale as an evaluation metric to understand when and how it might be incorporated. To this end, we found that the Perkins et al. (2024) AI Assessment Scale (AIAS) becomes a viable tool to use in tandem with the ADDIE framework to better comprehend the full potential of AI possibilities. According to Perkins et al. (2024), "The AIAS has emerged as a response to these changing dynamics, highlighting the need for a more structured approach to the integration

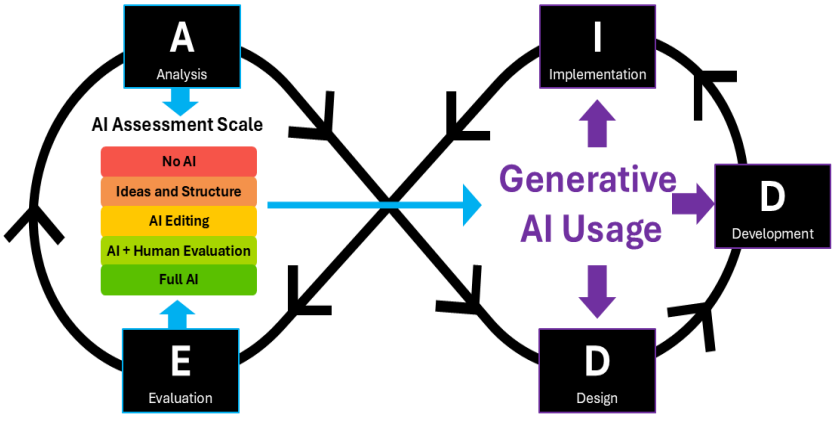
of Gen AI in academic settings" (p. 5). Further, three goals define the AIAS: 1) Help educators consider how their assessments might need to be adjusted in light of Gen AI tools, 2) Clarify to students how and where Gen AI tools might be used in their work, and 3) Support students in completing assessments in line with the principles of academic integrity (Perkins et al., 2024). The AIAS scale itself has five pointers:

1. No AI: AI must not be used at any point during the assessment.
2. AI-Assisted Idea Generation and Structuring: No AI content is allowed in the final submission.
3. AI-Assisted Editing: AI can be used but your original work with no AI content must be provided in an appendix.
4. AI-Task Completion Human Evaluation: You will use AI to complete specified tasks in your assessment. Any AI created content must be cited.
5. Full AI: You may use AI throughout your assessment to support your own work and do not have to specify which content is AI generated. (Perkins et al., 2024)

The AIAS further provides a scalar approach to integrate digital technologies in education, especially in a time when the broad spectrum of digital tool usage is becoming so prevalent in higher education (Perkins et al., 2024).

In Figure 1, we offer a visual of how the components of the AIAS, Generative AI, and the ADDIE Framework would function together. In this figure, the ADDIE framework follows an infinity pattern to underscore how the phases continually influence one another. In the first half of the infinity pattern, the Analysis and Evaluation components of the ADDIE framework are pointing towards the AI Scale because these components are actively being guided by the selection of the AI Scale being used. For example, in the Analysis phase, an instructor would determine the level of AI use in student learning based upon student needs as described by the AI Scale. In the Evaluation phase, student learning and content design is evaluated based on the use of AI as previously selected by the AI Scale in the Analysis phase.

Figure 1. *Integration of AIAS into ADDIE Framework*



The other three phases in the ADDIE Framework—Design, Develop, and Implementation—are in the second half of the infinity pattern. This implies that they are guided by the Analysis and Evaluation phases, as well as the selection of levels on the AI Scale. These three phases are pointing to receive input from Generative AI technology use based on earlier phases informed by the AI scale. The infinity cycle underscoring the ADDIE Framework in the visual implies a continual review process with respect to AI selection, design, and use in faculty teaching and student learning.

In combining the AIAS with the ADDIE framework, we are proposing a way to help facilitate the understanding between students and teachers regarding the pedagogical benefits of using AI as part of the teaching and learning process in higher education (Patel et al., 2018; Perkins et al., 2024). As the AIAS helps to address concerns related to academic integrity, AI literacy skills development, plagiarism, and other issues, integrating it with the ADDIE framework may help develop learning environments, student activities, and other instructional related content. It was important to have a flexible framework that worked for both educators and practitioners to bolster critical learning and teaching skills when it comes to the use of AI. Specifically, by identifying the ways in which AI will be used as part of the design of course content or student engagement, this could amplify putting ethics on the forefront when discerning when and how to use digital technologies in the learning processes at the postsecondary level.

In our conceptual framework, we propose using the AIAS as the means by which to identify initial teaching, learning, and administrative needs, especially as part of the Analysis phase in the ADDIE framework. In this way, when educators, administrators, or students are planning their work, the AIAS will be the first tool leveraged to understand the need for the use of AI, which then would guide the design and development of the content created or strategy used. The AIAS could then also be utilized to assist with the evaluation aspect in the ADDIE framework, as educators, administrators, and students could anchor evaluation in the ways in which AI was initially intended to be used in the design process. In Table 1, we offer a supporting organization of how and when the AIAS could be incorporated as part of the ADDIE process, complementary to Figure 1.

Table 1. *ADDIE Framework with AIAS Incorporation*

Analysis	Identify student learning needs or teaching needs using the AIAS. This would pinpoint how and why AI is used in the learning process.
Design	Create course content or engagement with AI around the decision on how AI can be used in this activity.
Develop	Prototype the course content or engagement with AI around the decision on how AI can be used in this activity.
Implement	Carry out the course content or engagement with AI as designed and developed in previous stages with AI decisions.
Evaluate	Reference the initial decision to use AI as per the AIAS. Gauge what worked and what did not work in terms of the use of AI.

Teaching and Learning Vignettes

To highlight how AI intersects with postsecondary ethics and learning parameters, we feature four vignettes that offer different perspectives of how this type of technology may be used in postsecondary settings. These vignettes also provide narrative to understand where the combined ADDIE and AIAS framework could address discrepancies relating to ethical considerations in AI use. To anchor these perspectives, we posit the following question: how do educators, students, and administrators leverage generative AI's expanding capabilities to improve teaching and learning, while minimizing educational risks? Through these examples, we reflect on how the ADDIE framework and AIAS can be combined to evaluate the efficiency of the uses of AI in various contexts in higher education.

Teaching and Learning: Faculty Perspective

The human oversight of AI is a must to harness its biggest potential. There can be a multitude of ways for faculty to use AI to help support their teaching and scholarly tasks. This new technological advance can assist in feedback and email creation, nevertheless it is not enough to simply copy and paste the generated text. For example, the feedback or an email template offered by AI can be a starting point for further additions, with student specific information and directions, a base which the instructor supplements, assuring students the benefit of receiving the correct and deserved personalized and relevant information.

The introduction of AI has several implications for teaching and learning in the field of education for faculty, including the way that educators design how students engage with content and assessment that could leverage AI for learning purposes. For example, an instructor may use AI for designing a study guide assignment which is used as part of many undergraduate level courses. This study guide assignment is essentially a form that engages students in reflection of several chapter textbook questions to which students need to provide reflective answers based on the text, at times citing meaningful passages from the reading. In creating the content for this assignment, AI could help faculty with generating study guide prompts by outlining lists of content questions that could provide a selection for the instructor. AI could also be utilized to create a template for various student feedback content that could ensure that necessary study guide features are outlined, with the instructor adjusting and individualizing this feedback to tailor to students' needs.

Further, it is advantageous to allow students to use generative AI to supplement their research endeavors for this assignment, and in the same token teach them how to verify peer-reviewed sources as part of their learning. In this example, AI can provide the first step in a vast research search, but ultimately it needs to be the student who writes-up the scholarly sourced results, citing meticulously where the information was found for further verification and transparency. Hopefully, it is needless to say that same standard should apply to faculty. In using AI, it is appropriate for faculty to note and acknowledge use in these endeavors, placing an acknowledgement note as part of the content of the study guide material.

For faculty, the use of AI can potentially provide a springboard for ideas. How often do faculty sit in front of a blank sheet of paper or a white screen? In these academic situations a brainstorming session or an engagement with AI could launch the imagination to a scholarly universe of possibilities and could prove productive and valuable. The human factor, however, is the most important and critical thinking skills should always be at the forefront of any scholarly tasks.

AI can improve writing and, by its use, we learn alongside it, often requesting a synonym or correcting the wrong syntax. This speeds up the writing process and provides an additional level of instruction that occurs almost in an implicit manner. As postsecondary instructors are becoming more open to such AI use, many are utilizing the same resources to advance writing.

When both teachers and students use AI in an ethical manner, when we leverage AI possibilities, we can ensure the best outcomes. Some specific ways to use AI in an ethical manner in teaching and learning include the use of a disclaimer regarding AI use in the generation of any scholarly content, discerning how to use AI in different settings, incorporating classroom discussions on the appropriate use of AI technology for teaching and learning, and setting clear guidelines on what is expected in terms of appropriate AI use for the discipline. Several scholars and universities offer guidance on how this potentially could be accomplished. For example, universities could offer workshops where faculty can learn how to make mindful and ethical choices in using AI, collaborate with institutional leaders to integrate AI projects into existing courses, create communities of learning to help foster discussions on the critical evaluation of the use of AI in faculty-developed content, offer professional development training on issues of transparency and privacy in using AI, and partner with various campus offices to understand how AI can help support student learning and enhance accessibility features (Cornell University, 2024; Dwivedi et al., 2023; Noyes & Girdharry, 2024; Uzzi, 2020; Wargo & Anderson, 2024). Ultimately, these discussions need to be centered on "striking a balance between riding the wave of AI advancements and upholding ethical principles" (Wargo & Anderson, 2024, par. 22).

In teaching and learning, the focus needs to remain on individual growth and development in terms of the content shared in the classroom. Adding AI as a technological tool, whether to advance faculty responsibilities or student learning, can be considered skill development as part of the overall educational environment. AI tools can and should revolutionize postsecondary environments. More conversations and opportunities to discuss current technological advancement would be constructive as we have just started walking on this new technological path and we all need guidance regarding what is right and wrong. Sure…some answers are black and white, and ethical conduct gives straightforward responses, but as on many paths there are gray areas, and further conversations would bring about clarity. Also, we should not just assume that AI use is bad and unwanted as progress is unavoidable and should be welcomed and desired, with academic ethics in mind.

Teaching and Learning: Student Perspective

The goal of a university class should be mastery of the course content. One of the best ways to achieve mastery is for a student to put focused attention on learning and understanding their coursework while also having a professor or tutor at hand to help. Unfortunately, both professors' and tutors' time is limited, and if extra help beyond university-provided resources is needed then it is often expensive. Friends and study groups can make up more of this gap but often provide little more than a sounding board, rather than information-rich instruction. Fortunately, AI promises (and delivers, with caveats) the experience of having both an information-rich tutor and a natural-language sounding board at a student's fingertips whenever and wherever they are working.

If the goal of a university course is mastery of the content, then a tool that gives answers with no thinking required from the student would be a catastrophic addition to the academic landscape. Fortunately for mathematics, large-language-model AI is not capable of providing accurate

answers to computational problems the way a dedicated mathematics software, or even calculator, can. Using AI to help with course mastery consists more of treating the AI as a combination search engine, tutor, and sounding board. One of the co-authors started using AI as an academic tool when she began her calculus II course. The following is an excerpt from her experience.

Since I had taken calculus I eight years prior, I was woefully behind at the start of the course and had forgotten many basic calculus concepts. I found myself unable to read and decipher complex mathematical notation and struggled to keep up with the assigned homework. Basic searches using a search engine provided resources, certainly, but those resources often were not targeted to exactly my problem and required me to spend extra time searching through them for the information needed. When I realized I was spending so much time trying to find answers to what was, usually, a basic question any professor or tutor could answer in a single sentence, I changed my strategy and added AI to my study routine.

Since it was both unlikely and undesirable to get solutions to homework problems from AI (I was determined to master the content as a foundation for my future studies), my queries often looked like a Google® search, for instance: what are the properties of logarithms? The accuracy of that answer was excellent since the model was trained on natural-language answers, which included natural-language explanations of the properties of logarithms. If I did not understand the explanation, I was then able to ask the AI to rephrase in a different way, clarify a part of the answer, or add the context of my specific homework problem. These are functions that you can get in real-time from a tutor, but not from a webpage search result.

The second kind of question I would ask was a clarifying prompt about the phrasing or notation of the homework problem itself. In the past, before this kind of AI existed, I would try search Google® and see if someone had explained a similar question. That technique often failed, even in the lower-level mathematics courses where there is much more content online, because teachers and professors often phrase or frame things using very different key words. It was especially difficult to find clarifying information about complex mathematical notation, since specialized formatting cannot translate to a simple search. Using generative AI, I was able to describe what I was seeing and get a detailed explanation of what it meant, which then enabled me to continue working on the problem.

The third kind of question I would ask AI was intended to refine my thoughts by writing them out rather than to obtain a specific answer. It was similar to the rubber-duck method in programming (explain your problem to a rubber duck and you will often realize the solution before you have even finished), except that the AI could give me an intelligent answer the same way a human conversational partner could. Simply organizing my thoughts enough to write a query was valuable, but the AI was often able to point out nuances I had missed, or add context that I had not thought of.

Ultimately, one of AI's strengths is that it does not magically give you the right answer to any question. For me, the value of AI as a tool came from thinking critically about the answers it gave me and using those answers to hone in on what I needed, the same way Miller (2023) suggested it should be done. Inaccurate answers still provided me with new keywords I had not thought of before. AI's inability to do problems outright meant that I could only use it as a tool to help me achieve mastery and find the answer myself. This is especially important because I often used other mathematics-specific software to check my answers, as suggested by scholarship (Miller, 2023). If I did not care about mastery, the tools to cheat already existed prior to AI and, indeed, the nature of AI as a tool made it less appealing to give up on understanding a problem when I could not get to the calculated answer unaided.

Teaching and Learning: Accessibility Perspective

Although AI has been talked about in the literature from the perspective of students and faculty, narratives reflecting first-hand encounters with this technology in other university units is rare. To add to these narrative, we share in the following the experiences of another co-author who, as both a graduate students and staff at a university, shares a unique perspective from the accessibility aspects of AI. The following is an excerpt from her experience.

As both a visually impaired graduate student and university administrator, I have witnessed the transformative impact of AI on educational accessibility. AI has not only streamlined processes but has also opened up unprecedented opportunities for students with disabilities. The integration of AI technologies in education represents a significant leap forward in our efforts to create accessible learning environments that cater to different needs and abilities. The challenge of accessing reading materials, once a significant barrier, has been largely mitigated by AI-powered tools. Screen readers and text-to-speech software, utilizing Optical Character Recognition (OCR) and Natural Language Processing (NLP), have revolutionized how visually impaired students engage with course content (Kaplan-Rakowski & Heap, 2023; Roshanaei, 2024). Tools like Seeing AI by Microsoft and Job Access With Speech (JAWS) offer robust support, making both digital and physical texts accessible. These technologies have made it possible for students to access a wide range of materials, from textbooks to academic journals, with unprecedented ease and efficiency.

During my graduate studies, integrating OCR technology into my daily routine proved invaluable, significantly enhancing my reading efficiency and allowing me to keep pace with my peers (Alkhawaldeh & Khasawneh, 2023; Shuford, 2023). The ability to quickly scan physical documents and convert them into accessible digital formats meant that I could participate fully in class discussions and complete assignments without the delays that once accompanied the process of obtaining accessible materials.

Navigation of physical spaces, particularly expansive university campuses, presents another hurdle for visually impaired individuals. AI-driven navigation apps like BlindSquare and Be My Eyes offer crucial assistance, providing real-time auditory directions and environmental descriptions (Alkhawaldeh & Khasawneh, 2023; Kaplan-Rakowski & Heap, 2023). Be My Eyes, leveraging AI-powered software, even goes a step further by describing images captured in real time, facilitating tasks like reading signs, papers, and navigating unfamiliar spaces. These tools foster independence and confidence in campus navigation, allowing students to move freely among classes, libraries, and other campus facilities without relying on constant human assistance. However, it is important to note that these technologies are not without limitations. The AI algorithms, often trained on data from sighted users, may occasionally misinterpret images captured by visually impaired individuals, necessitating a balanced approach to their use. As educators and administrators, we must be aware of these limitations and work to provide complementary support systems when necessary.

In the digital realm, AI assistants have proven instrumental in developing digital literacy skills, an increasingly crucial aspect of modern education and professional life. AI assistants like ChatGPT®, Google Gemini®, and Claude® serve as virtual tutors, offering step-by-step guidance and troubleshooting assistance for navigating complex software applications. In my role as a university administrator, I frequently rely on these AI-powered tools to navigate complex software applications, particularly in deciphering specific settings or functions within Excel® and Word® documents. These virtual tutors offer step-by-step guidance, effectively demystifying intricate dig-

ital processes and enhancing workplace productivity (Shuford, 2023). For people with visual impairments, mastering these digital tools is not just about academic success; it is about preparing for a future where digital competence is a prerequisite for many career paths.

The impact of AI extends beyond individual accessibility to academic research, an area where visually impaired students and researchers have historically faced significant challenges. AI-driven literature review platforms streamline the research process, allowing visually impaired students to efficiently filter and focus on the most pertinent academic literature (Müftüoğlu et al., 2022). This capability is particularly beneficial for visually impaired students who, unlike their sighted peers, rely on screen readers to process information in its entirety. AI tools level the playing field by rapidly filtering vast amounts of academic literature, allowing students to focus their efforts on analyzing and comprehending the most critical studies.

The ability to quickly identify relevant sources and extract key information has been particularly beneficial in fields where the volume of published research is overwhelming. However, it is crucial to emphasize that these tools serve as assistants rather than replacements for critical analysis and comprehension (Roshanaei, 2024). As educators, we must ensure that students develop the skills to critically evaluate and synthesize information, even as AI tools make the process of gathering that information more efficient.

While the benefits of AI in improving educational accessibility are substantial, they come with ethical considerations that warrant careful attention. Issues of data privacy, potential biases in AI systems, and the risk of over-reliance on technology must be addressed (Müftüoğlu et al., 2022; Shuford, 2023). As we integrate these technologies, we must balance leveraging AI tools with fostering fundamental skills development. It is crucial to consider how AI can complement human skills rather than replace them, providing opportunities for upskilling and reskilling (George et al., 2023).

The integration of AI in education has the potential to transform accessibility from an aspiration to a reality for students with disabilities. However, technology alone is not the answer. It must be accompanied by intentional policies, adaptive teaching methods, and a commitment to addressing the unique challenges faced by individuals with disabilities.

Teaching and Learning: Assessment Perspective

Universities and colleges are often data-driven institutions that rely on accurate numbers to make decisions that are aligned with their mission. The utility of data-driven decision making in the postsecondary context is not only valuable, but also a necessary part of the fabric that supports student success practices (Gagliardi, 2022). For example, during the pandemic, data- driven processes were leveraged by several institutions to better understand the student experience and provide essential support, including much needed access to federal funding, technology (e.g., internet and computers), and mental health services (Gagliardi, 2022). However, for this data to be readily accessible, the data offices of postsecondary institutions needed to have access to resources like advanced software and data collection techniques to help deliver and expedite such requests.

This is precisely where artificial intelligence can play a major role in facilitating access for institutions that may have limited resources. In the example shared here, we look at a community college data office where two of our co-authors worked that was charged with better understanding the propensity of AI to assist in fixing integration challenges. Data management for this particular office included leveraging a variety of datasets from several units in Academic Affairs, Student Affairs, and President's Office to understand enrollment, retention, and student success trends.

Over the course of a semester, as a two-person team, we would create over 300 reports for various learning outcomes and institutional reporting mechanisms. However, in manually merging these various datasets, this small, understaffed, data office under the Institutional Effectiveness unit was taking hours as multiple tasks and projects were being managed. Therein lies the challenge that AI could assist with in terms of efficiency.

To help address this challenge, this office enrolled in a Presidential initiative to review functionality possibilities that could be enhanced through AI. After participating in AI training as part of this initiative, we tasked AI to see if it could find a way to assist in developing the programming code needed to get the various datasets merged and cleaned efficiently. By using common software services, Microsoft SharePoint® and Power BI®, two that were familiar to faculty and staff at the college, we were able to create looping systems and codes, with the assistance of AI technology, that not only seamlessly merged the datasets needed for these reports, but also could be used to double-check inventory and track related to this data. By using AI technology, we were able to create a homegrown, embedded system that cut down time on data entry and allowed for more time to be used for advanced analyses on these reports.

In this regard, AI was leveraged as a third essential staff member that would essentially guide staff in understanding and developing codes for effective data integrations. Limited in resources to purchase more advanced software that could potentially address this issue initially, we used resources available to create our own software for this purpose. Although we knew exactly what we wanted the programs to do, and were versed in programming and coding, complex integrations were where we needed the most assistance, especially when creating code that was intended to speak to two different programs. AI became an assistant and third staff member essential in helping to think more thoroughly about programming and coding nuances.

In this journey, however, there were several ethical implications we had to consider. For example, we could never share or upload institutional data for AI to review to provide ideas. Having student and identifiable information on the datasets made that option an impossibility. Further, we had to be careful in terms of the integration information we were asking for as it held implications for our college's security. For this reason, we had a sandbox on our secured college site to run coding experiments using the software we were adopting for our homegrown system. This helped to keep data secure while also instituting a place wherein codes and programming language could be tested. This is also precisely where our first successes occurred that were then transferred to a more formal system shared with faculty and administration.

Analysis

From the above examples, the use and integration of AI in higher education activities is varied and not tangibly measured in terms of how or to what extent it needs to be used. These examples are offered in the context of better understanding the situations that faculty, students, and administrators may face when trying to engage with AI for instruction, learning, or efficiency-related tasks. Below, we expand on the second example shared, from the student perspective, to indicate how an ADDIE-AIAS combined framework might have been applied to help guide student learning and set ethical parameters for the assignments. In Table 2, we summarize the phases of the ADDIE framework for each example, linking the Design phase to the level and use of AI as a helpful tool to better understand the varied technological needs and uses for AI in postsecondary tasks.

Table 2. *Cross-Examination of ADDIE Framework with AIAS*

Vignettes	Teaching and Learning: Faculty Perspective	Teaching and Learning: Student Perspective	Teaching and Learning: Accessibility Perspective	Teaching and Learning: Assessment Perspective
Lesson Learned	Example 1: Balanced Approach	Example 2: Student Homework	Example 3: Accessibility Support	Example 4: Efficiency
Analysis	Identify top level learning goal Problem identification Ex: Study Guide and student learning	Identify top level learning goal Problem identification Ex: Calculus homework and student learning	Map required resources Ex: accessibility office resources needed to support students	Identify stakeholder needs Ex: Integration of new program language to improve efficiency in reporting
Design	AIAS Scale 4: AI Task completion, human evaluation	AIAS Scale 2: AI-assisted idea generation and structuring	AIAS Scale 5: Full AI	AIAS Scale 5: Full AI
Develop	Develop the AI instructional strategies that best support students Develop the best technological access	Develop the AI instructional strategies that best support students Identify the best technological tools to access	Create an inventory of needed accessibility resources and link to student needs	Create parameters of expectations with use of AI and align to stakeholder needs
Implement	Faculty and students are free to	Student is free to	Student is free to use any AI tool	Team is free to leverage available AI

	use AI with appropriate sourcing and citations	use AI to brainstorm tasks but no AI is allowed in the final submission	to support learning environment	tools to adapt and modify coding
Evaluate	Evaluation of faculty and student use of AI, its appropriate sourcing, and alignment of knowledge acquired	Evaluation of percentage of student's original work with points for improvement of process	Evaluation of student participation in AI accessibility resources as a case study	Evaluation of project goals and proposal of points of improvement for use of AI in future efficiency-related projects

Teaching and Learning Student Example Explained

Analysis

Highlighting Example 2 (Table 2, Column 2) for the purposes of describing this combined model, we begin by identifying the components of the Analysis phase. In the ADDIE framework, the Analysis phase focuses on problem identification, assessment of target audience, and identifying top-level learning objectives (Larson & Lockee, 2014). In terms of problem identification, the activity (i.e., calculus homework assignment) would center around the core calculus concepts that a student needed to learn as part of that homework assignment (e.g., specific calculus functions and applications) as well as what skills are needed to bolster student learning.

Design

Once those objectives and skills are identified, in the Design phase, the professor may outline the ways in which AI could be used as part of that assignment. In this example, where the focus was the use of AI to complete a calculus homework assignment, a few questions should guide this task including:

- How would students need to engage with AI for the purpose of completing this homework task?
- What would detract from student learning if AI is used inappropriately?
- How can AI enhance student learning?

In answering these questions, AI could be utilized as an assistant to help correct and guide students with understanding the complex functions within the calculus homework, but students need to be able to learn the specific objectives through the application of these functions. In this case, the AI scale was set at two, wherein AI-assisted idea generation and structuring was allowed but the final submission had to be the student's own work.

Develop

In the Develop phase, the focus is to determine the strategies and methods for implementation, the way that technology will be leveraged to support the implementation, and the creation of evaluation, learning, or other related products for implementation, *inter alia* (Larson & Lockee, 2014). For this example, as the focus is on understanding how AI would be used as part of the students' calculus homework, two major priorities need to be considered. The first is the development of the AI instructional strategies that best support and guide students on what the expectations are for AI use on this assignment; the second is the identification of the best technological access strategies (i.e., what AI tools will be available for students to use).

Implement

Based on the guidelines provided in the Design and Develop phases, the homework assignment is implemented following the alignment to the AIAS scale identified. In this example, because the AIAS was set at 2, students are free to use AI to brainstorm tasks, but no AI is allowed in the final submission. The two items identified in the Develop phase, the instructional strategies, and the best technological access strategies, are then used to help students navigate how to engage with AI as part of their learning process. In this case, students are free to use AI in a way that reflects the example provided, wherein AI offered support and assistance in the brainstorming phases of the assignment, but the final thoughts and products had to be students' own work.

Evaluate

In the Evaluate phase of this framework, the purpose is to engage in continuous improvement, including the evaluation of each phase, what worked, what did not work, and the identification of points for improvement. In this example, as is the case in most learning environments, there needs to be an evaluation of student learning as well as students' navigation of AI integration into their learning. For the calculus homework assignment, the evaluation of percentage of student's original work with points for improvement of process would benefit future iterations of this activity. It would also help to understand any improvements needed to the strategies created in the Develop phase of the framework.

Although this analysis focused on the calculus homework example provided, Table 2 details the application of the ADDIE-AIAS combined framework to each vignette offered in this work. As each example is reflective of a different aspect of higher education settings, it is imperative to note that the alignment of AI is also different for each case. This, in turn, shifts the types of activities listed in the Design, Develop, and Implement phases with the purpose of indicating how the integration of AI can shift the course of higher education activities.

Lessons Learned

What Works?

Leveraging the combined ADDIE-AIAS framework provides a potential avenue to help faculty, students, and administrators understand how AI could and should be integrated into stu-

dent learning, teaching, and/or administration projects. Taking into consideration the ethical aspects that are still being developed in postsecondary settings and using the combined guidelines provide clear expectations for all (students, faculty, and administrators) on how to engage with this new technology. The guidelines also help to refine learning/teaching and working environments in a way that is supportive and not convoluted. Such combined guidelines provide the basis for future developments of both frameworks and new pointers altogether.

What are Areas for Improvement?

AI use is new and revolutionary. We are only in the footsteps entering the full potential of AI technologies. This is why as AI evolves, we need to revise how it is used and utilized in postsecondary environments. Frameworks such as ADDIE and AIAS need to be revisited and looked at again in the light of future advancements. The guidelines for both ADDIE and AIAS need to be also always considered with flexibility in mind. As postsecondary faculty, students, and administrators, we wear multiple hats as we plan lessons, teach lessons, engage in lessons and student life, advise students, enroll in courses, participate in research, design presentations, and share our scholarly discoveries via conferences and publications. In using the combined ADDIE-AIAS framework for designing learning environments and administrative projects, it is important to note that certain parts of the guidelines work better when looked through the student and teacher lens rather than administrative one. As ADDIE was intended to be a framework for developing learning environments, it is not a surprise that this is the case; however, it is also not the case that it is not applicable to administrative projects. The critical review of what can and cannot be applied and used to particular postsecondary tasks is thus an important component.

Conclusion

The purpose of this contribution was to provide an in-depth review of the recent advancement in generative AI technologies used in the context of postsecondary education. As faculty, administrators, and students, we positioned our research from the lens of different arrays of experiences with generative AI in the contexts that we experience in higher education. It is our hope that our collective stories—the good, the bad, and the ugly—help others in the realm of postsecondary teaching, learning, and adminsitration while navigating the new technological terrain. Due to the complexity of the use of AI in its varied formats throughout postsecondary settings, we found it useful to analyze the use and related evaluation of the implementation of AI using a combination of the ADDIE framework and the AIAS. We hope that the cross-examination of both provides a guided path for postsecondary education, a path that continues and is not concluded.

The integration of AI can be transformative and bring about multiple positive factors. Moving forward, we need to focus on the best ways to harness and maximize the potential of AI in an ethical and beneficial manner to faculty, administrators, and students alike. When all stakeholders use AI in an ethical manner, when we leverage AI possibilities, we can ensure the best outcomes and AI tools can revolutionize postsecondary environments. Ethical conduct needs to be on the forefront of what is required and permitted in our classes for students, for ourselves as teachers, and administrators as leaders. The balanced approach to AI use can be a roadmap moving forward where the partnership with artificial intelligence can aid efficiency but not take away from the hard work needed to be done while interacting with students and colleagues.

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