

METHODS TO INTEGRATE CHATGPT INTO UNIVERSITY TEACHING AND LEARNING

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ABSTRACT: The release of OpenAI's ChatGPT at the end of 2022 posed significant challenges to universities that have necessitated adaptations to curricula and academic policies. This article describes a case study undertaken at an Applied University in the MENA (Middle East North Africa) region to explore the effectiveness of teaching strategies that incorporate ChatGPT into instruction and evaluation, with an emphasis on empowering students and improving their academic and professional communication skills. Through the instructor's reflections on research questions, this study explores instructional strategies that may help to transition students from passively accepting ChatGPT-generated responses to actively engaging in dialogue with the machine and acquiring deeper insights in the process. The study examines the utility of ChatGPT in facilitating active teaching strategies such as roleplays, debates, and thought experiments. It also examines the essential critical reading skills required to assess and evaluate ChatGPT's output in terms of fact-checking and source evaluation. The results of the research provide practical suggestions for educators and guidance for integrating active learning through ChatGPT. This research highlights the importance of finding a balance between the benefits of AI technology and having students actively participate and develop their skills.

Keywords: Pedagogy, Artificial Intelligence, Large Language Models, ChatGPT

INTRODUCTION

The release of ChatGPT in November 2022 left little time for adjustments in our academic department. With a Winter semester start date of January 8, 2023, faculty had approximately a month to envision the impact of the new language model and adapt their curriculum and policies to this incipient reality where traditional assessments could be completed in seconds and render traditional plagiarism detection software like turnitin.com unreliable (Fowler, 2023). This report highlights the effectiveness of the strategies employed in integrating ChatGPT into instruction and assessment to empower students.

Our applied university in the MENA region comprises four main Colleges: Engineering Technology, Health Sciences, Business Management, and Computing and Information Technology. We offer one diploma, twenty bachelor and five master's programs. At the time of the study, there were approximately 6500 students enrolled from diverse backgrounds. The University's mandate is to provide an applied, technical education to serve key industries and stakeholders. The College of General Education offers core courses for first year students in math, science, communications and the humanities. Three of the authors are faculty members in the Department of Communications and Humanities.

Our objective of using ChatGPT in the classroom was to provide learners with a tool that could enhance their critical thinking and problem-solving skills. We also hoped to see our students acquire key skills using ChatGPT that would increase their efficiency at university as well as in the workplace upon graduation. We sought to write policies and practices that would ensure students and teachers have a framework with which to successfully use the platform at the University. In short, we were trying to find a way to increase student performance without sacrificing learning.

We were all early adopters of AI ChatGPT in our classrooms in January 2023 and have had an opportunity to reflect on our practice throughout the semester and beyond. The goal of this study is to respond to the four research questions and to add practical suggestions that can prove useful to instructors struggling to answer these same questions themselves.

RESEARCH QUESTIONS (RQ)

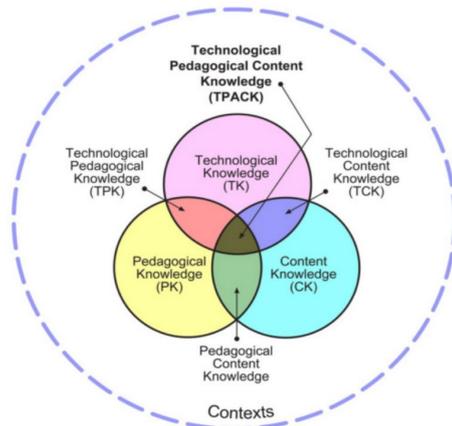
1. What instructional strategies work best for moving students from accepting a monologue from ChatGPT (i.e., asking a shallow/broad question and copying and pasting answers) to engaging in a dialogue with ChatGPT (i.e., asking the right questions and critiquing ChatGPT's responses until deeper insights are gained)?
2. How useful is ChatGPT in developing specific active teaching strategies such as roleplays, debates, thought experiments, think, pair share etc.?
3. How can we teach students the critical reading skills required to assess and evaluate the output of ChatGPT (fact and source check)?
4. How useful is ChatGPT for helping instructors move their courses from a passive to an active learning focus (Teaching prompts, Teaching critical reading skills)?

LITERATURE REVIEW

Pedagogy

The conceptual framework of this research is based on the Technological Pedagogical Content Knowledge (TPACK) model originated by Shulman (1987), later enhanced by Mishra and Koehler (2006) (Figure 1).

Figure 1. The TPACK framework and its knowledge components



From “Technological pedagogical content knowledge: A framework for teacher knowledge,” by M. J. Koehler, & P. Mishra, 2009, *Teachers College Record*, 108(6), 63 <https://citejournal.org/volume-9/issue-1-09/general/what-is-technological-pedagogicalcontent-knowledge> Copyright 2016 by CITE Journal

The framework was selected due to its extensive research background and our approach to exploring how academic content could be functionally integrated using next-generation emerging technology into meaningful active pedagogy (Park & Hargis, 2018). The interface between each category is key with the goal of effectiveness to attain the sweet spot encompassing all or as many of the attributes as frequently as possible while teaching and learning. Hargis (2001) explored how students learn via the Internet, identifying key attributes that include self-regulated learning, metacognition and curriculum design. Over the past two decades, education has seen a continuous input of various forms of educational technology, such as electronic learning objects and robot-assisted chatbots (Chun & Hargis, 2020; Nomoto et al., 2022). Through this relatively short time frame, an overarching theme of how information is processed, analyzed and consumed has/is transformed from orality to literacy to electracy (Hargis & Rakita, 2005). For this research, we continue that exploration in the form of AI ChatGPT.

The primary path to effective pedagogy is a clear sense of course and curriculum design. This can be accomplished by aligning learning outcomes, authentic (formative) assessment, teaching methods and appropriate and well-integrated technology (Lockard & Hargis, 2017; Hargis et al., 2016). The primary outcome of a well-designed course is elevated student engagement, which is an essential driver for every major component of learning (Davies, Welch & Hargis, 2008). Effective teaching methods can stimulate student engagement, and that student

engagement is associated with positive learning outcomes (Troisi, 2014). Henderson, Khan and Dancy (2018) found that a low-lecture, high-engagement environment is associated with the highest learning gains. Students believe active learning helps them learn better; find active learning classes enjoyable; like to interact with other students; and like to use technology.

Alkather and Dolan (2011) found that effective teaching methods focus on an inquiry-based (inductive) model to engage and motivate students in a sustained way. Inductive teaching and learning is an umbrella term encompassing a range of instructional methods, including inquiry learning, problem-based learning, project-based learning, case-based teaching, discovery learning, and just-in-time teaching. Inductive teaching is a learner-centered model where learners detect patterns and work out rules for themselves.

Finally, Chickering and Gamson (1987) created a foundational resource, [Seven Principles for Good Practice in Undergraduate Education](#), which include:

1. Encourage contact between students and faculty.
2. Develop reciprocity and cooperation among students.
3. Give prompt feedback.
4. Emphasize time on task.
5. Communicate high expectations.
6. Respect diverse talents and ways of learning.
7. Encourage active learning.

ACTIVE LEARNING

A major category of active learning is the concept High-Impact Instructional Practices (HIIP) as recently described by Rodriguez and Koubek (2019). The authors examine the relationship between HIIPs as adopted by the American Association of Colleges and Universities (AAC&U), student engagement, and learning outcomes as measured on the National Survey of Student Engagement. Major themes included the importance of applied learning, collaborative assignments, understanding diverse points of view and constructive feedback. This research cites Kuh et al., (2017) work detailing eight “key features” of HIP that could account for improved student learning outcomes.

- Performance expectations set at appropriately high levels;
- Significant investment of concentrated effort over an extended period of time;
- Interactions with faculty and peers about substantive matters;
- Experiences with diversity, wherein students engage in ideas that differ from their own;
- Frequent, timely, and constructive feedback;
- Opportunities to discover relevance of learning through real-world applications;
- Public demonstration of competence; and
- Periodic, structured opportunities to reflect and integrate learning.

The challenge of integrating ChatGPT AI as an active learning strategy will be to identify key ways the technology can further enhance learner engagement in ways similar to HIIPs. One specific way to integrate active learning using ChatGPT could include the following: Think-Pair-Share (TPS) is an active learning strategy where students share and compare answers with a partner before discussing them with the class. TPS promotes collaboration, clarifies thinking, and assesses understanding. ChatGPT can enhance TPS by generating alternative viewpoints, providing suggestions for strengthening reasoning, and offering insights on ethical implications (OpenAI, 2023).

Artificial Intelligence

This research aims to focus on the effect of active pedagogy when integrating updated emerging technology, such as artificial intelligence (AI). Therefore, there is a need to incorporate a brief background on AI. Educause identified AI as an important factor for learning in their 2017 Horizon Report. Educause (2017) defined AI as computer systems that undertake tasks usually thought to require human cognitive processes and decision-making capabilities. To exhibit intelligence, computers apply algorithms to find patterns in large amounts of data—a process called machine learning plays a key role in many AI applications. Substantial research has shown that although technology is being used in teaching in varying amounts and quality, there remains little integration of educational theories and models (Tang, Chang & Hwang, 2021). This has frequently led to less than effective use of functional technology to increase student engagement and subsequent academic performance (Bates et al., 2020; Kabudi et al., 2021).

Large Language Models (LLMs)

Our research focuses on integrating LLMs into higher education. LLMs are large language models that have been trained on vast volumes of text data, allowing them to generate human-like prose and accurately complete

language-related tasks (Kasneji et al., 2023, p. 122). They use self-attention mechanisms to determine word relevance and predict the next term in a sentence. Popular LLMs include OpenAI, GPT-4 and Google Bard LaMDA (Google, 2023). Other LLMs like Turing NLG, Gopher, OPT, and Ernie 3.0 are also available. These models are trained on extensive datasets and can generate text, translate languages, provide answers, and more. GPT-4 is trained on a 500 billion-word dataset, while LaMDA uses a 1.5 trillion-word dataset (Google, 2023). In higher education, LLMs have various applications such as personalizing learning for students, automating grading, and facilitating research tasks like hypothesis generation, data collection, and analysis (OpenAI, 2023).

ChatGPT

In our study (January to May 2023), we chose ChatGPT for its availability, while Google Bard became accessible in March 2023 (Hadi et al., 2023). ChatGPT in Higher Ed has various applications such as content summarization, data interpretation, simplifying complex concepts, translation, collaborative data analysis, and more (Hadi et al., 2023). Other popular AI tools in the learning and research fields include Consensus, QuillBot, Gradescope, Elicit, and Semantic Scholar.

UNESCO released “ChatGPT and AI in Higher Education: A Quick Start Guide” in April 2023, based on ChatGPT 3.5 (UNESCO, 2023). The guide explores the impact of ChatGPT on teaching, research, and administration, covering topics like academic integrity, regulation, privacy, cognitive bias, and accessibility. ChatGPT is a generative AI language model that facilitates natural and conversational interactions with computers, leveraging natural language processing and learning from Internet data.

ChatGPT stands out from other emerging technologies in the classroom, as it can perform various tasks such as writing jokes, code, essays, and explaining scientific concepts (Roose, 2022). Mollick and Mollick (2023) incorporate AI into their courses, employing strategies like AI-created examples, explanations, assessing student knowledge and confusion, and distributed practice with AI.

METHODS AND DATA ANALYSIS

This qualitative case study was conducted with colleagues who have worked in higher education throughout the world and at the time of the study all were teaching at a mid-size science and technology university in the MENA region. The participants are three of the four authors, two male and one female with mixed ages experiences and academic backgrounds (table 1). Data was collected during the spring semester 2023.

Table 1

Participant Background Information

Researcher	Author3	Author2	Author1
Course	Academic Communication	Effective & Experiential Learning	Ethical Reasoning
Length of Higher Ed Teaching Experience (years) [Full Time: FT; Part Time: PT]	3 FT; 1 PT	16 FT	9 FT; 6 PT
Length of University Teaching (years)	4	16	15
Length of Teaching Course (semesters)	3	6	3

Table 1 describes the authors who participated in the research, the courses they taught and their experience in higher education.

A shared document was created and each author contributed their experience and how they have integrated and explored AI in their teaching. The case study will share their methods, reflections, perceptions and evidence on how the methods affected teaching and learning.

In this study, the individual written reflections and transcribed oral interviews were de-identified and analyzed. The case study approach of Yuan et al. (2022) to the design of the study and question prompts was used. This included three stages of data collection that gradually increased from individual written reflections to paired interviews and then a focus group with all the participants. The goal of this deliberate design approach is to

maintain varied group dynamics, enhance methodological triangulation and bolster the overall reliability and credibility of the study.

1. Individual reflections based on 15 prompt questions that each researcher answered.
2. Paired reflection oral interview with two researchers at a time (Several questions that drew on key themes in part 1).
3. Focus reflection oral interview with all three researchers moderated by the fourth researcher (Several questions that drew on key themes from 1 - 2 and asked broader scope questions).

ChatGPT Data Analysis

The following basic steps to qualitative analysis were performed on the data attending to a foundational approach to analyzing qualitative data.

- Prepare and organize your data
- Review and explore the data
- Create initial codes
- Review those codes and revise or combine into themes; and
- Present themes in a cohesive manner.

In devising this methodology, we incorporated ChatGPT in the process of analyzing the data. In early June 2023, the research team used the free public version of ChatGPT to ask it to: “Analyze the following text for keyword extraction, sentiment analysis, topic modeling, text analysis and summarization, comparison, thematic analysis, and clustering [for all of the text created by co-authors].”

This process was taken over a 10-day period in early June 2023 using the May 24 public version of ChatGPT. This was followed up with an analysis of a portion of the data to verify the accuracy of the ChatGPT output. The responses to the section 1 questions: 1 - 4 were analyzed, coded and compared ([Appendix](#)).

It was determined that there was clear consistency between the codes analyzed by the research team and the themes generated in ChatGPT. We concluded that ChatGPT's deductions were reliable qualitative analysis and since the research team was reviewing the interviews, any lapses in reliability would be quickly identified and addressed. The second stage was to focus on some of the key themes we wanted to emphasize and then ask ChatGPT to identify all the examples in the text that reflected those themes. Here again, we reviewed 15% of the interviews to check that the themes and the identified examples were correct and that key examples were not being missed or skipped.

RESULTS

We approached this research as a qualitative case study using ChatGPT to analyze the qualitative data for keyword extraction, sentiment analysis, topic modeling, text analysis and summarization, comparison, thematic analysis, and clustering. We then analyzed the ChatGPT thematic analysis and clustering to identify general patterns and key themes. We aligned the Interview Prompts with RQ and these themes (table 3). We used a modified “describing, classifying, and interpreting loop” (Creswell, 1998 p. 144) to interpret our findings in the Discussion section.

As a reminder to the reader, from the Introduction section, the research questions for this study include:

1. What instructional strategies work best for moving students from accepting a monologue from ChatGPT (i.e., asking a shallow/broad question and copying and pasting answers) to engaging in a dialogue with ChatGPT (i.e., asking the right questions and critiquing ChatGPT's responses until deeper insights are gained)?
2. How useful is ChatGPT in developing specific active teaching strategies such as roleplays, debates, thought experiments, think, pair share etc.?
3. How can we teach students the critical reading skills required to assess and evaluate the output of ChatGPT (fact and source check)?
4. How useful is ChatGPT for helping instructors move their courses from a passive to an active learning focus (Teaching prompts, Teaching critical reading skills)?

Table 2

Interview Prompts aligned with the Research Questions (RQ) and Themes from ChatGPT

Interview Prompts	RQ	Theme Clusters (from ChatGPT)
Phase 1	—	—
<ul style="list-style-type: none"> What is your teaching philosophy? What are some common active teaching strategies that you employ in the classroom? 	1, 2, 4	<ul style="list-style-type: none"> Active learning & engagement Real-world application of theory Collaboration
<ul style="list-style-type: none"> How did you feel when you decided to use ChatGPT in the classroom? 	1-4	<ul style="list-style-type: none"> Benefits for learning Grading & academic integrity Impact on multilingual and AEL learners
<ul style="list-style-type: none"> What are the main learning outcomes of the course? How do you think ChatGPT could strengthen/challenge the achievement of these outcomes? 	1, 3	<ul style="list-style-type: none"> Experiential, time-management, group assignments, projects Credible research, portfolios, report, analysis, comparison Assessment, reflections, plagiarism, lockdown software
<ul style="list-style-type: none"> In retrospect, describe what you have done to prepare for using ChatGPT in the classroom. 	1-4	<ul style="list-style-type: none"> Awareness of ChatGPT Experimenting and ground rules Strategies for incorporating Academic Integrity & plagiarism
<ul style="list-style-type: none"> Based on your overall ChatGPT experience during the Winter 2023 semester. <ol style="list-style-type: none"> What can instructors expect students to use ChatGPT for? What does the effective use of ChatGPT look like? What issues can instructors expect with student submissions? 	1, 3	<ul style="list-style-type: none"> Enhancement of teaching Brain-storming Plagiarism Lack of original writing
<ul style="list-style-type: none"> If you were a student in your own class using ChatGPT, how would your learning experience be different from ones that did not use ChatGPT? 	2	<ul style="list-style-type: none"> Perception as another study tool and instructor's excitement Disadvantages of not using and time-saving benefits Improved grammatical edits and simplified research process Value as a starting point for writing & providing options
<ul style="list-style-type: none"> Describe your beliefs about the impact that ChatGPT will have on student learning. 	1, 2, 4	<ul style="list-style-type: none"> Redefinition of questions related to learning Concerns about critical reading, false information & hallucinated Benefits for seeking information & strengthening arguments Disruption to learning
<ul style="list-style-type: none"> How have you overcome the challenges of teaching with ChatGPT? 	1, 3	<ul style="list-style-type: none"> Engaging in conversations Curriculum adjustments & changes in assessment Importance of critical reading skills and building upon output Effectiveness of oral interviews and presentations in assessing

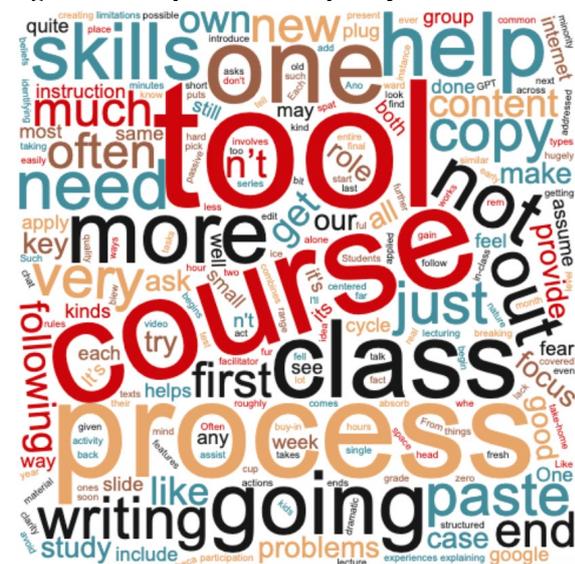
<ul style="list-style-type: none"> In retrospect, please share what strategies/methods you find helpful when integrating ChatGPT into your courses. 	1, 4	<ul style="list-style-type: none"> Faculty's role in applying AI tools & adapting curriculum Instructional strategies and collaborative dialogue Faculty's comfort and integration in teaching Concerns about output legitimacy, grading & feedback Promoting critical thinking
<ul style="list-style-type: none"> What are some of the changes you made to your classes using ChatGPT and why have you made these changes? 	1-4	<ul style="list-style-type: none"> Grading Challenges & Originality Moral Dilemma and Policing Evaluation Criteria & Changes
<ul style="list-style-type: none"> How will you modify your course in the future using ChatGPT? What aspect of ChatGPT will you keep, and what other changes will you make? Why? 	1-4	<ul style="list-style-type: none"> Assessment Approach Human Creativity v. Technology Plagiarism & Accountability Changes in Course Assessment Instruction & Active Learning
<ul style="list-style-type: none"> What do you think are the strengths and weaknesses of ChatGPT for the type of courses you teach? 	4	<ul style="list-style-type: none"> Hallucinates, sources, inaccurate information, trust Brainstorming, comparing, contrasting, tone, voice Assessments, awareness, limitations Tool, learning process, abstract philosophical concepts
<ul style="list-style-type: none"> Did your perceptions of ChatGPT as a teaching and learning tool change over the course of the semester? Why/Why not? 	1-4	<ul style="list-style-type: none"> Initial expectations, excitement, & observations of limitations Evolving understanding and recognition of capabilities Student reliance, ethics, risks of overdependence Importance of critical filtering & threat to truth and knowledge Exploration of effective use and achieving desired outcomes
<ul style="list-style-type: none"> What were the most significant impacts that ChatGPT had on your teaching approach? 	1, 3, 4	<ul style="list-style-type: none"> Timeline creation, project management, IT skills, research portfolio, critical reading, teaching philosophy Efficiency, tech in the class, EAL students Active learning, experiential learning cycle, feedback
<ul style="list-style-type: none"> Do you have any long term hopes or fears for how ChatGPT and other AI tools can impact active learning? 	1-4	<ul style="list-style-type: none"> Graduating, self-sufficiency, dependent population Enable, level playing field, creativity, idea generation Expand horizons, change perspectives Developing/assessing courses, cutting human element Enhance active learning, engaging classes, human interaction

Phase 2		
1. Why do you think ChatGPT is beneficial for higher education, considering the existing concerns and apprehensions surrounding it?	3	<ul style="list-style-type: none"> ● AI's impact on assessment and knowledge generation. ● Ethical considerations and the need for policies. ● Faculty's role in understanding and preparing students for AI. ● Evolution of tech & its influence on thinking and work processes.
2. Do we need to “control” students by banning ChatGPT or should we be empowering them with these tools?	3	<ul style="list-style-type: none"> ● Empowering with AI tools ● Assessments & skills testing ● Managing the use of AI tools ● Promoting creativity ● Teaching students to use AI tools for problem-solving ● Critical reading and editing
3. Considering we are an applied university: how can we teach students to use these tools for communication and problem solving but still assess what they know and are able to do?	1-4	<ul style="list-style-type: none"> ● Workplace skills and efficiency ● Responsible use & skill building: ● Tech integration & assessment
4. Do you think it's possible to use academic integrity as a lens for analyzing the pedagogical aspects of our courses?	3	<ul style="list-style-type: none"> ● Need tools for writing improvement & plagiarism detection. ● Assessment methods & pedagogical approaches. ● Challenges and opportunities in adapting to new tools. ● Communication & problem-solving skills.
5. What specific strategies do you employ in using ChatGPT?	1, 4	<ul style="list-style-type: none"> ● Writing & critical reading ● Workplace readiness & communication skills ● Teaching strategies & assessment methods ● Oral communication & defenses ● Importance of using AI tools effectively
6. What is your vision for ChatGPT in the future?	1-4	<ul style="list-style-type: none"> ● Analogy of a calculator ● Potential for education ● Concerns about limitations and creativity ● Integration of AI tools, personalization ● Privacy, security & ethical implications
Phase 3		
<ul style="list-style-type: none"> ● What motivated you to explore using AI such as ChatGPT in your teaching? <ol style="list-style-type: none"> a. How were your progressive teaching actions rewarded and recognized by your university, colleagues, students, community and/or industry? 	1-4	<ul style="list-style-type: none"> ● Excitement about technology ● Adoption and recognition of AI ● Challenges, concerns & experimentation ● Benefits of AI for students' writing abilities
<ul style="list-style-type: none"> ● What are three critical outcomes that you hope to accomplish by integrating AI into your teaching methods? 	1-4	<ul style="list-style-type: none"> ● Research process & simplification ● Writing skills & confidence ● Classroom engagement & improvement ● Preparation for the future

<ul style="list-style-type: none"> Assessing, measuring and evaluating are ubiquitous struggles for instructors at all levels of education. Share details on how you believe AI can create a learning environment which will offer more frequent formative assessment, and strongly encourage instructors to prioritize authentic assessments as primary tools to produce reliable and valid measures of student success? <ol style="list-style-type: none"> What type of faculty development opportunities should be provided to faculty to effectively integrate AI into their teaching? How would you motivate faculty to engage in this development? How could AI support enhanced access and inclusive learning environments for our students and address diversity and equity issues? 	1-4	<ul style="list-style-type: none"> AI-based grading can speed up the assessment process Create opportunities for more personalized specific feedback. Faculty development Challenge of convincing older faculty of AI benefits. Changes in learning outcomes & assessments Creating authentic assessments Equity & inclusivity in learning environments.
<ul style="list-style-type: none"> Describe a specific plan on how other instructors can navigate through the known and unknown challenges of addressing ethics and academic integrity of AI for education (including legal, privacy and data security issues)? 	1, 3	<ul style="list-style-type: none"> Ethical concerns & policy development Academic integrity & plagiarism. Data privacy & security. Assessment & alternative approaches. Legal implications. Role of universities in managing AI-related challenges.
<ul style="list-style-type: none"> Why won't AI work in higher ed (i.e., what do you foresee as the entities, people, systems, etc., that will stop or significantly marginalize the use of AI for education)? 	3	<ul style="list-style-type: none"> Challenges in Higher Education Resistance to Change Potential Impact of AI Open vs. Closed Source Debate Corporatization and Training
<ul style="list-style-type: none"> Is there anything further you would like to share about your experience using ChatGPT for higher education? 	1-4	<ul style="list-style-type: none"> Fear and Acceptance of AI Generalist Approach & Skills Engagement & Resistance Exploring AI's Potential Communication Gap

Another way to view qualitative data is through a word frequency diagram. An example is provided in Figure 1.

Figure 1 Example Word Frequency Distribution Diagram for Author 1, Phase 1 Prompts.



Discussion, Conclusion and Suggestions

The qualitative approach to this research allowed the researchers to combine contemporary teaching tools with practice, reflection and empirical evidence on integrating AI into effective teaching. In this section, we connect the results to each research question and share examples of how the findings correlate. We use a modified “describing, classifying, and interpreting loop” (Creswell, 1998) to address the findings.

Research Questions (RQ)

1. What instructional strategies work best for moving students from accepting a monologue from ChatGPT (asking a shallow/broad question and copying and pasting answers) to engaging in a dialogue with ChatGPT (asking the right questions and critiquing ChatGPT’s responses until deeper insights are gained)?

The data derived from the research showed that the authors agreed on the importance of engaging ChatGPT in a dialogue. We recognized the shortcomings of students copying and pasting the first answer that it gave them. And, that the best way to move students from monologue to dialogue with ChatGPT revolves around faculty implementing the following four key strategies:

- **Foster a dialogue with students around AI:** Lead discussions with students about the application of AI tools in their respective fields and draw connections between AI impacts and the learning process. This helps students understand the value and limitations of ChatGPT, as well as its role as a tool in their own learning and in the broader context of higher education and industry.
- **Scaffold the learning process:** Provide guidance and support in using ChatGPT in the classroom. Communicate to students the potential efficiency of ChatGPT for research, idea generation, and improving writing, but also emphasize the importance of fact-checking, independent research, and avoiding overreliance on the tool. This includes showing students variations in output, discussing limitations and inaccuracies, and providing examples of errors generated by ChatGPT. Ethical considerations regarding authorship and whether the platform or the student are in control of the creative process should also be addressed.
- **Encourage active engagement and critical thinking:** Encourage students to use ChatGPT for collaborative dialogue or, as a peer editor, ask questions that differentiate between student answers and ChatGPT-generated responses. Develop students' critical thinking skills by encouraging them to question and evaluate ChatGPT’s responses rather than accepting these at face value.
- **Incorporate alternative assessments:** Explore alternatives to traditional take-home written assignments. This can include combining written reflections with multiple-choice simulations, an oral defense of a ChatGPT output, or designing research tasks that require critical evaluation, and shifting the instructor’s evaluation focus from form to content. Faculty, and the assessments they create, should still value and reward independent thought and exploration.

The authors agreed on the need for a conversation about AI and academic integrity. This was observed to be a useful step in helping students develop their understanding of how best to use this tool and how it would impact them in the long term. We observed from our own teaching that we often made assumptions that students would naturally understand how to use ChatGPT actively and critically, only to discover that, most often, much more scaffolding was required. These observations lead to the need for the development of courses to emphasize active engagement, critical thinking skills and the evolution of our assessments.

Quotes from Researchers:

- “This process [engaging ChatGPT in a dialogue] isn’t something that instinctually makes sense to all students, whereas for faculty who are researchers by profession, this is a natural process.”
- “Discover together with your students that there are tasks ChatGPT can do well and some that it cannot.”
- “Students who use ChatGPT to generate ideas or as a peer editor will see the best success.”
- “Encouraging students to dialogue with the platform will help get better results.”
- “Assessments have to change as it was not clear how to assess students' use of ChatGPT.”

2. How useful is ChatGPT in developing specific, active teaching strategies such as roleplays, debates, thought experiments, think, pair share etc.?

The data derived from the research showed that using ChatGPT in the classroom encouraged us to think of innovative teaching strategies that could maximize the platform’s potential but also address the lack of an effective plagiarism checker (turnitin.com). Notably, all the authors believe in the benefits of active learning and

engagement, including real-world application of theory and collaboration, which is evident in our teaching philosophy. We discussed the implications of employing ChatGPT in the classroom, particularly in promoting innovative teaching strategies and redefining assessment practices.

We also discussed the overdependence of take home writing assignments as a method of assessing student learning outcomes. The findings show a shift towards more oral presentations, group discussions and one-on-one interviews to examine student progress throughout the semester. In general, we advise modifying assessment approaches to provide more personalized feedback.

We elaborated on ChatGPT's usefulness in developing active teaching strategies such as creating interactive class plans and suggestions for changes in assessments. Even though the student learning outcomes remained the same, ChatGPT was able to understand and process the issues highlighted such as plagiarism, lack of critical thinking and lack of original student writing. It was also identified that using the platform saved a considerable amount of time.

There were four primary areas where Instructors could use Chat GPT:

1. **Idea generation** - Input specific learning outcomes and educational goals; ChatGPT can assist in generating ideas for roleplays, debates, thought experiments and other interactive activities. This, in turn, can stimulate student engagement and critical thinking.
2. **Scenario Creation** - Create realistic and relevant scenarios for role plays or thought experiments using ChatGPT. Faculty can provide the model with the context, topic, or theme you want to explore, and it can offer suggestions and descriptions, or even help create dialogues for the given scenario.
3. **Teaching strategies** - Use ChatGPT to provide answers to questions related to specific teaching strategies. If you have queries about how to structure a debate, conduct a think-pair-share activity, or implement other active learning techniques effectively, ChatGPT can offer insights, strategies, and best practices to consider.
4. **Feedback** - ChatGPT can provide feedback and evaluation on student work or responses, particularly in written form. You can simulate a role-play or debate scenario with the model, and it can review and analyze the students' written contributions, providing constructive feedback and suggestions for improvement.

The interviews revealed a few limitations of the ChatGPT platform. One was the absence of personal interaction and individualized guidance that an instructor can offer through in-person classes and their familiarity with the students. Another concern was the potential for generic and less detailed feedback of students' work. The data also emphasized the importance of training teachers to effectively utilize the platform. We highlighted how ChatGPT can offer tailored solutions for English as an Additional Language (EAL) classrooms by using simplified language that suits the students.

Overall, we felt that ChatGPT is a tool that has great potential to improve the classroom experience, encourage innovative teaching methods and help develop personalized and engaging assessment practices.

Quotes from Researchers:

- "ChatGPT can be used as part of professional development sessions where instructors can experiment with creating class plans, assignments, evaluation and even feedback. In our experience it can transform skeptical instructors' attitudes towards these tools."
- "I found it to be helping me achieve better outcomes as a teacher. I'm developing better materials by engaging ChatGPT. It does actually save me a lot of time."
- "As the platform gets more advanced, it can give us particularly good quality data, and in the future, we'll be able to import much more specific and really useful information. For higher education, all the research that's gone into, say, active teaching, will really just take off to another level for faculty."
- "For example, if I'm doing a lesson plan (and this is actually something I've shared with students), I'll talk them through the lesson that they've done, and I'll explain to them how I spent time developing a lesson plan with ChatGPT to get a better output."

3. How can we teach students the critical reading skills required to assess and evaluate the output of ChatGPT?

Our data indicates that, although teaching students critical reading skills has always been a challenge, adding AI tools can be both beneficial and detrimental, depending on instructors' integration of these tools (as per their teaching philosophy) and the students' self-efficacy. Four key strategies were identified for teaching critical reading skills:

1. **Integrate AI into active critical reading activities** and align them with learning outcomes. When ChatGPT is integrated into reading activities instructors can model the importance of this skill over passive or “no reading” of ChatGPT outputs.
2. **Design assessments that prioritize and emphasize critical thinking and critical reading skills**, particularly for first-year undergraduates. These course assessments should be structured to combine different formative assessments that where necessary incorporate and limit the use of ChatGPT in order to accurately assess active critical reading skills.
3. **Empower students by teaching them critical reading strategies** that enable them to navigate complex concepts they encounter in their courses and leverage ChatGPT to explain those concepts in a manner that resonates with them personally.
4. Educate students about the limitations and potential inaccuracies of ChatGPT's outputs. Develop specific critical reading and research strategies to help students identify and verify the information provided by ChatGPT.

We observed problems and issues that instructors might encounter with their students' use of ChatGPT. These include students not understanding how to deal with complex texts, concepts or problems; not realizing that ChatGPT is capable of hallucinations and that ChatGPT outputs need to be independently checked and verified. The need to scaffold and model these skills caused us to rethink the assessment and learning outcomes of the course, with greater emphasis put on the development of activities and assessments that focused on critical reading.

Quotes from Researchers:

- “Students can be asked to explain theories in straightforward and everyday language and get them to keep asking questions until it gives them a response that resonates with them, but reminding them not to just copy and paste this response into their assignments but to describe it in their own words.”
- “Students in their first year might not connect with the idea that the program might hallucinate references and that they need to thoroughly vet the referencing to ensure the information and sources are real and accurate. They might just take what they are told as the right answer.”
- “That process [of research] has to include students showing the critical reading that they've done, showing the editing and the prompts that they've given us.”
- “The exercise isn't “can you go find a whole bunch of information and then use it while writing, report yourself”. It's “how good you are at fact-checking this stuff?”

4. How useful is ChatGPT for helping instructors move their courses from a passive to an active learning focus (teaching prompts and critical reading skills)?

Our findings to this RQ indicate that instructors entered into the use of ChatGPT in the classroom with an excitement about its potential to enable student learning and extend student potential. We identified four primary areas that teachers can consider:

1. **Improve communication for multilingual students:** ChatGPT can enhance communication, especially for EAL learners. Additionally, it can improve the accuracy and depth of information available to all students.
2. **Deeper exploration of concepts:** Incorporating ChatGPT into classroom research activities has the potential to enable students to investigate topics more deeply, actively engaging them in finding better and better information, which helps them understand multiple sides of an issue without having to read extensively in order to explore all aspects of a topic.
3. **Enhanced idea generation:** The potential in idea generation is also a key benefit of ChatGPT; students can use it to generate ideas very quickly, which helps them actively pursue areas of interest. The authors agree that ChatGPT has the potential to benefit students who use it for the following fundamental reporting tasks: topic selection, brainstorming, researching topics, writing, data analysis, recommendations, and outlining. We agreed it is an excellent starting point for research, but caution that students may need reminding that they need to be the filter of the information they receive (see above on critical reading). For instructors, there are many benefits of using ChatGPT in idea generation for creating and curriculum. We noted that it sped up lesson creation by quickly developing debate topics, case studies and data sets. On a related note, we also noted that the superior language output saved time. Grading student papers that had better grammar and syntax would make things easier for instructors
4. **Maximizing student advantages:** Better active editing, questioning, and re-prompting of students' own queries are absolute requirements for ChatGPT use. Students who learn to use the platform well could have an advantage over their peers who are not using the platform.

However, we noted limitations to the effectiveness of the LLM; in less capable hands, it can be used for plagiarism. By offloading key learning processes such as reading, note-taking, information chunking, summarizing, and writing, students can bypass a lot of knowledge. Students who passively engage with ChatGPT may be less able to explain their work orally, which might suggest the lack of retention endemic to this “creative” approach. Issues around content have also been discussed as limitations of the platform.

At the same time, we also observed limitations with creating content like syllabi and case studies; sources were often hallucinated, which resulted in the task taking longer, due to the increased time spent fact-checking. Creating case studies with ChatGPT was seen to risk giving students false information that could negatively impact their grades and inadvertently lead them into a plagiarism case.

Quotes from researchers

- “Getting initial research ideas and brainstorming are hugely aided by the program [ChatGPT]. Final grammatical edits are also made faster and better. Those who understand how to use the info given can develop strong research in far less time.”
- “ChatGPT could be a great starting point for encouraging students to seek more information. It could strengthen and deepen essential arguments and provide direction when seeking evidence.”
- “...employers will expect students to be masters of AI tools and therefore curriculum and assessments must adapt to ensure the students are masters of these tools.”
- “Instructional strategies need to scaffold the process of learning how to use ChatGPT and to ensure students engage in a collaborative dialogue with the tool to produce deeply insightful answers to difficult and complex questions.”

Limitations

The study only collected data from four instructors, so the findings are not widely generalizable, although that was not the goal of this early, investigative work. The variables identified included the non-systematic methods for collecting the reflections, which could contribute to a non-linear approach to making connections for subsequent work. However, the random approach could lead to broader abilities to connect to colleagues across settings.

The variables were minimized by discussing our methodology, adding approaches that made sense and ultimately aggregating the data to discuss the approaches holistically. Ultimately, we accounted for the variables by being aware of the differences early in the study, incorporating when possible and realizing the work early in the use of AI for higher education.

ChatGPT provides the following disclaimer: “It’s important to note that while ChatGPT can be a helpful resource, it doesn’t replace the expertise and guidance of an experienced educator. Its responses are generated based on patterns in the data it was trained on, and it may not always provide accurate or contextually appropriate information. Therefore, it’s recommended to use ChatGPT’s suggestions and insights as a starting point and to adapt and refine them to suit your specific teaching objectives and the needs of your students” (OpenAI, 2023).

Further Work

We plan to continue the investigation of the effect of AI on higher education. Subsequent research questions include:

1. Discuss ethical issues behind student writing using AI: What constitutes knowledge? The ability to generate output or the retention of that output (also copyright, intellectual property, accessibility, lack of regulation, privacy, etc.)?
2. What type of AI output can universities allow in student submissions? Where can the line be drawn around authorship vs task offloading to an AI program?
3. What are the dangers of allowing second language learners to use AI in their writing? Does it benefit their work or does it actually reduce language acquisition?
4. What strategies can instructors use to determine whether a student understands what has been written using AI? If a charge of plagiarism is to be made, what does the instructor have to prove and how can (s)he prove it?
5. What are the use cases/limitations for using ChatGPT in curriculum design and measurement rubrics and do these uses create efficiencies?
6. How can ChatGPT increase student engagement and authentic assessment?
7. Is ChatGPT useful in refining instructor feedback to “strike the right tone”?

References

- Alkather, I. & Dolan, E. (2011) Instructors' decisions that integrate inquiry teaching into undergraduate courses, *International Journal for Scholarship of Teaching and Learning*, 5(2).
- Bates, C., Cobo, O., Mariño, S. & Wheeler, S. (2020). Can artificial intelligence transform higher education? *International Journal of Educational Technology in Higher Education*, 17(42).
- Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
- Chickering, A. & Gamson, Z. (1987). Seven Principles for Good Teaching in Undergraduate Education. *AAHE Bulletin*, 39, 3-7.
- Chun, H. & Hargis, J. (2020). Linear Algebra online learning objects: A focus on pedagogy, *The Online Journal of New Horizons in Education*, 10(4).
- Crewell, J. W. (1998). Qualitative inquiry and research design: Choosing among five traditions. SAGE Publications
- Davies, J., Welch, C. & Hargis, J. (2008). The Bridge course design: Faculty collaboration and cross-course formative assessment. *International Journal for Scholarship of Teaching and Learning*, 2(2).
- Educause (2017, April). 7 things you should know about Artificial Intelligence. <https://library.educause.edu/-/media/files/library/2017/4/eli7143.pdf>
- Ekoç, A. (2020). English Medium Instruction (EMI) from the perspectives of students at a technical university in Turkey. *Journal of Further and Higher Education*, 44(2), 231–243.
- Enkelejda K., Sessler, K. & Gjergji, K. (2023). ChatGPT for good? On opportunities and challenges of large language models for education, *Learning and Individual Differences*, 103, ISSN 1041-6080.
- Fowler, G. A. (2023, April 14). We tested a new ChatGPT-detector for teachers. It flagged an innocent student. *Washington Post*. <https://www.washingtonpost.com/technology/2023/04/01/chatgpt-cheating-detection-turnitin/>
- Google. (2023). Bard (version 1.4.5) [Large language model]. <https://bard.google.com/>
- Hadi M. (2023). Exploring User Perspectives on ChatGPT: Applications, Perceptions, and Implications for AI-Integrated Education. ResearchGate, 10.13140/RG.2.2.15524.86401.
- Hargis, J. (2001). Can students learn science using the Internet? *ISTE Journal of Research on Computing in Education*, 33(4), 475-487.
- Hargis, J. & Rakita, G. (2005). The more we change, the more we remain the same: Electracy model of teaching. *International Journal of Learning*, 11, 309-314.
- Hargis, J., Carlson, B., Suh, J., Kai, T., Lockard, L. & Soto, M. (2016). Backward Design Course Redesign. Proceedings from the Hawaii International Conference on Education, January 3-5, 2016.
- Henderson, J., Khan, J. & Dancy, M. (2018). Will my student evaluations decrease if I adopt an active learning instructional strategy? Inside Higher Ed.
- Kabudi, T., Pappas, I. & Olsen, D. (2021). AI-enabled adaptive learning systems: A systematic mapping of the literature, *Computers and education: Artificial intelligence*.
- Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge? *Contemporary Issues in Technology and Teacher Education*, 9(1). <https://citejournal.org/volume-9/issue-1-09/general/what-is-technological-pedagogical-content-knowledge>
- Kuh, G., O'Donnell, K. & Schneider, C. (2017). HIPs at ten. Change: *The Magazine of Higher Learning*, 49(5), 8-16.
- Lockard, E. & Hargis, J. (2017). Andragogical design thinking: A transition to anarchy in and beyond the classroom. *Transformative Dialogues*, 10(4), 1-15.
- Mishra, P. & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017–1054.
- Mollick, E. & Mollick, L. (2023). Using AI to implement effective teaching strategies in classrooms: Five strategies, including prompts. <https://ssrn.com/abstract=4391243>
- Nomoto, M., Lustig, A., Cossovich, R. & Hargis, J. (2022). Qilin, a Robot-Assisted Chinese Language Learning Chatbot. Fourth International Conference on Modern Educational Technology (ICMET) Proceedings, Macau, China May 24-26, 2022.
- OpenAI. (2023). ChatGPT (Mar 14 version) [Large language model]. <https://chat.openai.com/chat>
- Park, E. & Hargis, J. (2018). New perspective on the TPACK framework: The “A” stands for affective. *International Journal of Scholarship of Teaching & Learning*, 12(2).
- Rodriguez, R. & Koubek, E. (2019). Unpacking High-Impact Instructional Practices and student engagement, *International Journal for the Scholarship of Teaching and Learning*, 13(3).
- Roose, K. (2022, December 5). The Brilliance and Weirdness of ChatGPT. The New York Times. <https://www.nytimes.com/2022/12/05/technology/chatgpt-ai-twitter.html>
- Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, 57(1), 1–22.

- Tang, K., Chang, C. & Hwang, G. (2021). Trends in AI-supported e-learning: A systematic review and co-citation network analysis (1998–2019), *Interactive learning environments*, 1-19.
- Troisi, J. (2014). Making the grade and staying engaged: The influence of student management teams on student classroom outcomes. *Teaching of Psychology*, 41(2), 99-103.
- UNESCO. (2023). United Nations Educational, Scientific and Cultural Organization (UNESCO) and UNESCO International Institute for Higher Education in Latin America and the Caribbean (IESALC), Edificio Asovincar, Av. Los Chorros con Calle Acueducto, Altos de Sebuacán. Caracas, Venezuela.
- Yuan, Y., Hargis, J., Lu, H., Lian, J., Huang, X. & Song, Y. (2022). A qualitative investigation into instructors' reflections on rapid migration to online teaching. *Transformative Dialogues: Teaching and Learning Journal*, 14(3).

APPENDIX

APPENDIX TABLE 1

Phase 1 Individual Reflections

Black = keywords Grey= Matches across participants			
Ques.	Author 3	Author 2	Author 1
Section1	Key Words	Key Words	Key Words
1	Education = social leveler Education can improve life Applied teaching strategy Active real-life scenarios	Applied teaching strategy Active real-life scenarios Student motivation	Applied teaching strategy Active real-life scenarios Thought experiments Collaboration Experiential learning
2	Excitement Concern for misuse of ChatGPT Plagiarism Little lead time for teaching with ChatGPT Efficiency of ChatGPT	Excitement Apprehension/worry Plagiarism Not being left behind	Excitement Nervous ChatGPT = leveler for multilingual speakers
3	Experiential learning Applied teaching strategy Active real-life scenarios ChatGPT advantages Efficiency of ChatGPT ChatGPT Disadvantages ChatGPT Accuracy	Research method Researching & Writing	Reflective writing Thought experiments Assessment Copy and paste with GPT Block ChatGPT and disadvantage multilingual speakers New assessment ChatGPT clarify concepts
4	Demonstration Collaboration Research tasks Case studies Critical Reading	Patterns in writing style TEAC Model Write paragraphs Grammar	Demonstration Research Tool Case Study

Chat GPT Levels the playing field	Positive Responses to ChatGPT
Applied teaching strategy	Negative Responses to ChatGPT
Active teaching	ChatGPT + Teaching Strategies
Experiential Learning	ChatGPT + Teaching Activities
Active real-life scenarios	ChatGPT + Plagiarism
Student and Instructor Collaboration	ChatGPT = Leveler
ChatGPT = Excitement	ChatGPT Accuracy issues
ChatGPT = Concern	ChatGPT = Research Tool
Plagiarism	
ChatGPT Accuracy	
ChatGPT = Research Tool	
Teaching Case Studies	
ChatGPT demonstration	
