2026 ASEE ANNUAL CONFERENCE June 21–24, 2026 | Charlotte Convention Center, NC
Host Sponsor UNC Charlotte
Paper ID #50886

AI Education in a First-Year Seminar Course

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AI Education in a First-Year Seminar Course

Abstract

Artificial Intelligence (AI) has been progressing rapidly and impacting society tangibly. Engineering and technology students are expected to master AI tools at work, and graduates may join teams developing such tools in the future. Although educators in higher education have not reached a consensus on how AI education should be carried out or even if AI should be included in education, such different opinions promote critical thinking and are intrinsically helpful in developing the pedagogy for AI education. As a step in exploring effective methods for AI education, the authors incorporated AI LLM (large language model) tools, together with other classic library tools, to guide first-year engineering and technology students on proper AI usage, in the scope of literature survey, patent search, and information verification. The students in the first-year seminar course at Western Carolina University are from all engineering disciplines in the school (electrical, mechanical, technology, etc.). During the class module on library resources, students were introduced to both traditional venues with reputable resources and the AI tool currently institutionally approved. The students were then randomly grouped to do research on each tool and present their findings on each tool's pros and cons during class. After the class, the students were tasked to do an assignment individually to choose at least three out of six questions to answer on a discussion board at the online learning management system. They could not see others' responses until they had posted their own answers. They were also tasked to read other students' answers and make comments on those. Students were allowed to use both AI and traditional tools to develop their answers, and they were expected to verify the information from multiple sources. The research questions covered an array of disciplinary topics on math, statistics, quantum computing, case studies in engineering practices, and environmental issues. This exercise allowed students to apply what they had learned in class and served as an assessment of how the teaching module impacted their usage of AI tools. Findings indicated that the students were most excited to answer unfamiliar questions and that the AI tools enabled them to take on these topics easily, although a few answers and student comments were incorrect, inaccurate or irrelevant. The recommended next step is investigating how to use AI tools to correct incorrect or inaccurate statements, however, this is complicated by the students' lack of recognition of mistakes. Students need to be aware of such mistakes to follow up. A solution proposed in this paper is for the students to research any new keyword in the conversation with AI, no matter how plausible a statement may seem, until all statements are understood and verified. This framework is expected to be applicable in more senior disciplinary courses, as future work.

Introduction

With the rapid development of Large Language Models (LLM), Artificial Intelligence (AI) is now accessible to the general population and is used in many different settings, including higher education. In the higher ed classroom, AI has potential as a TA chatbot [1], yet it is not a replacement for teachers nor should it become a crutch [2]. Rather it should be viewed as a useful tool in a human-in-the-loop system to help interactive learning [3]. Experimental AI use by educators also includes using AI in student feedback reviews [4], to help students in project design [5], for team building [6][7] and even with selection of student majors [8]. Meanwhile, student perceptions of AI are shifting, as studied in [9][10], while students are developing relationship with AI as a collaborative tool, and student voices are important to be integrated in campus policy and pedagogy development. It is evident that it is increasingly important to incorporate AI literacy and potential use starting in students' first year at college or university [11][12]. AI may help students learn across different disciplines when used as a co-instructor that explains the nuances effectively [13]. With all of these practices, educators have been developing assessments of the effectiveness of said practices [14][15] as well as student attention level [16].

Beyond LLM, AI agents that incorporate actions – such as perceiving and modeling learners' cognitive behaviors, assisting with knowledge-based prompt generation, solution design, prototype completion, and providing evaluation and feedback – will make learning even more convenient [17]. As more AI tools are developed by companies besides OpenAI, including Google Gemini [18], faculty and students gain more options; Mishra, et. al provide an overview of AI agents useful in engineering education [19]. With the growing availability of all of these tools, now is the time for engineering educators to make conscious choices to design the curriculum [20], plan learning outcomes [21], and carry out assessment [22]. Educators are indispensable in streamlining the whole process [23], balancing the human-centered skill development and technology [24], developing and/or adopting best practices for engineering education [25], and finding effective prompting framework to optimize the utility of AI [26].

Within the context of active exploration of incorporating AI in engineering education, this paper presents a learning module on classical library resources and new AI tools in three sections of a first-year seminar course. In this first-year seminar, the students in the class were mixed from all the engineering and technology programs in the school (electrical, mechanical, computer, etc.). After an in-class workshop that included education on various tools to help students find answers, the students were tasked with a post-class assignment to answer questions on potentially unfamiliar topics. Use of AI tools was encouraged, and utilization was expected to help these future engineers explore topics with which they may only be slightly familiar or topics that were entirely new to their knowledge base. The assessment of their answers and comments demonstrated student effectiveness in using AI tools as well as student enthusiasm for AI, though assessment did reveal that not all student answers were correct. A remedial procedure is proposed in this paper to address the issues by continuing the conversation on any new term that appears in discussions and asking direct questions, e.g., whether a statement is true or not. Future work on this topic is to apply these procedures in junior or senior disciplinary courses to help students solve real-life challenges. The contributions of this paper include (1) presenting a framework on how to incorporate AI education in a first-year seminar, (2) providing case studies on how students applied their skills, and (3) proposing a solution on AI usage procedure to help students avoid irrelevant or incorrect answers.

The remainder of this paper is structured around the class organization, completed assignments, and assessment of student responses. The initial section describes the in-class teaching module, then setup of the post-class assignment is explained, as well as how the AI responses are used as a baseline in comparison with the student responses. During the class, after instructions and team research, the students presented their perceptions of the library resources and AI tools, which are summarized in Table 1. The student responses from the post-class assignments are analyzed in detail for all six questions (the students were required to choose at least three of them to answer). These student responses are summarized in Table 2, ranked by the number of their interactions indicating their interest level. Observations and potential solutions to avoid irrelevant or incorrect answers are presented, together with some future work.

Education Module on Library Resources and AI Tools

The professors met with the STEM librarian to discuss learning outcomes and goals for this module, which was taught by the STEM librarian in collaboration with each of the three professors. During the class on library resources, the students were informed that the class was to help them develop an understanding of different tools, how they work, and when/why they might be best used. Students were also reminded that not every tool is useful for every task. The students were then introduced to several resources for academic learning:

- O'Reilly Online Library
- Credo Reference (a library subscription database)
- Engineering Database (a ProQuest database)
- Google (the general search engine where AI answer was provided by default)
- Google Scholar
- IEEE Xplore (IEEE digital library with conference proceedings and journals)
- IET Research Hub (The Institute of Engineering and Technology by Wiley, with open access)
- Microsoft Copilot (this is the only AI LLM tool that is approved by our campus)

The students were randomly divided into teams, generally with two to four members. They were asked to explore each tool using a broad topic – robotics – and to answer a set of five assessment questions. The STEM librarian and professors provided guidance and direction during this exploration time to answer questions and to ensure students stayed on task. Teams were told from the beginning to note their findings and post them on an interactive slide show app. At the end of the exploration time, the collaborative slideshow began with each team presenting their assigned tool to the rest of the class. The questions each team answered are as follows:

- What is this resource? Describe this resource and let the audience know how useful you found it for your topic. For example: This resource is a collection of X that you can search, when you need to find Y.
- What features does this resource have? Tell the audience about any special features that this resource has. For example, does it have a useful advanced search, a citing feature? Describe or note any features you can use to limit or navigate through your results.
- What is this resource most useful for? If you had to advise someone who asked you if they should use it, when would you tell them "Yes, this would be good for that task"?
- What are some drawbacks or shortcomings of this resource? For example, does it not include resources you were expecting? Does it require you to be really specific with search terms? Is it good for only the beginning parts of your research? Is it super technical? Do you see things that make you not want to use this resource?

During the presentation, students were engaged and eager to talk about their resources, even if their particular resource did not work very effectively for the topic. As the students presented, they were provided with feedback from the professors and the STEM librarian to clarify any misperceptions or inaccuracies for the class. Though not a part of the official question list, students often provided an overall would-or-would-not recommendation for others in the class. Slide records were then finalized and locked from further edits and kept for later review.

A summary of student presentations on these tools is listed in Table 1. These presentations were made during one class period of research, so student perceptions of the pros and cons of each tool might not be fully justified. However, these sources presented themselves well enough to new users so that the student perceptions mostly captured their essence.

Table 1. Summary of Student Group Presentations on Source Comparison in Class

Source	**Main Content**	**Special Features**	**Pros**	**Cons**
O'Reilly	Textbook, audiobook, articles, media. More on coding	On-demand courses. Rating system. Multiple languages	Advanced search and filtering. Learning in different modalities	Very technical to be overwhelming at times. Need to be specific.
Credo	Quick reference, research tips, translations	Mind map among related topics. Images. Filters	Broad overview. A great starting point	May not be in depth. Need to be specific. Subscription
Engineering Database	Working papers and journals from multiple sources	Easy to cite and forward. Ratings. Filters	Research specific fields	Very specific keyword, or else search may not render the intended result

Source	Main Content	Special Features	Pros	Cons
Google	Search for information	Multimedia search to include email, maps, news, media, etc.	Huge database, user-friendly, customizable	May be less specific or less reliable
Google Scholar	Academic papers, patents	Excluding non-citable sources	Allow one to save, cite, sort, and track citations	Limited filters
IEEE Xplore	Database on technology topics	Smart filters. Abstracts are available	Widely used and respected. Offer standards and courses.	IEEE is the only publisher, could it be biased? Keyword should not be too narrow nor too broad. Subscription
IET Research Hub	IET articles with easy layout of all relevant abstracts	Advanced search	Useful for STEM research	Not easy to understand for lay people. Subscription.
Copilot	Conversation on any topic. Could provide links to references (need verification)	Fluent in multiple languages. Generating images	Gathering information from internet widely. Follow-up conversation deepens the search	Need to be specific for good response. Need verification.

The student group on Google used the built-in Google AI to obtain information on Google's daily search instances. The student group presenting Copilot made a point that Copilot was just like ChatGPT in its usage, and the students were likely familiar with it.

Assignment Setup

In the post-class assignment, the students in the first-year seminar course were asked to answer at least three out of six research questions on topics that they might not have been exposed to yet, with the help of AI, but they needed to incorporate their own critical thinking and verification to use the AI information properly.

These questions were issued as threads on discussion boards in the learning management system (Canvas), and the students needed to post their own responses before they were able to see other students' responses. Once the responses were revealed, they were expected to comment on other students' answers, as another part of the assignment. In this way, they could learn from each other, and some comments confirmed that seeing others' responses brought something to their attention that they had not previously considered.

Challenges in Data Analysis

The purpose of this assignment is for students to learn to use AI tools and verify the information obtained from these tools to then write their own statements of understanding. During data analysis, it is challenging to ascertain which part of the answer or comment is from direct AI output and which part is from the students' critical thinking and analysis. Therefore, the authors have gathered responses from multiple AI tools when the AI tools are asked the same questions as a comparison.

The AI tools used in the comparison include the following.

- Microsoft Copilot
- Google Gemini
- DeepSeek
- Manus Lite

Note that this comparison data from AI output was generated about a semester later than the original date students submitted their answers and comments. Some tools might not have been available to the students or, for those that were, the tools were potentially initially less refined or accurate as more current versions of each tool.

The AI tools provided answers in different ways, but the core information of the answers was common. The common core of this first round of answers from these AI tools was then used as a baseline to compare with student answers. The guiding principles in judging the student answers and responses are below in the "Response Analysis" section.

- If the student statement is correct, it could be from AI output directly. However, anything that is not typically provided from the first round of AI output is likely due to the students' own research or from reading other published reports.
- If personal reflections are added, it is likely from the students' own thinking.
- If a statement is incorrect, it is more likely that the students are using the AI tool without verifying the answers.

Response Analysis

Six questions were assigned, and the students could choose to answer at least three out of the six questions and comment on other students' responses afterward.

Question #1: What caused the Florida International University Pedestrian Bridge Collapse? What were the consequences?

The most common responses included the following facts:

- It happened on Mar 15, 2018.
- Miscalculation caused underestimation of the load and overestimation of the capacity of the structure.
- Cracks on the structure were observed and reported earlier but did not lead to any corrective actions. The bridge collapsed when the workers tightened the tension rods.
- 6 deaths (1 worker and 5 motorists), 10 injuries with one permanently disabled.
- The engineer who signed off this project lost his license (or stripped of his PE license).
- The Engineering firm was banned from participating in federal projects for 10 years, the contractors, and the relevant departments were fined.
- Legal consequences included a $103 million settlement and the construction company filing for bankruptcy.

However, there are some details that were mentioned by only one student:

- The bridge was not fully built when it collapsed. (Upon further checking, this was true, and the bridge collapsed within 5 days of the construction starting.)

Interestingly, some student responses were irrelevant or factually wrong:

- The explosion and resulting fires killed people. (There were no explosions nor fires, although the cloud of dust was big. It was purely mechanical but not thermal.)
- The Hyatt Regency walkway collapsed in 1981 and over 100 people died. (This was a different event where 114 people died.)
- One student said that there were 6 deaths and 8 injuries. (The number of injuries was incorrect.)
- Two students mixed Louis Berger Group (the civil engineering company that was chosen by FIGG to do peer review, while FIGG Bridge Engineers, Inc. was the designer engineering firm) with the person, Louis Berger, (a civil engineer, 1914-1996, who founded the company, Louis Berger Group). However, one student provided the source from NTSB (National Transportation Safety Board) where the name Louis Berger was mentioned as the peer reviewer without specifying if it's a company or a person, which was the reason for this confusion.

Upon cross-checking with our own prompts to the AI LLM tools using Copilot, Google Gemini, DeepSeek and Manus Lite, the well-established and well-known facts were indeed the most common responses in the first round of each AI LLM tool's replies. The detail on the timeline was not stated by any AI LLM tool, though, though Copilot offered to generate a timeline. This timeline started from March 10, 2018, but the timeline did not state that the bridge collapsed while it was still under construction. However, when the AI LLMs were asked specifically if the bridge was still under construction when it collapsed, they all confirmed it with more details. For student responses that were factually wrong or irrelevant, these responses could have easily been verified by students and corrected, but they did not.

After the students submitted their answers, the discussion board setting allowed them to see other responses and make comments. Students showed sympathy and empathy (some even included such comments in the first round of their responses) including the following:

- Students felt a great sense of responsibility to become engineers as engineering mistakes could cost lives.
- Students called for stricter oversight, faster responses, and higher standards.
- Some students also realized the time needed to carry out such safety measures, and even if this might cause inconvenience with delayed traffic, especially considering the reconstruction in our own region due to recent hurricane damage, it would be best to take that time.
- One student commented that the duty and responsibility of an engineer could be a little scary and nerve-wracking.
- One student made a connection between this question and the other question option in this assignment on ODE (ordinary differential equation), as the stress analysis could use ODE.

An interesting observation is that all comments were made only under the correct answers with an agreeing tone, but no one corrected the wrong answers posted by students. Students chose to agree with a correct answer instead of disagreeing with a wrong answer.

Question #2: Why is it so challenging to predict and/or estimate the damage from a natural disaster such as Hurricane Helene?

Given the complex nature of this issue, the answers tended to be general. Some answers were comprehensive lists and appeared like direct AI outputs. The common facts provided by students are listed below:

- The hurricane pattern, including path and intensity, is unpredictable inland.
- The environment is different such as terrain, topography, land use, infrastructure, natural barriers, and population density.
- Secondary disasters such as flooding, landslides, power outage, infrastructure damage, and communication interruptions made things worse.
- Building code and building materials inland are different from the coastal regions. These regions are not as prepared as other areas to handle such disasters.

- The early warning systems are only on the wind or rainfall intensity, direction, etc., but not on potential impact or damage, so people are not warned properly. People might have underestimated the impact given similar past warnings that didn't cause much damage before Hurricane Helene.
- Multiple factors are involved, making it extremely hard to predict and prepare.

Some keywords in the answers were different between different students' answers, and the students made comments on those, indicating they had not thought about it earlier.

- The damage is hard to estimate as it could be based on the communities' value, and secondary impact to other regions.
- Climate change may have contributed to the worsening of the weather patterns.
- The erosion of natural barriers is a good point. The rainfall events prior to the hurricane made it more susceptible to flooding and landslides.
- Many areas are rural with fewer resources and less accessibility, making them hard to recover. Bigger cities, such as Asheville, got more media coverage and more help.

Question #3: What is normal distribution? How is it used in quality control and digital communications?

The answer to this question is straightforward. All the AI tools emphasized the following:

- The normal distribution's probability density function is in a bell curve, with 68% of data falls within 1σ of the mean. 95% of data falls within 2σ of the mean. 99.7% of data falls within 3σ of the mean.
- Quality control uses it for process or product variation control.
- Digital communication uses it to model the noise to calculate the communication quality metrics.

Quite a few students said that it is the most common, or at least one of the most common distributions. The central limit theorem makes it widely applicable. It is "normal" because it happens naturally in many real-world situations. Some students also mentioned the distribution's other applications, such as in health care, finance analysis, psychology, and machine learning.

Three students mentioned that the IQ test scores would follow normal distributions. This field was not asked. It could be a common application from AI so several students picked up on that.

There was one inaccurate statement from a student that "the distribution is predictable, and it can help spot problems", and another student agreed with the predictability of normal distribution. The suitability of a statistical model depends on if the model actually fits the real system and if the model parameters could be accurately estimated from the measurement data and the system does not change much over time. A statistical model does not have inherent predictability. This nuance is not easily recognizable for students who have not taken the probability and statistics course yet.

Question #4: What are some applications of ODE (Ordinary Differential Equations) in Mechanical Engineering, Civil Engineering, and/or Electrical Engineering?

The answer to this question is also straightforward, and the AI tools all provide very similar answers. However, students may not be as familiar with ODE as with the normal distribution, unless they have taken Calc AP class or similar. before their enrollment at the university. The purpose of this question is also to spark their interest in ODE so when they take this course in their sophomore year, they will understand why learning ODE is needed.

The answers provided by students were noticeably more scattered than the answers to Question #3. However, a higher level of excitement and more comments on this topic were observed in the student answers than in Question #3. The students provided many specific ODE examples:

- Modeling buckling, and/or modelling if a building may collapse or not
- Dynamic load response analysis, such as car suspensions, bridges, airplanes, machinery
- Chemical reactions and energy transfer
- PID controller
- Resonance in an RLC circuit
- Electronic filters and signal processing
- Electromagnetic fields
- Electric grids and energy distribution optimization
- Signal transmission in communication systems
- Flow of groundwater or traffic patterns, fluids
- Motion, heat transfer, vibrations, hydrology, soil mechanics
- Fluid mixtures and dilutions, for water treatment, nuclear plant cooling intake, etc.

The students found these general impacts of ODE:

- Model the real world accurately
- Make our infrastructure more efficient and safer
- Bridge between math and physical reality
- Be versatile to model the rates of change over time continuously
- Predict system behavior, optimize performance, ensure safety and stability

As to tools that use ODE,

- One student found that Matlab/Simulink used ODE to model the electrical circuits
- A student cited Copilot in their response, and another student commended them for providing the citation.

One student did mention that some of the discussions made ODE a bit intimidating.

Question #5: What is a qubit? What are the potential ways to do quantum computing?

This question was beyond the class's knowledge, but we provided instructions – see below – to encourage students to explore. The same instructions are provided for the question on normal distributions.

"You may or may not have heard any of these concepts. Don't worry! Now with the ample information online and the help of Copilot, ChatGPT, and/or other tools, you can get started on any topic! We won't be an expert after such a search, but we will be able to get some preliminary understanding of a new topic. Please know that the answers from the AI tools may not be accurate, so how can you verify it using other reputable sources? Using the skills you learned from the class to do research on these concepts, answer these questions as best as you can."

Many students were able to find the correct information, but compared to the other questions, more students said that it was hard to wrap their head around how the computation was done.

- A qubit can be both 0 and 1 at the same time due to superposition.
- Two qubits can be entangled to allow instant multi-qubit operations even when physically separated.
- Quantum states can interfere, allowing the correct answers to suppress the wrong ones.

Several students listed the potential implementation of qubits, with their pros and cons.

- Superconducting qubits
- Trapped ions
- Topological qubits
- Photonic systems
- Quantum dot (silicon spin)
- Neutral atoms

Some students pointed to some key milestones for quantum computing:

- In 1994, Shor's Algorithm demonstrated that quantum computing could greatly speed up the factorization of huge integer numbers, rendering the classic cryptography inadequate, although the number of gates and bits needed to do so is still not yet feasible at that moment.
- In February 2025, Microsoft claimed to have created Majorana 1, the world's first quantum processor powered by topological qubits. This chip can compute up to 1 million qubits and is capable of tackling the most complex industrial and societal problems.

However, one student made an incorrect statement and another student agreed with it. That statement was a common misconception, but if they had asked AI again about this, they would have found the correct information.

- The wrong statement was that "qubits can hold a lot more information than HDD and SSDs." However, although qubits allow parallel computation, once measured, only one state will be observed but not multiple states. Also, the qubits are short-lived and nearly impossible to copy, unlike a traditional storage device.

Two other similar inaccurate statements were observed, and one other student agreed to it.

- "A qubit can store far more information than a traditional bit." Or "A qubit can hold more data than a bit". A qubit allows parallel processing given its superposition state, or it can process more information in parallel than a regular computer, but it cannot store or hold the information or data.

This demonstrated that when presented with new information, the students could not tell if the information was correct or not, and they believed what was plausible. This observation is different from the discussions about Question #1 where the students appeared to avoid commenting on or disagreeing with wrong statements, although they might have found the info wrong, and they chose not to disagree with those actively.

Question #6: What is the efficient way to solve three simultaneous equations?

This question is about approaches rather than information. The students were encouraged to use equation editor to demonstrate their arguments. This question was also aimed at inspiring students to learn and use linear algebra.

"*What is an efficient way to solve for three unknown variables from three simultaneous equations? How do we know if there are solutions or not, quickly? You could choose to use a numerical example to illustrate your point. When you reply, you could choose to use the equation editor on Canvas, which works in the similar way as the Equation Editor in Word. Or you can choose to upload a scan of your work on paper.*"

This question got the fewer responses among all the choices of questions. The reason for the few numbers of answers is unclear, but some potential reasons include:

- Expected usage of equation editor takes extra time.
- Math expressions are not as exciting as real-world applications for other questions.

There were students who took the effort to illustrate the steps: One student provided an example problem with solution on paper and uploaded the scan, and another student did it in Excel using built-in functions, MINVERSE() and MMULT() that worked correctly with solution checking.

The available responses, although fewer, provided the correct answers.

- Gaussian elimination simplifies the system step by step for back-substitution.
- Cramer's Rule solves each variable individually, which is best for small systems.
- Matrix inversion is especially efficient when using a computer. LU decomposition may be used to find the inverse matrix.
- Whether the solution exists or not could be examined by the determinant of the system coefficient matrix.

One student indicated that they did these approaches in high school. Several students commented that errors at some steps of these approaches could lead to wrong final answer, and those calculation mistakes were prone to happen if done by hand. A computer would have been more efficient and accurate when carrying out these tasks.

One student also said that they could only think of substitution when they heard this question, and then the AI search mentioned the other approaches such as Gaussian elimination and matrices that they knew little about at that point. This is normal for a freshman student.

Several students mentioned potential tools that are especially suitable to handle this kind of problem, such as Python, MATLAB, Excel, or a calculator. These are indeed the popular tools to solve for simultaneous equations.

Table 2 contains a summary of the response analysis performed on all six questions. These are ranked by the number of interactions (answers and comments) with the number of interactions indicating student interest. Even on unfamiliar topics the students' enthusiasm, as indicated by the number of responses and the length of their posts, was observed in their discussions. The discussions were facilitated by student use of library resources and AI tools. Not all statements were correct or relevant, though, and these statements demonstrated that the students either did not put thought into their response or had misconceptions after reading the sources. In several cases, the students cited their sources, including Copilot, IEEE Xplore, Google Scholar, and other AI tools, with occasional cross-checking for validation. The remainder did not cite a source. As mentioned in the summary of answers earlier, some answers appeared similar to an AI output with a comprehensive list, while other answers incorporated their personal perceptions and were likely written by students.

Table 2. Summary of Response Analysis, Ranked by the Number of Interactions

Question Topic	**Student Familiarity**	**Number of Answers**	**Number of Comments**	**Number of Incorrect, Irrelevant, or Unclear Statements**	**Mentioned sources** (mostly unmentioned)
#1 FIU bridge collapse	Medium	34	26	5	Copilot
#4 ODE, in engineering applications	Low	31	26	0	Copilot, MathWorks
#2 Damage prediction for Hurricane Helene	Medium	30	17	0	Google Scholar
#5 Qubit	Low	27	18	6	Google Scholar
#3 Normal distribution, in quality control, communications	High	24	20	3	IEEE Xplore, Using IEEE to validate Copilot. IEEE
#6 Efficient ways of solving simultaneous equations	Medium	15	7	0	Google Scholar, AI tool (didn't mention the name)

When a statement was irrelevant, the student should have read it carefully to see the mismatch between the answer and the topic; failure to do so indicated a lack of commitment to the assignment. When a statement was factually incorrect, such as listing the wrong number of injuries in the FIU bridge collapse question, the student could have used multiple sources to verify that number.

When a statement was conceptually incorrect, it demonstrated a lack of understanding, but this is considered normal during the learning process. However, the student could have used AI tools or other tools to query or clarify the unknown concept in that statement or, with AI tools, ask directly if that statement was correct. Currently, AI tools are able to address such concepts with reasoning, although the tool's reasoning may or may not be correct. Therefore, students could and should continue researching any new terms that appear in the conversation with AI, no matter how plausible a statement might seem, until all statements are understood and verified.

The overall observation through the assessment of student answers and comments after using AI tools was that the AI tools enabled students to learn new concepts and/or gather information quickly, although the students needed to take the initiative to verify the sources and dispel misconceptions.

Conclusions and Future Work

With the rapid evolution of AI tools, AI usage and education have become a must for engineering and technology students and are no longer optional. This paper presented an AI education module in a first-year seminar course with group research on classical library sources and AI tools, and the students did individual assignment after the class to practice using these tools to answer questions on discussion boards in an online learning management system. The students could not see other students' responses until they had posted their own answers, and then they were encouraged to comment on other students' answers. The responses from the students indicated that AI was a useful tool to help students learn a new concept or gather information, and the students showed enthusiasm for new concepts that they had no idea about earlier, however, the AI answers could be wrong, fabricated, or irrelevant. Students needed to learn to use reputable sources and/or continue the conversation with AI to address any new concepts in the process of understanding to get the correct info. Overall, AI could be a first step in such a learning process, and it could help during the exploration to explain keywords and/or lead to other relevant topics.

After the students practice how to identify and avoid irrelevant or incorrect statements from a first-year seminar course, they can apply these skills on using AI tools in their later disciplinary courses. Currently there are useful frameworks on how the prompts should be constructed, and such prompt engineering skills will be incorporated in the sequential prompting process suggested in this paper, in junior or senior disciplinary courses as future work. Given the rapid development of AI tools, AI literacy education may not be aiming at the perfect end product, but rather the focus is to teach students how the process is performed so students understand and keep refining the end product.

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