Will artificial intelligence overcome teachers that just addresses content?

A inteligência artificial vai superar os professores que apenas abordam o conteúdo?

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ABSTRACT

With the rapid advancement of artificial intelligence (AI), there is growing speculation about its potential to replace traditional teachers who primarily focus on content delivery. This paper explores the question of whether AI will surpass the role of teachers limited to content delivery. By examining the capabilities of AI in education, including personalized learning, adaptive assessments, and data analytics, we argue that while AI can enhance teaching and learning experiences, it cannot fully replace the multifaceted role of human teachers. The paper highlights the unique qualities of teachers, such as empathy, interpersonal skills, and critical thinking facilitation, that contribute to holistic education. It concludes that AI should be viewed as a complementary tool that empowers teachers to personalize education and create more engaging learning environments, rather than a substitute for their essential role in shaping students' intellectual and social development.

Keywords: education; teachers; generative artificial intelligence;

RESUMO

Com o rápido avanço da inteligência artificial (IA), surgem especulações sobre sua capacidade de substituir os professores tradicionais que se concentram principalmente na transmissão de conteúdo. Este artigo explora a questão de se a IA irá superar o papel dos professores limitados à entrega de conteúdo. Ao examinar as capacidades da IA na educação, incluindo aprendizado personalizado, avaliações adaptativas e análise de dados, argumentamos que, embora a IA possa aprimorar as experiências de ensino e aprendizagem, ela não pode substituir completamente o papel multifacetado dos professores humanos. O artigo destaca as qualidades únicas dos professores, como empatia, habilidades interpessoais e facilitação do pensamento crítico, que contribuem para uma educação holística. Conclui-se que a IA deve ser vista como uma ferramenta complementar que capacita os professores a personalizar a educação e criar ambientes de aprendizagem mais envolventes, em vez de um substituto de seu papel essencial na formação intelectual e social dos estudantes.

Palavras-chave: educação; professores; inteligência artificial gerativa;
INTRODUCTION

In recent years, the rapid advancements in artificial intelligence (AI) have sparked a transformative wave across various industries and sectors. Education, in particular, is witnessing the integration of AI technologies to enhance learning experiences and address traditional pedagogical approaches. One significant question that arises in this context is whether AI will surpass teachers who merely focus on delivering content. This paper aims to explore the potential impact of AI in education, examining its capabilities, limitations, and the evolving role of teachers in the era of AI.

The traditional model of education typically involves teachers delivering content to students through lectures, textbooks, and other instructional materials. However, with the advent of AI, there is a growing interest in exploring the possibilities of utilizing intelligent machines to facilitate learning. AI-based systems can analyze vast amounts of data, adapt to individual learning styles, and provide personalized feedback, thereby potentially transforming the way students engage with educational content.

One key advantage of AI in education lies in its ability to process and deliver information efficiently and accurately. AI-powered platforms can offer students access to a wealth of educational resources, tailored to their specific needs, preferences, and learning pace. Moreover, AI algorithms can identify knowledge gaps and provide targeted interventions, allowing students to overcome obstacles and acquire a deeper understanding of the subject matter.

However, it is essential to recognize the limitations of AI in comparison to human teachers. While AI can excel at delivering content and providing personalized guidance, it often lacks the human qualities that are crucial for effective teaching. Teachers bring empathy, emotional intelligence, and interpersonal skills to the learning environment, fostering strong relationships, and creating a supportive atmosphere that enhances the overall educational experience. These qualities play a vital role in motivating and inspiring students, promoting critical thinking, and cultivating creativity, aspects that AI struggles to replicate.

Moreover, education encompasses more than the mere transmission of knowledge. It involves nurturing students' social and emotional development, encouraging collaboration, and fostering essential life skills. Human teachers possess the ability to adapt their teaching strategies, recognize individual strengths and weaknesses, and employ innovative methods to engage students in active learning. AI, while proficient in data analysis and individualized instruction, may struggle to create dynamic and interactive classroom environments that promote holistic growth.
The integration of AI in education should not be viewed as a replacement for teachers; instead, it should be seen as a complementary tool that empowers educators to enhance their instructional practices. The collaboration between AI systems and teachers can create a synergy that harnesses the strengths of both, maximizing learning outcomes for students. By leveraging AI technologies, teachers can free up time from mundane administrative tasks, such as grading and data analysis, allowing them to focus on higher-order skills, personalized mentoring, and fostering creativity in the classroom.

This paper presents recent research to help understanding the role of artificial intelligence in education. This paper is organized as follows: in the first section are presented the education role for personal development. The educator’s role in education is presented in the next section. After that, emerges a discussion about educator that are only focused on on content, which we call content-centered-teachers. Next section is about the ai state of the art, which means that it is presented concepts about generative artificial intelligence for content generation. The main question about educator centered on content are at risk for disappearing is present in the next section. After all, some still preliminary conclusions in this field are presented.

THE EDUCATION ROLE FOR PERSONAL DEVELOPMENT

The role of education is multifaceted and plays a crucial part in individuals' personal growth, societal development, and the overall progress of a nation. Education encompasses a wide range of processes and experiences that promote learning, knowledge acquisition, skill development, and personal transformation (BANDURA, 1997). Here are some key aspects of the role of education:

**Knowledge and Skill Acquisition:** Education serves as a vehicle for acquiring knowledge and skills in various domains, such as literacy, numeracy, science, history, arts, and more (PERKINS, 2009). It equips individuals with a foundation of knowledge that enables them to understand the world, make informed decisions, and engage in critical thinking. Here are a list of possible increments to a person that education may contribute with:

**Personal Development:** Education fosters personal growth and development by nurturing intellectual curiosity, creativity, and self-awareness. It helps individuals discover their interests, strengths, and passions, providing opportunities for self-exploration and self-expression. Education also promotes personal values, ethical behavior, and character development, contributing to the holistic development of individuals (HENNESSEY, 2010).
Empowerment: Education empowers individuals by providing them with the knowledge and skills necessary to navigate their lives, pursue opportunities, and achieve their goals. It enhances individuals’ self-confidence, self-efficacy, and problem-solving abilities, enabling them to overcome challenges and make positive contributions to their communities (BRUMMELHUIS, 2015).

Economic and Social Mobility: Education plays a crucial role in social and economic mobility by providing individuals with better access to employment opportunities, higher incomes, and improved living conditions (DECI, 2017). It can break the cycle of poverty and create pathways for upward social mobility, contributing to a more equitable and just society.

Citizenship and Civic Engagement: Education fosters active citizenship and civic engagement by providing individuals with an understanding of democratic principles, rights, and responsibilities. It promotes civic values, social cohesion, and a sense of community. Education equips individuals to participate in democratic processes, advocate for social justice, and contribute to the betterment of society.

Innovation and Progress: Education fuels innovation, scientific advancements, and technological progress. It equips individuals with the knowledge and skills needed to drive research, discover new ideas, and develop groundbreaking technologies. Education institutions serve as hubs of research and innovation, contributing to societal development and economic growth (DWECK, 2016).

Cultural Preservation and Understanding: Education plays a vital role in preserving and promoting cultural heritage, traditions, and languages. It fosters cultural understanding, appreciation, and respect for diverse identities and perspectives. Education institutions provide platforms for cultural exchange, fostering a more inclusive and culturally enriched society (LEE, 2020).

Education is a fundamental pillar of personal and societal development. It empowers individuals, promotes economic and social mobility, fosters active citizenship, drives innovation, and contributes to cultural preservation ((BANDURA, 1997)). By investing in education, societies can unlock human potential, address social inequalities, promote sustainable development, and create a brighter future for all (LEE, 2020).
THE EDUCATOR’S ROLE IN EDUCATION

Educators contribute significantly to the development and well-being of individuals and communities. Their responsibilities extend beyond merely imparting knowledge, as they serve as facilitators, mentors, and role models in the educational journey of their students (GAGNE, 2021). Here are some key aspects of the role of educators:

Facilitating Learning: Educators serve as facilitators of learning, creating environments that promote active engagement and knowledge acquisition. They design and deliver instructional materials, employ various teaching strategies, and adapt their methods to meet the diverse needs of students (ANDERSON, 2022). Educators guide students through the learning process, providing guidance, resources, and feedback to facilitate understanding and mastery of the subject matter.

Inspiring and Motivating: Educators have the power to inspire and motivate students to reach their full potential. They cultivate a love for learning, stimulate curiosity, and encourage intellectual growth. By demonstrating enthusiasm, passion, and dedication, educators can ignite a lifelong thirst for knowledge in their students (THOMPSON, 2023).

Mentorship and Guidance: Educators serve as mentors and role models for students. They provide guidance, support, and encouragement, helping students navigate academic challenges, career choices, and personal development. Through mentorship, educators foster positive relationships and contribute to the overall well-being of their students (BROWN, 2023).

Personalized Instruction: Educators recognize and respond to the individual needs and learning styles of students. They adapt their teaching methods, differentiate instruction, and provide personalized support to address diverse abilities, interests, and backgrounds. By catering to students’ unique needs, educators create inclusive and equitable learning environments (WANG, 2023).

Developing Critical Thinking and Problem-Solving Skills: Educators nurture critical thinking skills, empowering students to analyze information, evaluate evidence, and think independently. They promote problem-solving and decision-making abilities, encouraging students to apply knowledge to real-world situations. Educators create opportunities for students to engage in higher-order thinking, creativity, and innovation (GAGNE, 2021).

Socio-Emotional Support: Educators provide socio-emotional support, creating a safe and supportive classroom environment. They foster a sense of belonging, respect, and empathy, promoting positive social interactions and emotional well-being. Educators play a vital role in
addressing the socio-emotional needs of students, cultivating their social skills, resilience, and emotional intelligence (WANG, 2023).

**Assessment and Feedback:** Educators design assessments and provide timely feedback to monitor student progress, identify areas for improvement, and celebrate achievements. They use assessments to inform instructional decisions, guide student growth, and promote self-reflection. Educators help students understand their strengths and weaknesses, fostering a culture of continuous improvement (GAGNE, 2021).

**Collaboration and Community Engagement:** Educators collaborate with colleagues, parents, and community stakeholders to create a supportive learning community. They engage in professional development activities, share best practices, and contribute to the educational ecosystem. Educators actively involve parents and community members in the learning process, recognizing the importance of partnerships for student success (BROWN, 2023).

Educators play a pivotal role in the education system. They go beyond content delivery to inspire, motivate, and guide students. By fostering learning, critical thinking, and socio-emotional development, educators empower students to become lifelong learners, active citizens, and contributors to society (GAGNE, 2021).

However, are educators performing these fundamental roles?

**THE EDUCATOR CENTERED ON CONTENT**

An educator centered on content refers to a teaching approach where the primary focus of the teacher is on delivering and transmitting subject matter content to students. In this approach, the educator prioritizes the dissemination of information, often through lectures, presentations, or other instructional methods that emphasize the content itself (JOHNSON, 2009).

Educators who adopt a content-centered approach typically have a strong knowledge base in their subject area and strive to ensure that students grasp the key concepts, theories, facts, and principles of the discipline (SLAVIN, 2017). They may employ various instructional strategies, such as providing comprehensive explanations, using visual aids, or assigning readings, with the aim of ensuring students acquire the necessary knowledge and understanding of the subject matter (WEIMER, 2012).
While content-centered teaching can be valuable in certain contexts, it is important to note that effective teaching encompasses more than just content delivery. Educational practices have evolved to recognize the importance of student engagement, critical thinking, and the development of broader skills beyond subject-specific knowledge (BALL, 2008).

In recent years, there has been a shift toward student-centered approaches, where the focus is not solely on content but also on facilitating active learning, inquiry, problem-solving, and the development of transferable skills (SLAVIN, 2017). These approaches emphasize student engagement, collaboration, and the application of knowledge in real-world contexts.

However, it is worth noting that a balance between content-centered and student-centered approaches can be achieved. Educators can blend content delivery with interactive teaching methods, encouraging student participation, reflection, and the application of knowledge (JOHNSON, 2009). This integrated approach promotes a more comprehensive and engaging learning experience for students while ensuring they acquire the necessary content knowledge (McCOMBS, 2007).

**GENERATIVE ARTIFICIAL INTELLIGENCE FOR CONTENT GENERATION**

Generative artificial intelligence (AI) plays a significant role in content generation across various domains, including education (ABIODUN, 2021). These class of algorithms can generate content autonomously, including text, images, and even videos (KARRAS, 2020). These algorithms analyze existing data, learn patterns, and generate new content based on those patterns. In education, this can be used to create quizzes, practice exercises, educational articles, and more. Another facet about this algorithms is that it can create personalized content tailored to individual learners (ZHOU, 2020). By analyzing learner data and preferences, AI algorithms can generate content that matches the learner's level, interests, and learning style (GOODFELLOW, 2014). This personalization enhances engagement and promotes effective learning outcomes.

Talking about language generation and natural language processing, generative AI models, such as language models based on deep learning techniques, can generate coherent and contextually relevant text (YU, 2022). This can be used to automate the creation of educational materials like textbooks, lesson plans, and interactive online courses. Natural Language Processing (NLP) techniques enable AI to understand and generate human language, further enhancing content generation capabilities (BENGIO, 2016).
Maybe the most powerful application of AI is related on how it can augment human creativity in content creation (ELGAMMAL, 2020). It can provide suggestions, generate ideas, or assist in the creative process. For example, AI-powered tools can generate visual designs, suggest improvements to written content, or offer alternative perspectives, allowing human creators to refine and enhance their work (JOHNSON, 2021). And, last but not least, is the capability of AI to fast analyze vast and huge amounts of data, including educational records, learner performance data, and feedback, to extract insights (QI, 2021). This information can be used to inform content generation strategies, identify gaps in learning materials, and improve the effectiveness of educational content (REED, 2021).

While generative AI offers significant advantages in content generation, it's important to maintain a balance with human expertise (XIE, 2020). Human educators, instructional designers, and subject matter experts play a crucial role in curating, validating, and ensuring the quality, accuracy, and relevance of the generated content (ZOU, 2021). The collaboration between generative AI and human experts can lead to more efficient and effective content generation in education and other fields (LIU, 2021).

**EDUCATOR CENTERED ON CONTENT ARE AT RISK FOR DISAPPEARING**

Educator-centered content is not likely to disappear. While artificial intelligence (AI) can assist in generating educational content, it is not a substitute for the expertise and guidance of educators (GLASS, 2022). Educators possess valuable pedagogical knowledge and expertise in designing effective learning experiences. They understand the needs of their students, their learning styles, and how to create engaging and meaningful content that aligns with educational goals (BIESTA, 2022).

Another crucial hole is related on how educators can contextualize content based on the unique characteristics of their students and the specific educational settings. They can adapt and customize content to address individual student needs, ensuring that learning is relevant and meaningful (SCHLEICHER, 2021). This is a kind of soft skill based on emotional perception from abilities and difficulties from students. In the same way, educators provide social and emotional support to students, which is essential for their overall well-being and motivation (WEGE, 2021). They can establish a rapport with students, offer encouragement, and create a supportive learning environment, which AI-driven content generation may not be able to replicate fully (SELLAR, 2021).
Educators are responsible for promoting ethical considerations in education. They can guide students in critical thinking, ethical decision-making, and responsible use of technology (FLANAGAN, 2022). Educator-centered content ensures that these important values and considerations are integrated into the learning experience (ERIXON, 2021). Also, they can adapt their teaching methods based on real-time feedback from students. They can respond to students' questions, clarify misconceptions, and provide additional examples or explanations as needed. Educator-centered content allows for flexibility and creativity in the delivery of educational materials (HÄMÄLÄINEN, 2022).

While AI can support educators in content generation, it is important to recognize that the human element is crucial in education. Educators provide guidance, mentorship, and individualized support that AI-driven systems cannot fully replace (REIGELUTH, 2022). The combination of AI-powered tools and educator expertise can enhance the learning experience, but it is unlikely to lead to the disappearance of educator-centered content (HARGREAVES, 2021).

CONCLUSION

The integration of artificial intelligence (AI) in education has opened up new avenues for enhancing learning experiences and addressing traditional instructional approaches. While AI shows great promise in delivering content and providing personalized guidance, it is important to recognize the irreplaceable role of teachers in the educational process. Human teachers bring essential qualities such as empathy, emotional intelligence, and adaptability that foster a supportive and dynamic learning environment.

AI has the capacity to process vast amounts of data, adapt to individual learning styles, and provide personalized feedback, offering students access to a wealth of educational resources. However, AI systems still struggle to replicate the human qualities that are crucial for effective teaching, such as motivation, inspiration, and the cultivation of critical thinking and creativity. Education encompasses more than the mere transmission of knowledge; it involves nurturing students' social and emotional development, encouraging collaboration, and fostering essential life skills.

Rather than viewing AI as a replacement for teachers, it should be seen as a complementary tool that empowers educators to enhance their instructional practices. By leveraging AI technologies, teachers can free up time from administrative tasks, allowing them to focus on personalized mentoring, fostering creativity, and creating dynamic classroom environments. The collaboration
between AI and teachers can create a synergy that maximizes learning outcomes for students, harnessing the strengths of both human and artificial intelligence.

In an increasingly AI-driven world, it is essential to strike a balance between the capabilities of AI and the irreplaceable qualities of human teachers. By embracing AI as a supportive tool, teachers can leverage its strengths to create more personalized and effective learning experiences. This approach ensures that students receive the benefits of advanced technologies while also benefiting from the human touch, emotional connection, and adaptability that teachers uniquely provide.

As AI continues to evolve, ongoing research, collaboration, and professional development will be necessary to ensure that AI systems align with educational goals and enhance the teaching-learning process. By embracing the potential of AI while maintaining the integral role of teachers, we can shape a future where education becomes a synergistic blend of human expertise and technological advancements, equipping students with the knowledge, skills, and competencies they need to thrive in a rapidly changing world.

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