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Open and Interdisciplinary  
Journal of Technology,  
Culture and Education

*Special issue*  
From the Teaching machines  
to the Machine learning.  
Opportunities and challenges  
for Artificial Intelligence  
in education

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*Publisher*

Progedit, via De Cesare, 15

70122, Bari (Italy)

tel. 080.5230627

fax 080.5237648

info@progedit.com

www.progedit.com

qwerty.ckbg@gmail.com

www.ckbg.org/qwerty

Registrazione del Tribunale di Bari

n. 29 del 18/7/2005

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ISSN 2240-2950

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## Editorial

Valentina Grion\*, Graziano Cecchinato\*\*

DOI: 10.30557/QW000027

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Every day, we hear about new progress and new application areas of Artificial Intelligence. We hear about how AI is overtaking human skills in many of the most complex and sensitive activities and how it is transforming our daily life (Bostrom, 2017; Kelly, 2017; Diamandis & Kotler, 2020).

Education is not left out of this wave. Some argue that Artificial Intelligence has more potential to change education than any other technological advancements, and even though this has already been stated, the clues are that it could be true. Artificial intelligence is already playing a role in some of the core issues of education, such as in academic success prediction, in personalising learning, in tutoring students, in learning assessment (Zawacki-Richter, Marín, Bond, & Gouverneur, 2019). All these application fields raise sensitive issues that deeply involve education and educational research.

For these reasons, when we decided to devote this special issue to analyse the reality and the potential of Artificial Intelligence (AI) in all aspects and areas of Education (AIEd), we were confident to match the interest of the researcher's community. Quite the opposite, among all the papers, we received few submissions matching the core theme of the call.

Facing this situation, we think there is a need to reflect on whether this disinterest in the spreading of AI technologies in educational

\* University of Padua. Orcid: 0000-0002-2051-1313.

\*\* University of Padua. Orcid: 0000-0003-3020-4525.

Corresponding author: graziano.cecchinato@unipd.it

contexts does not imply the risk that the development and application of AI could lack pedagogical foundations.

Actually, only three contributions which are specifically linked to the theme of AI and its integration in the educational/didactic context have been accepted.

The first, the invited article by Bereiter and Scardamalia, discussing theoretical issues on AI, offers a particularly interesting point of view. The paper suggests that if on the one hand, AI can raise fears and perplexities because of its implications related to the dehumanisation of the teaching/learning relationship, on the other, it should also be interpreted as an area where we have to lead our students. The authors seem to advocate that, as educators, we should be able to create and offer our students an “AI protected space” provided by our educational supervision. A place where they can explore and experience contexts which will characterise and transform not only their (and our) professional life but also their and our social and personal ones. In light of this, Bereiter and Scardamalia propose an effective approach to the integration of AI in education. Essentially, they recall their previous idea about collaboration as a key-principle of the Knowledge Building Community (their original model of knowledge construction) to make it the core instrument for approaching AI in education. The capacity and the possibility for humans to collaborate with machines, in search of new and unimaginable constructions of knowledge, represents a fundamental educational challenge in today’s times: “Collaboration between skilled players and inventive machines” could produce an unbeatable team, the authors suggest.

Both the other two articles devoted to the AI topic focus on its application to improve assessment processes. Authors show that the used methods of automatic assessment/automatic feedback in a MOOC in the Persico’s article, and a summative assessment of an annotation system in the Cecchinato & Foschi article, represent added values for learning.

Besides this, a further three high-quality contributions on educational technology research enrich this special issue.

Trevisan and De Rossi propose an article of interest in this particular historical moment, in which a wide implementation of DAD represents a necessity due to the COVID emergency. Referring to the TPCK model, the authors address the problem to understand how teachers give meaning to technology and how we can support future teachers to integrate technology into their pedagogical reasoning.

Perucci, Khanlari and Cacciamani offer a contribution to understanding the instructor role compared to the tutor role in blended courses. Founding their analysis on the KBC model, the authors analyse the impact the two different figures have on students' interactions and on knowledge creation within the learning community.

The last article, written by Fabbri, explores students' perception about the efficacy of in presence or online educational contexts where students working in groups of peers have a role assigned, compared to the situations where they have chosen a role. The study results suggest that in students' opinion, an assigned role is more effective in reference to their learning, social dynamics and satisfaction with their experience.

We hope this special issue could represent a stimulus for our educational research community, to take charge of the new and potentially extraordinarily rich field of IA in education.

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## Editorial

La prise de conscience que l'intelligence artificielle (IA) représente un champ d'investigation particulièrement fructueux et que ses applications suivent un rythme très soutenu et irréversible est une conviction largement partagée. Tout comme l'ensemble des domaines des sciences humaines, l'éducation n'est pas exclue d'être profondément impliquée, à tel point que l'on émet l'hypothèse que l'IA pourrait avoir un impact plus important sur l'éducation que n'importe quelle avancée technologique antérieure. Par ailleurs, elle joue déjà un rôle central dans certaines des questions de fond en éducation, telles que la prédiction des résultats scolaires, la personnalisation de l'apprentissage, le tutorat des étudiants, l'évaluation (Zawacki-Richter, Marín, Bond et Gouverneur, 2019).

Pour ces raisons, lorsque nous avons décidé de consacrer ce numéro spécial à l'analyse de la place et du potentiel de l'IA dans l'éducation, nous étions convaincus de répondre à un intérêt majeur de la recherche. À l'inverse, parmi les nombreuses contributions reçues, très peu concernaient le thème central de l'appel, qui était précisément l'IA.

Face à cette situation, il paraît important de réfléchir aux retombées de ce désintérêt portant sur la diffusion de l'IA dans des contextes éducatifs, et plus particulièrement au risque que ses développements se déroulent sans le soutien nécessaire des connaissances développées dans la recherche en pédagogie.

Parmi les trois papiers présentés sur le thème de l'IA et ses intégrations dans un contexte pédagogique/didactique, l'article invité, de Bereiter et Scardamalia, offre un point de vue particulièrement intéressant. Si, en effet, le sujet peut soulever des craintes et des doutes quant à une déshumanisation de la relation enseignement/apprentissage, il doit également être interprété comme un domaine dans lequel il est nécessaire de superviser nos étudiants. Les auteurs invoquent leur idée antérieure de *collaboration* comme principe par excellence de leur Knowledge Building Community, et en font ainsi un outil incontournable pour aborder l'IA dans le domaine de l'éducation. La capacité et la possibilité de collaborer avec des machines à la recherche



de nouvelles et inimaginables constructions de connaissances représentent aujourd'hui, pour les deux auteurs, des enjeux pédagogiques fondamentaux.

Les formes de collaboration didactique avec les machines sont aussi celles proposées dans les articles de Persico et de Cecchinato et Foschi. Les deux papiers montrent comment l'utilisation de systèmes automatiques de feedback et d'évaluation peut améliorer l'apprentissage.

Trois autres contributions liées au domaine des technologies éducatives enrichissent ce numéro.

Trevisan et De Rossi, sur la base du modèle TPACK, abordent la question du sens que les enseignants attribuent aux technologies, et discutent de la manière d'aider les futurs enseignants à intégrer la technologie dans leur raisonnement pédagogique.

Perucci, Khanlari et Cacciamani nous aident à mieux comprendre les rôles d'instructeur et de tuteur dans les cours mixtes, en analysant comment les deux types d'interlocuteurs ont un impact différent sur les interactions d'étudiants et sur la création de connaissances au sein de la communauté d'apprentissage.

Le dernier article, rédigé par Fabbri, explore le thème du rôle assigné ou choisi par les étudiants dans un travail de groupe en face à face et en ligne.

Nous espérons que ce numéro de QWERTY incitera notre communauté de recherche en éducation à prendre en considération ce nouveau domaine très prometteur qu'est l'IA dans l'éducation.

## **Editoriale**

La consapevolezza che l'Intelligenza Artificiale (AI) rappresenti un campo d'indagine particolarmente fruttuoso e che le sue applicazioni stiano seguendo un ritmo vertiginoso e irreversibile è convinzione ampiamente condivisa. Come ogni ambito umano, l'educazione non è esclusa da un profondo coinvolgimento in questi processi, tanto che si ipotizza che l'IA potrebbe avere un impatto sull'educazione maggiore rispetto a qualsiasi precedente progresso tecnologico. D'altra parte,

sta già giocando un ruolo centrale in alcune delle questioni sostanziali in ambito educativo, come la previsione del successo accademico, la personalizzazione dell'apprendimento, il tutoraggio degli studenti, la valutazione (Zawacki-Richter, Marín, Bond e Gouverneur, 2019).

Per queste ragioni, quando abbiamo deciso di dedicare questo numero speciale all'analisi della realtà e delle potenzialità dell'IA in educazione, eravamo fiduciosi di incontrare l'interesse della comunità dei ricercatori. Al contrario, tra i tanti contributi ricevuti, solo pochissime proposte riguardavano il tema centrale della call, che era proprio l'AI.

Di fronte a questa situazione, potrebbe essere necessario riflettere sulle ragioni di questo disinteresse per la diffusione dell'IA nei contesti educativi e soprattutto considerare se questo non implichi il rischio che i suoi sviluppi si realizzino senza il necessario supporto di basi di tipo pedagogico.

Dei tre articoli focalizzati sul tema dell'AI e delle sue integrazioni in contesto educativo/didattico quello a cura di Bereiter e Scardamalia offre un punto di vista particolarmente interessante. Se, infatti, il tema può richiamare paure e perplessità per le sue implicazioni legate alla disumanizzazione della relazione insegnamento/apprendimento, d'altra parte dovrebbe anche essere interpretato come un ambito all'interno del quale è necessario condurre i nostri studenti. Richiamando la loro precedente idea di *collaborazione*, come principio per eccellenza della Knowledge Building Community, gli autori ne fanno uno strumento essenziale di approccio all'AI in ambito educativo. La capacità e la possibilità di collaborare con le macchine alla ricerca di inedite e inimmaginabili costruzioni di conoscenza rappresentano, per i due autori, sfide educative oggi fondamentali.

E paiono proprio forme di collaborazione didattica con le macchine quelle che vengono proposte negli articoli di Persico e di Cecchinato e Foschi. In entrambi si rileva come l'utilizzo di sistemi automatici di feedback e valutazione possa migliorare l'apprendimento.

Altri tre contributi relativi all'ambito delle tecnologie educative arricchiscono il presente numero.

Trevisan e De Rossi, basandosi sul modello TPACK, affrontano il tema del significato che gli insegnanti assegnano alle tecnologie e di

scutono come supportare i futuri docenti a integrare la tecnologia nei ragionamenti pedagogici.

Perucci, Khanlari e Cacciamani offrono un contributo per comprendere i ruoli di istruttore e tutor nei corsi blended, analizzando come le due figure impattino diversamente sulla creazione di conoscenza all'interno della comunità di apprendimento.

L'ultimo articolo, scritto da Fabbri, esplora il tema del ruolo assegnato o scelto dagli studenti nei lavori di gruppo, sia in presenza che on-line.

Ci auguriamo che questo numero di QWERTY possa rappresentare uno stimolo per la nostra comunità accademica, affinché si faccia carico del nuovo e potenzialmente molto promettente campo dell'IA in educazione.