Editorial. Innovation in teacher education

Editoriale. Innovazione nella formazione iniziale degli insegnanti

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In his famous article "Computing Machinery and Intelligence" (1950), Alan Turing describes a hypothetical game where he poses a fundamental question for consideration: "*Can machines think?*" In this game, the player needs to recognise the sex of two debaters without being able to see them, only by asking them some questions and receiving their answers. But at one point, Turing poses a new, unexpected question: "*What would happen if a machine took the part of one of the two debaters in this game? When playing the game this way, would the player guess wrongly as often as when playing the game involving a man and a woman*?"

The name of Turing's original game was "The Imitation Game", and indeed many of you may now be thinking of the popular movie "The Imitation Game" starring the brilliant Benedict Cumberbatch, who plays the role of the mathematician Alan Turing. Watching this movie, as scholars in the use of technologies in education, we may wonder: "*Could machines replace teachers*?" or, more specifically, "*Could AI replace teachers*?"

We are living in strange times. At the time of writing, most of us are shut up at home due to the COVID-19 emergency, trying as best we can to arrange good and hopefully meaningful lessons for our students. This is happening at all levels, from kindergarten to higher education institutions. Suddenly, teachers are trying out different video conference applications to find the best one, trying to create digital materials (pictures, diagrams, maps, etc.) with different software programs, using different cloud services, using online applications (Padlet, Mentimeter, Kahoot, etc.) to create polls, seeking to support cooperation activities, to assess student performance, and so on.

Everywhere we look, our education system is in the midst of an accelerated digital transition: how schools educate, teachers teach or how students learn will not be done tomorrow the way it's being done today.

Faced with this emergency, schools and teachers have spared no effort in transitioning their teaching to an online environment using diverse education tools, but the present situation gives them no time to reflect deeply on how to develop their teaching strategies and practices accordingly.

As difficult as it is for teachers who are already feeling burnt out, they and their schools need to find the time to re-establish what key pedagogical and didactical strategies they want to keep going forward. This will help them define what digital means are needed to sustain their new online and (hopefully imminent)

face-to-face teaching environments.

This raises an issue directly related to Turing's concerns: what role will AI and technologies in general potentially play in teaching/learning processes? AI is either going to support teachers' work or it's going to replace them. By the way, this is already happening to a degree, because our students are already using their smartphones every day to learn something; in an informal way, of course, but they are learning to walk on paths determined by different intelligences, be they natural (teachers, YouTubers, scholars, anyone who creates whatever kind of online materials) or artificial (applications, software programs, search engines, etc.).

Since the Neolithic age, human beings have interacted with nature and created tools, utensils and instruments. The German philosopher Gehlen (1988) said that humans are born premature, naked, unprotected, exposed and utterly helpless (Giri & Clammer, 2014, p. 52). Humans need technology to survive, live and evolve. But not in a technical sense. The transliteration of τέχνη in ancient Greek is *téchnē* but the real meaning is "art", in the sense of ability or expertise in doing something, in an intellectual or manual way. The evolution of humankind is based on a deep techno-anthropological connection.

Consequently, the education relationship between human beings and technology is not related to repetitive robotic actions, like the classic and unforgettable imagine of Charlie Chaplin in "Modern Times". Rather, it is founded on creating something new. Indeed, the acronym STEM is changing to STEAM, highlighting the role of the interaction between art and technology, between the ability to create a tool and give it a deep sense for humankind.

Some readers may be wondering why and in what way these reflections are related to school and, in particular, to teacher education issues. This special issue is focused on how to educate future teachers in innovative ways. We wanted to gather colleagues who have tested new methods and strategies that allow prospective teachers to face the current global challenges. However, our attention is not only focused simply on how technologies allow us to identify new perspectives but also on *why* we must multiply our efforts to give the teachers of future generations more intellectual and technical solutions in order to develop new meaningful learning environments. Innovation in teacher education means creating educational paths, where trainee teachers feel they are becoming part of a historical process in which past and present are continuously interwoven (Gadamer, 1979).

In several teacher education institutions around the globe, digital innovations are supporting the education of future teachers. Examples include the use of chatbots helping the learner to answer questions related to topics within physics and chemistry, employing digital games in order to simplify mathematical models, and the use of virtual learning environments supporting the development of students' oral presentation skills (Koops & Hoevenaars, 2013; Molnár & Szüts, 2018; Van Ginkel et al., 2020). Regarding this last example, recently conducted experimental studies reveal that students within teacher education are able to rehearse their presentations in front of virtual classrooms, theatrical environments and television studios (Van Ginkel et al., 2019). Furthermore, these VR tools provide the student with immediate or delayed feedback on aspects of presentation delivery such as eye contact, the use of voice, postures and gestures. Thus far, teachers have still been needed to translate the complex feedback reports delivered by the VR system to the individual student. However, new developments in education and technology have facilitated the translation of quantitative VR data on presentation performances into qualitative feedback messages that match the high standards of feedback in presentation research.

This leads us back to our original question: "*Can machines replace the teacher*"? Future studies in realistic educational settings are, therefore, required to answer this question.

As editors of this special issue, we not sought categoric answers to this fundamental question. The articles included in this issue investigate innovation in teacher education from different points of view in the endeavour to stimulate reflection: reflection about schools and teachers, universities and researchers, teacher

education programmes and teacher educators; reflection about the basic issues concerning the relationships among the different factors at play: teaching, learning, technologies, instruments, teachers, pupils, subjects, education.

In the first paper, Josef Buchner presents a study focused on the use of augmented reality to educate prospective teachers so that they will be able to orchestrate the implementation of AR in their own classrooms.

The subsequent two articles are dedicated to the use of MOOCs to enhance teachers' professional development. Selene Dodici, Maria Cecilia Reyes and Guglielmo Trentin present user reactions to participation in a multi-platform Interactive Massive Open Online Course (I-MOOC) whose design is based on an e-learning approach specifically conceived for teacher training in the use of technologies for educative and social inclusion. Orly Melamed and Rivka Wadmany analyse a MOOC designed and implemented to train student teachers in developing educational project plans based on new media and networked pedagogy.

The last two papers are aimed at showing the benefits of using video technology in teacher education. Giovanni Bonaiuti, Rossella Santagata and Giuliano Vivanet analyse the reactions and the comments of two groups, composed respectively of novice and experienced teachers, while they are watching video-recorded lessons, and compare the observation and interpretation skills of the two groups. Lastly, Marina De Rossi and Cinzia Ferranti focus their attention on the creation of videos as an educational strategy for developing trainee teachers' soft skills.

We hope this selection of articles will be inspirational for you, our readers, and prove beneficial for your further teacher training and research activity.

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