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New Frontiers in Creativity, Learning, and Technology Research

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ABSTRACT

This article offers a brief introduction to the special issue 'New frontiers in creativity, learning, and technology research' by situating the topic and explaining the events and previous publications that led to this new edition. It then gives an overview of the 12 papers included in the present collection and groups them under four main themes: a) conceptual overviews and ongoing research; b) teaching online in times of COVID-19; c) online platforms and virtual environments; and d) digital tools for creativity. It ends with final reflections about the value of exploring new frontiers in the emerging, interdisciplinary field of creativity, learning and technology studies.

KEYWORDS:

creativity, learning, technology, online platforms, digital resources

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In a (post)pandemic world there is little doubt that technology is an integral part of our life, shaping not only how we work and communicate but also how we learn, teach, and create. Education in particular has been transformed by the pandemic or, at the very least, its transformation has been accelerated. Online teaching moved from occasional to mandatory in most places, digital resources turned from a luxury into a necessity, the push to help students make the most out of technologically mediated learning became the norm. In many ways, teachers and students alike were forced, since early 2020, to be creative in how they approached their tasks and orchestrated their interactions. The years that follow will be dedicated to a sustained reflection about who succeeds in this new environment and how, and who fails and why. Technology is, after all, a tool, one that we don't all have at our disposal, one that is not always easy to use (or learn how to use), and one that facilitates certain processes while hindering others. Our focus in this special issue is to examine how learning and creativity – and especially creative learning – are impacted by technology in and beyond the context of COVID-19.

This special issue grew out of a highly successful International Seminar on 'New frontiers in creativity, learning, and technology research', hosted as an online event in December 2020 as part of the series of conferences co-organised by the Webster Center for Creativity and Innovation (WCCI), at Webster University Geneva, and the Centre for the Science of Learning and Technology (SLATE), at the University of Bergen. Contributions to the first event in this series, held in December 2017 on the general topic of 'Creativity, learning, and technology', have been published as a special issue by the *Creativity Research Journal* (volume 32, issue 1) and, later on, turned by Routledge into a book (*Creative learning in digital and virtual environments: Opportunities and challenges of technology-enabled learning and creativity*; Glăveanu, Ness & de Saint Laurent, 2020). The present special issue marks three years since the original event and both expands and deepens the theoretical reflections and empirical examples discussed at that time. With an enlarged and truly international set of contributions, the current special issue aims to explore the newest frontiers in what is by now an emerging, interdisciplinary field of study: creativity, learning, and technology research.

The 12 papers brought together in this edition are tentatively grouped around four main themes: a) conceptual overviews and ongoing research; b) teaching online in times of COVID-19; c) online platforms and virtual environments; and d) digital tools for creativity. These capture some important points of focus for the community of academics and practitioners engaged in this area, interests that range from the theoretical to the applied. Some key questions run through the articles, questions such as:

1. How exactly does the use of technology shape the way we learn and what is the nature of its impact on creative expression?
2. What new technologies and digital practices contribute to cultivating creative forms of learning?
3. Are these technologies equally impactful at an individual and group level?
4. How has the COVID-19 pandemic shaped our relation to technology and the processes of creative learning?

5. What is the role played by online platforms in creativity and learning?
6. How can we build new and effective tools for creative learning inside and outside of the classroom?

In their paper on technology as a socio-material mediator, Basu and Beghetto (this issue) proposed an insightful theoretical framework that articulates the relation between creative learning and technology use. They argued for an ongoing cycle between primary and secondary creativity (or personal and social creativity) and between the material and the digital. The various transformations of ideas and practices within this cycle depend on technology and can have unexpected, emergent outcomes for both creators and their audiences. But can technology move from being a mediator to being a (co)agent in the creative process? Lubart, Esposito, Gubenko, Kirsch, Smilek & Houssemand (this issue) offered an interesting perspective in this regard by inquiring into how robots interact with humans in order to accomplish creative work. The distinguished three types of relations: a) human creativity being supported by robots; b) social robots being supported by humans; and c) relations marked by complementarity contributions from humans and robots in which there are moments of co-creation.

The 'worldmaking' attributes of the relations between creativity, learning, and technology were discussed at length by Valquaresma and Coimbra (this issue). Starting from a solid constructivist foundation, the two authors explored the individual and sociocultural influences that frame these phenomena and give birth to a range of developmental possibilities. In this context, technology as a cultural tool can be used to nurture creative learning, particularly on the radically changed background of a global epidemic. And it is precisely this setting that helps us remember that creativity and learning are agentic processes and, therefore, they require self-regulation resources and strategies. The article by Zielińska, Lebuda, Jankowska and Karwowski (this issue) reminds us that people learn and create when they are confident they can and when they value these activities. Their longitudinal study revealed the importance of self-regulatory strategies for the relation between divergent thinking, creative confidence, and creative learning. The question is: how do we cultivate such strategies in education?

This is a particularly relevant question in the context of COVID-19 and its answer cannot focus us on the individual alone, we need to understand the social, economic and political constraints the person lives with. A powerful reminder of how these factors can end up squashing creative confidence and self-efficacy is offered by Souza Neves-Pereira who talked about the possibilities and impossibilities of teaching online in times of COVID. Focusing on the situation in Brazil, she showed that we cannot take for granted the power of creativity to 'save the day', especially when dealing with historically marginalized populations and with people living on the edge of poverty. There are important ethical dimensions to our discussions of remote education during the pandemic that need to be acknowledged and addressed. We also need to know if teaching online is effective for a range of topics and not only assume that it will have to do, given the circumstances. Shimizu, Yomogida, Shijun and Okada (this issue) provided such evidence through a yearlong longitudinal

study of an art program. Focused on the themes of material engagement, inspiration, exploration and motivation, the authors documented improvements in the participants' creativity anxiety, divergent thinking, and openness to other people, among others. Online environments are not always ideal for teaching so we need ongoing research to understand best practices.

This special issue showcases several articles that take a closer look at online platforms and creative behaviour in order to help us address, in an empirical manner, the concerns noted above. For instance, Ceh and Benedek (this issue) conducted a study to uncover, in the context of the COVID-19 pandemic, which online outlets people use to share creative work and why they use them. They discovered that creative work is posted online at least a few times per year, particularly related to cooking, visual art and literature, and that YouTube, Facebook and Instagram are the three platforms with the highest familiarity and usage among participants. Interestingly, this research also helps us understand why people share creative work online with motivators ranging from the need to be connected with friends and followers to the heightened accessibility of the platform. It is useful as well to explore specifically the uses of social media in a context like education. Rezende Vilarinho-Pereira, Koehler and de Souza Fleith (this issue) conducted a systematic literature review for this purpose. What they found was that simply adding social media to a classroom experience doesn't manage to enhance the potential for creative learning – it is in how teachers and students use such platforms that we can find support for creativity development. One of the key benefits of this kind of technology use had to do with feedback and being able to share creative outcomes, even if documented cases of co-creation online were rarer. It is to be noted that such uses can also foster student empowerment, feeling of ownership and visibility, and are often adapted to the lifestyle and practices of younger generations.

Particular questions arise from such studies and reviews, one of them being how students actually feel when exploring the digital world, for instance in virtual environments. In their study, Agnoli, Zenari, Mastria and Corazza (this issue) examined the impact of different types of virtual environments on creative performance and considered the role of emotional reaction and personality traits (e.g., openness). It emerged that participants ideas were more original when positive affect increased as a consequence of being in a positive virtual environment. This study thus paves the way for unpacking the complex relations between technology use, emotion, and individual differences. At the same time, we know from experience that people often create and learn online as part of groups and teams so how do virtual teams operate and how can we help them become more creative? Reiter-Palmon, Kramer, Allen, Murugavel and Leone (this issue) reviewed the literature on virtual teams, virtual meetings, and creativity and stressed both the opportunities (e.g., meet anywhere, anytime, with just about anyone) and challenges (e.g., multiple modality contributions converging, simultaneously competing for human attention) associated with creating online, together. They also set out an important agenda for future research in this area.

Last but not least, we have the question of application and the necessity to develop concrete technology-based tools that support creativity and learning. In this regard, Toumi, Girandola and Bonnardel (this issue) focused on the case of design and the kinds of physical and virtual environments

that support cognitive and social processes needed to create. For instance, multiplayer games can be useful to enhance creativity but require a good empirical basis for studying the techniques that work and the pitfalls to be avoided. It becomes thus essential to understand not only the tool but the process of co-creating technological tools for learners and creators. Kynigos and Daskolia (this issue) documented such a process of boundary crossing in the design of digital resources for teaching and learning about climate change. They showed, for instance, how diverge groups can come together to exchange perspectives and work on technologies that help others understand complex societal challenges.

There is a great richness of ideas, theoretical approaches and empirical fieldworks showcased in this special issue. Important questions are being raised, answered, and new questions emerge as part of the investigation. It is certain that a field as complex as creativity, learning, and technology studies is nourished by new questions and investigations, especially at times of such radical societal change. In the end, we can ask what is on the horizon for this area of research and practice, based on the articles published in this edition. Without aiming to be exhaustive, here are a list of concerns that transpire in one or more of the papers and that we believe will continue to guide future investigations and theoretical developments:

- There is a clear acknowledgment of the fact that technology can play either positive or negative roles when it comes to creativity and learning and that we must understand both in order to foster the positive and reduce the negative;
- This impact of technology is differentiated according to: a) the type of platforms (e.g., social media) and digital environments (e.g., virtual reality) we are taking about; b) individual differences when it comes to users (e.g., personality traits, motivation, emotion); c) the educational aims and practices that incorporate technology; and d) the wider social, cultural, economic and political contexts in that incorporate person, technology, and education;
- Group processes are also extremely important and a key topic for further investigation as most of the times people, including in education, use technology collaboratively or can increase their capacity for creative learning by doing so;
- Also important is an understanding of the impact of inequality, poverty, and oppression when it comes to being creative or learning online. Not only is it the case that many students around the world don't have access to online tools and technologies to begin with but, even for those who do, the concern might be for immediate survival rather than creative growth;
- A final, underlining question has to do with the integration between humans and technology. We have been living technology enriched lives for a long time and, indeed, we have been tool makers since the start of our species, but the rapid developments we are witnessing today leave little time for reflection and adaptation. It is imperative, thus, to develop a sustained, critical and ethical inquiry into what technology makes possible for creating, learning, and living.

Time of crisis are also times of opportunity. The COVID-19 pandemic will not make us all expert users of technology and, especially, creative users who learn and produce things online as much (or more) than we do offline. If anything, though, it gives us the opportunity to think about the relations between creativity, learning, and technology, their intersections, possibilities, and limitations. It is towards this reflection that we edited this special issue and we are grateful to all the contributors as well as Maciej Karwowski and the team from Creativity. Theories – Research – Applications who welcomed this project and supported us along the way. Horizons are momentary, leaving way to a new skyline as soon as we approach them. This issue and the ideas within it are a new stage of a wider, ongoing dialogue we are happy to continue.

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