AI invaded university education – is it really helpful?

The embrace of AI through universities worldwide prompted an increase in alerts towards the disadvantages of this development. Core issues include fraudulent manuscripts in scientific publications, reduced brain activity, decreased critical thinking, and increased cognitive offloading.

Pros and cons of AI

Businesses, the industry, governmental agencies, and all those aiming to gain more benefits push the agenda forward, while society was heavily attacked through AI technology by the scam crime (1). The danger of chatbots for certain vulnerable minds, the polarization of social media, and the unrealistic expectations for achieving evidence-based politics have been outlined (2). However, certain applications of AI in biomedical research and health sciences are advantageous. The pros and cons of scientific publication have been discussed previously (3). All over the world, scientific institutions, universities in the forefront, are eager to join the AI trend. This, of course, is true for Thailand as well. For instance, workshops, such as the one for Khon Kaen University, are up to familiarize staff and students with AI developments (4).

AI helps scientists and hurts science

Whether, throughout these workshops, both the positive and negative aspects of AI are introduced is not known. A recent publication in the scientific magazine Nature reported an increase of AI in publications, resulting in the shrinking of new scientific areas. Comparing AI-driven publications with those composed in more conservative ways, AI papers receive more citations and more easily take the lead in their field, but the 'collective' scientific topics studied decrease (5). This finding was commented on by the US competitor, Science, as 'AI has helped scientists – but may have hurt science' (6).

A week later, Science informed that the popular preprint server, 'arXiv', required first-time submissions to obtain the endorsement of established arXiv authors. The move was justified to curb 'the rising tide of fraudulent manuscripts generated with AI by junior unskilled people sending some rubbish to arXiv' (7). The use of AI in research and the subsequent publication of research results in scientific journals is one major activity for universities. Establishing AI in academic education is another concern.

AI and the brain's activity

It was just arXiv, through which a team of scientists from high-ranking US universities drew attention to the less favorable effects AI use seems to have on the brain. Three groups of students were observed while writing an essay using electroencephalography (EEG). The first group used LLM, like ChatGPT, the second used the internet through a search engine,

and the third was asked to rely only on their ‘brain’. An AI device called Natural Language Processing (NLP) was the non-invasive method to record brain activity via (EEG).

Each group of 18 participants cooperated for three sessions. A fourth session was conducted with 18 participants, by changing the formerly brain group to use LLM (brain-t-LLM) and vice versa (LLM-to-brain).

Between the groups, significantly different neural connectivity patterns, due to ‘divergent cognitive strategies,‘ were measured. Brain connectivity was less for LLM, better for internet help, and best for the brain, showing the ‘strongest, widest ranging network’. In the following interviews, the brain-to-LLM group remembered best what they had written, which was deficient for the LLM participants (8). The results of the study indicate, in plain words, that what the LLM group absorbed from the exercise was lower than when using only their brains, and, in the end, they hardly remembered what they wrote.

AI for teaching is not welcomed by everybody

The authors of this experiment received around 4,000 emails from teachers, schools, and universities worldwide, commenting sometimes desperately on their experiences with AI in teaching. An increasing number of academics start to worry. In June 2025, an open letter, which got 1.000 signatures worldwide ‘objected the uncritical adoption’ of AI technology by universities. One of the initiators of the letter remarked that in the ‘past couple of years … the students’ … skills… have dramatically changed’ and ‘struggle’ to find references and write an essay (9). However, aside from those who teach, the students' acceptance of AI is quite forthcoming.

What students think about AI

Their perceptions, expectations, and preferences were explored in 2024, based on responses from 3,839 students from 16 countries by the Digital Education Council. The overwhelming percentage of them, i.e., 86%, use AI in their studies, and 24% on a daily basis. Around 70% search for information, more than for 40% brush up their grammar, more than 30% ask AI to summarize the documents, and about 25% use AI to come up with a first draft. More than 70% expected to be trained for effective use of AI tools, and 60% expect that the universities should use AI for teaching and learning (10).

These figures in Thailand might be even more supportive of AI, since the tools are widely welcomed for translation and drafting English text, not only for students but also for staff. In Thailand, as across the world, the use of AI has rapidly increased. For instance, the generation of text rose from about 30% to over 60% between November 2023 and December 2024 (9). Another facet of AI as a tutoring and teaching tool is accepted, but with mixed feelings.

A positive study outcome for an extraordinary group of students

A study from Harvard University, often cited in the literature, could be considered as a promising model for tutoring in an already advanced, peer-instructed, introductory course in Physical Sciences. Of 233 students, 194 agreed to participate in a randomized controlled trial, in which students were assigned to a group tutored in an active-learning class. The second group was exposed to a generative artificial chatbot for undergraduate science education, informed by best practices in pedagogy and educational psychology. It was found that students learned significantly more in less time with the AI tutor than during in-class learning activities. The post score AI group by far was higher compared to the class group, and the AI group showed significantly more engagement and were more motivated to participate (11).

LLM tested against online search and the brain

The Harvard model's validity for universities in general is certainly limited by the fact that it involves a group of science students from one of the leading universities. A wide spectrum of scientific faculties comprises an ordinary university, each of which might use a different AI tool. Students differ in their basic overall education, interests, and motivation to study. In addition, the outcome of the Harvard study is challenged by another, not yet published investigation by the Center for Online Education at the Tsinghua University, which initially came up with a higher score for AI-instructed students, who, however, scored lower than their peers after two to three weeks (9). What are the fundamental adverse drawbacks of using AI in teaching, tutoring, and writing scientific essays?

Critical thinking and cognitive offloading

From the Swiss Business School in Zurich, Switzerland, attention was drawn to two main crucial aspects of AI tools that might harm society. The academic sector, especially, will be affected by a decline in critical thinking and an increase in cognitive offloading (12). In critical thinking, cognitive skills and strategies are used to enhance the probability of a desirable outcome. Critical thinking has a purpose, is reasonable, and goal-oriented. It is needed for problem solving, to formulate interfering aspects, calculate likelihoods, and make decisions (13).

Using external tools, such as AI, to reduce the cognitive load on a person's working memory is defined as cognitive offloading (14). Many years before AI was on the agenda, the so-called Google effect was the forefather of AI, as a dangerous form of cognitive offloading, named as 'transactive memory' at the time. It is easier to remember where to find information and more troublesome to remember the information as such. Maybe automatically the brain avoids storing what should be kept better. The very easily available AI tools nowadays offer, besides ready-made information, even quick solutions and, by doing so, jump across the entire process required for critical thinking (12, 15).

The Swiss study, besides its clumsy presentation of the statistics applied, is worthwhile reading, especially the introduction and literature review. The effect on AI was tested among 666 people in England, most of whom held a bachelor's, master's, or doctoral degree. Critical thinking and cognitive offloading were assessed using accepted expert methods. The main outcome was 'a significant negative correlation between the frequent use of AI tools and critical thinking abilities, mediated by the phenomenon of cognitive offloading.' Overwhelmingly, AI is seen to be of advantages, but 'they may inadvertently diminish users' engagement in deep, reflective thinking process' (12).

Not only do more conservative academic staff question the benefit of AI, but students are also concerned about the over-reliance on AI, as reported by the 2024 Digital Educational Council survey. Fifty-five percent of students believed that over-reliance on AI in teaching decreases the value they receive, and fifty-two percent sensed a negative impact of AI on their academic performance (10).

Handling AI in universities elsewhere

Universities and countries differ in their responses to AI. The uncontrolled offspring of AI tools became another point of concern. Within universities, the AI tools recommended might differ between courses within the same faculty, confusing the students. In other countries, such as Australia, a national agency has developed, together with the universities, guidelines for several years. In China, AI is not forced into the universities, but the integration is part of the national strategy. At Tsinghua University, ChatGPT was introduced in 2022, and within a year, hundreds of different AI teaching assistants were developed. The Centre for Online Education, with its director Shuaiguo Wang, began to work against the situation, at a time when every day a new model emerged, and incorrect content had to be addressed (9).

Example of guidance for a university to operate the AI issue

The center's initiative evolved into comprehensive guiding principles for the use of AI education. It stated that AI must remain an auxiliary tool while teachers and students are the primary agents in teaching and learning. The principles are outlined as responsibility, compliance and integrity, data security, prudence, critical thinking, and fairness and inclusiveness. What is allowed and what is not is listed, and students are reminded that AI does not replace the academic training and intellectual labor they are expected to complete independently. Three layers are outlined, which are the groundwork for further development. The Model Layer works with leading AI models to ensure that various scenarios can be integrated. The Engine Layer includes an AI assistant and courses that support a dynamic approach to further improving the system. The Application Layer deals with platforms for various assistants developed in response to frontline needs (16).

Conclusion:

The Chinese example of integrating AI into the university rightly ascertained that AI is an auxiliary tool and cannot replace academic training and intellectual fortitude. It is well aware of the many ways to mishandle and the opportunities for sheeting, and of the difficulties in testing students' individual efforts. Without any doubt, AI will transform teaching and learning in universities. A pessimistic view of the future holds that universities will not lead in development, while technology companies will force their AI models into the academic system (9).

The commercial sector will have an easy game, as long as the role of the universities is vaguely defined as an institution for higher education. The aim of education within the universities remains blurred. Expressions like ‘leadership’ are often expressed as a wishful target. The idea might be that ‘good and educated leadership’ will best serve society. It’s doubtful that AI, with the negative influence of declining critical thinking and increased reliance on AI models that bypass the brain, will achieve good leadership.

To align AI with a defined aim, the university should not only focus on education but also on what the German word “Bildung” encompasses. There is no English word for “Bildung,” and it stands for a very complex achievement, of which the focal point of the individual has the urge to expand one’s horizon and grow into a moral and emotionally mature personality (17). That the European Union (EU) and countries outside of the EU in Europe 1998 and 1999, through the Bolognian Process, abandoned the idea of ' Bildung effectively’ as an aim for the university is another matter (18, 19).

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Frank P. Schelp is responsible for the manuscript's content, and the points of view expressed might not reflect the stance and policy of the Faculty of Public Health, Khon Kaen University, Thailand.
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Grammarly software was used to improve English, but the AI function was disabled.