

Ways of using AI in IT education of Norway

Kateryna Osadcha¹[0000–0003–0653–6423] and
Birgit Rognebakke Krogstie¹[0000–0002–9998–1894]

Norwegian University of Science and Technology, Trondheim, Norway
{katheryna.osadcha, birgit.r.krogstie}@ntnu.no

The development of artificial intelligence (AI) technology has led to the emergence of ChatGPT and other AI-based tools for various purposes in the material and productive spheres of human activity. AI technologies can be used in IT education to improve the productivity of IT educators and enhance the professional training of future IT professionals. To improve IT education, researchers identify different ways to use AI tools. In particular, Becker et al. [1] offers a number of avenues where AI-generated code tools present clear opportunities, namely: code solutions for learning, producing learning resources, and new pedagogical approaches. Santos asserts that AI can support cognitive and motor development, stimulate reasoning by using such concrete cases of existing applications as Games of intellect Strategy gaming (e.g., chess, Cluedo, Go), gamification Action games (e.g., Duck Hunt) [2]. Teaching of computer application technology based on AI can improve students' concentration and enthusiasm for learning [3]. Research has shown that Deep Learning as the technology of AI can assist in automated assessments, helping students identify their flaws in learning computer programming [4]. Additionally, the use of AI reduces the workload of educators by shortening the time spent on assignments grading, preparing lesson plans, and other paperwork [5].

Several tools based on AI technology can be used in IT education. GitHub Copilot can be used to provide suggestions for improving a piece of code, generate a summary of a code change, or propose a strategy to solve an issue. AI can be used to prevent cheating in programming through the implementation of online proctoring systems (Proctorio, SMOWL) [6]. AI algorithms can furthermore be used to analyse students' behaviour, such as in online proctoring systems for webcam detection of behavioural signs of fraud [7]. AI-powered plagiarism (Originality.ai, GPTZero, AI Detector Pro, Winston.ai) detection tools can prevent cheating, e.g. by scanning students' written work and flagging potential cases of academic dishonesty.

To summarise, AI has the potential to revolutionize IT education and programming training by enhancing learning experiences and preparing IT specialties students for the future. IT educators can use AI tools to prepare for classes, support cognitive and motor development and stimulate reasoning of students, improve students' concentration and enthusiasm for learning, assist in automated assessments, provide suggestions for improving a piece of code, prevent cheating in programming and plagiarism detection, and analyse student behaviour in online systems.

In order to help teachers use artificial intelligence in IT education, best practices need to be analysed and systematised. In addition, it is necessary to select reliable, safe, effective AI tools to perform various tasks of teachers: administrative, organisational, methodological, scientific, assessment and communication. Given the workload of teachers, it would be advisable to develop guidelines for the use of AI tools to increase teacher productivity and the effectiveness of IT education. It is also worth remembering the principles of ethics and security in the process of using AI in IT education, which should also be developed at each university and shared with students and teachers.

References

1. Becker, B.-A., Denny, P., Finnie-Ansley, J., Luxton-Reilly, A., Prather, J., Santos, E.-A.: Programming Is Hard - Or at Least It Used to Be: Educational Opportunities and Challenges of AI Code Generation. In: 54th ACM Technical Symposium on Computer Science Education V. 1. on Proceedings, pp. 500–506. Association for Computing Machinery, New York, NY, USA (2023)
2. Santos, V., Mamede, H., Silveira, C., Reis, L.: A Reference Model for Artificial Intelligence Techniques in Stimulating Reasoning, and Cognitive and Motor Development. *Procedia Computer Science* **219**, 1057–1066 (2023). <https://doi.org/10.1016/j.procs.2023.01.384>
3. Li, P.: Teaching Transformation of Computer Application Technology Specialty Based on Artificial Intelligence. In: Hung, J.-C., Chang, J.-W., Pei, Y., Wu, W.-C. (eds.) 4th International Conference on Innovative Computing (IC 2021), Lecture Notes in Electrical Engineering, vol. 791, pp. 579–585. Springer, Singapore (2022).
4. Shahidatul, A. B., Adidah, L.: Deep Learning Approach for cognitive competency assessment in Computer Programming subject. *International Journal of Electrical and Computer Engineering Systems* **12**, 51–57 (2021). <https://doi.org/10.32985/ijeces.12.si.6>
5. Vinutha, D. C., Kavyashree, S., Vijay, C. P., Raju, G. T.: Innovative Practices in Education Systems Using Artificial Intelligence for Advanced Society. In: S. K. Panda, R. K. Mohapatra, S. Panda, S. Balamurugan (eds.) *The New Advanced Society: Artificial Intelligence and Industrial Internet of Things Paradigm*, pp. 351–372. John Wiley & Sons, Incorporated (2022). <https://doi.org/10.1002/9781119884392.ch16>
6. Bergmans, L., Bouali, N., Luttkhuis, M., Rensink, A.: On the Efficacy of On-line Proctoring using Proctorio. In: 13th International Conference on Computer Supported Education on Proceedings **1**, pp. 279–290. SciTePress (2021). <https://doi.org/10.5220/0010399602790290>
7. Nigam, A., Pasricha, R., Singh, T., Churi, P.: A Systematic Review on AI-based Proctoring Systems: Past, Present and Future. *Education and information technologies* **26**(5), 6421–6445 (2021). <https://doi.org/10.1007/s10639-021-10597-x>