Developing Transformational Student Learner Outcomes Through Artificial Intelligence

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Introduction

Agriculture is a dynamic and ever-evolving field requiring continuous adaptation to stay relevant and competitive. Adequately preparing students for careers in agriculture requires departments within colleges of agriculture to develop and maintain up-to-date and relevant learning outcomes to ensure students are equipped with the skills and knowledge needed to succeed in an industry that is constantly changing (Sommers et al., 2019). This is particularly true in relation to emerging technologies. Advances in artificial intelligence (AI), big data, and automation are creating new challenges and ethical dilemmas (Howard & Borenstein, 2018). Educating students on responsible and ethical technology use is crucial to prevent negative outcomes, such as the misuse of data, privacy violations, or discriminatory practices (Dennis & Harrison, 2021). A recent examination of [Department]'s existing student learning outcomes (SLOs) and assessment plan revealed significant gaps, specifically related to the responsible and ethical use of technology, leadership, diversity, and inclusive practices. Both students and faculty expressed that the current SLOs did not accurately reflect the breadth and depth of the program. Additionally, existing SLOs were vague, difficult to measure, and not representative of all areas of content covered in the [Department's] academic programs. To promote intentional, transformational learning, ChatGPT, an AI-driven language processing software, was used as an innovative methodological tool to enhance the development of qualitative performance indicators for programmatic SLOs (OpenAI, 2022).

How it Works

Course-level objectives were collected for all University of Tennessee's Agricultural Leadership, Education & Communications (ALEC) undergraduate courses. These outcomes were used to create a curriculum map showing alignment of course objectives to existing program SLOs. Most courses exhibited weak or no alignment between course objectives and SLOs. To check confirmation bias and see other possibilities that technology might illuminate, a free word cloud generator was used to create a visual representation of the most common concepts among course objectives. The word cloud also identified words that were not present but ones that represented the program (e.g., diversity, inclusion). This reflective process led to the identification of the following critical attributes of an ALEC graduate: critical thinking; leadership; communication (written and oral); ethical use of technology; and diversity, equity, and inclusion.

As the emergence of AI tools such as ChatGPT increases, questions arise as to how the tool might be used to operationalize programmatic SLOs as well as where the ethical boundaries might lie in using such a tool for academic purposes. ChatGPT is a language model that has been trained on a large dataset to recognize language patterns, but it does not have access to external information beyond its training data or data fed to it by users, which means it cannot access internet sources (OpenAI, 2022). The free research preview of ChatGPT Feb 13 Version was asked to "write performance indicators of critical thinking" and further asked to "refine the performance indicators to be more measurable." ChatGPT returned ten discrete performance indicators by which critical thinking competency can be measured. This process was repeated for leadership, communication, ethical use of technology, and diversity, equity, and inclusion.

Results to Date

A series of 10-20 performance indicators were returned for each critical attribute for a total of 85 indicators. Since indicators were grouped by attribute, each grouping was reviewed to combine like items and eliminate redundancy. Through this process, questions were asked to form the boundaries of the ethical use of an AI tool in crafting scholarly work. Questions included, “Is it intellectually dishonest to use an AI tool to shortcut the outcome development process, or rather does using the AI tool reduce the likelihood of unconscious biases shaping our SLOs?” and “Where is the line between collaborative scholarship with AI and intellectual dishonesty?” For example, when publishing the process of creating new SLOs using ChatGPT, is the language model a tool or a co-author? In fact, ChatGPT was used to generate draft text, which was edited and polished for the Introduction and Future Plans of this abstract.

Future Plans/Advice to Others

The next step in developing programmatic SLOs for ALEC is to distribute the AI-generated performance indicators, grouped by critical attribute, to all ALEC teaching faculty. Each faculty member will rank each item on a scale of importance. Responses will be collected, analyzed, and synthesized to identify areas of consensus and disagreement. Depending on the level of agreement additional rounds of ranking may be used to refine and clarify performance indicators. The final lists of indicators will be used to craft SLOs, which will be measured by those indicators.

ALEC faculty are exploring the expanded use of AI for curriculum development and its potential integration into coursework. Although discussions about how best to proceed with this technology are ongoing, undergraduate students in a program planning course have been introduced to AI-generated content as part of a learning activity, followed by a discussion on the ethical use of the technology for instructional design. Introductory oral communication course faculty are planning to introduce AI generated personal public speaking SMART goals on common areas of concern (i.e., eye contact, filler words) for undergraduate students to critique. Additionally, faculty in other departments at UT are collaborating with Food Science faculty about the integration of AI technologies into their academic program.

Beyond purely ethical considerations, potential adopters are cautioned to familiarize themselves with the limitations of the technology. ChatGPT excels as a language editor, generating high-quality English text from a given input. However, its ability to apply knowledge is limited to the content and timeframe of its training data. When presented with queries outside its knowledge boundaries, ChatGPT may invent facts to provide a response. For instance, in a research literature review query, ChatGPT provided fictional citations with invented paper titles, journals, and DOI numbers. On the other hand, it provided accurate information when asked about SPSS statistical software, likely because SPSS textual data was included in its training data.

Resources Needed

A research preview version of ChatGPT is available for free at chat.openai.com/chat. New users must create an account to access the platform; however, there currently is no fee. The free plan allows the user to enter queries or prompts and receive immediate responses. There are times when the system is overwhelmed by demand rendering the platform inaccessible. For USD $20 per month, users can update to a ChatGPT Plus subscription, which ensures access even when demand is high, provides a faster response rate, and early access to new features (OpenAI, 2023).

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