THE FUTURE OF INNOVATION AND TECHNOLOGY IN EDUCATION

EMERALD STUDIES IN HIGHER EDUCATION, INNOVATION AND TECHNOLOGY

Series Editors: Miltiadis Lytras and Anna Visvizi

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THE FUTURE OF INNOVATION AND TECHNOLOGY IN EDUCATION: POLICIES AND PRACTICES FOR TEACHING AND LEARNING EXCELLENCE

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Contents

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Acknowledgements

This edited volume reaches the audience at a time ripe with tensions and uncertainties, at a time filled with poignant questions of how to respond effectively to challenges our societies are exposed to on a daily basis. This book suggests that education is the answer. However, this volume argues as well that for education to bear results, dialogue, conversation and critical reflection are needed. This edited volume is an outcome of precisely this process. As researchers, educators, editors, consultants and citizens, we embark on a continuous dialogue, conversation and reflection on the state of education and the ways of improving it for the benefit of the society. Therefore, we are grateful to the contributing authors, by now our colleagues and friends, who responded to our invitation to join this conversation on the role information and communication technology can play in education, especially that the stakes have never been higher. We would like to thank you all for your hard work and for your patience and diligence. We are hopeful that we will be able to continue this discussion in different contexts soon. We are grateful to the publisher and the entire team that dealt with the book content, including the arduous process of typesetting and making the book look as terrific as it does. We appreciate that our ideas concerning the cover had been listened to and dealt with in a beautiful manner. This book required considerable effort on the part of all authors and, us, the editors.

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Anna Visvizi, Miltiadis D. Lytras and Linda Daniela
Editors

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Introduction

The Future of Innovation and Technology in Education: A Case for Restoring the Role of the Teacher as a Mentor

Anna Visvizi, Miltiadis D. Lytras and Linda Daniela

The past two decades have proved that, also in the twenty-first century, peace, prosperity and wellbeing are not to be taken for granted and that our societies continue to be challenged with a plethora of issues and developments that undermine coherence and stability of socio-economic systems worldwide. The question, thus, is: What is there to be done to make our societies more resilient to those challenges and their adverse implications. This book suggests that education is the key. However, while making a case for education, this volume highlights as well that a considerable rethinking of contemporary education model is needed if education is to make our societies more resilient to the challenges generated by the twenty-first century.

In other words, this edited volume makes a point of restoring the role of the teacher and professor as a mentor. This volume argues, therefore, that it is imperative to move away from the current model of education based largely on emphasis on passive instruction and excessive assessment. Arguably, this volume promotes a turn towards conversation and reflection between the learner and the mentor. This volume advocates a shift towards a dialogue geared towards inducing the learner with worldviews, skills and ethical stance conducive to the development of open, inclusive societies respectful of freedom, liberal values and good governance. Recent advances in information and communication technology (ICT) offer a variety of opportunities to do just the same.

Hence, the chapters included in this volume explore the question of how advances in ICT impact education at times when the imperative of better and more education becomes as salient as never before. The implicit question in each of the chapters included in this volume is how ICT can garner more excellence in teaching and learning. To put it differently: What is it that the community of teachers, professors, researchers, academics, students and learners can do to

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enhance the teaching and learning experience and thus benefit their families and the society at large?

This volume comprises 20 chapters, including the present one. The chapters have been organised into three broad sections focussing on, respectively, (1) learning innovation for digital economy and sustainable development; (2) the use of ICT for teaching, learning and assessment and (3) case studies documenting recent ICT-driven developments in education systems worldwide. The volume concludes with a bitter–sweet review of current developments and trends that shape the education landscape worldwide. The saddening depiction of reality notwithstanding, the concluding chapter outlines ideas and a guideline for the future. This *manifesto* indeed serves as an invitation to a thorough debate, organised research and policy responses.

The discussion in this volume opens with Chapter 1, titled 'How to Predict the Unpredictable: Technology-enhanced Learning and Learning Innovations in Higher Education' by Linda Daniela, Anna Visvizi and Miltiadis D. Lytras. The thrust of the argument the authors develop can be summarised as follows: The processes of digitisation and rapid development of new sophisticated technologies require the society to respond and make meaningful decisions promptly. This suggests that that the competence to predict the unpredictable is needed if our societies are to be able to resist the plethora of challenges they are exposed to on a daily basis. In context of the debate on education, this means that the educational environment must to a certain extent be able to predict what has not yet existed and cannot be verified. To what extent technology-enhanced learning in a higher education (HE) can contribute to that? By elaborating the outcomes of a pilot study, the authors dwell on this issue.

In Chapter 2, titled 'Focus on the Agency of Learners to Innovate in Pedagogy', Marc Nagels, Marie-Hélène Abel and Fatiha Tali argue that today pedagogy does not innovate by proposing new methods but by creating learning conditions conducive to the autonomy of learners. In training, students learn to set goals for acquiring knowledge, control their activity and persevere in the face of difficulties. Innovative teachers favour an integrative approach to human activity to jointly develop the relationship with the learning environment or work environment, the socio-cognitive characteristics of learners and their sense of responsibility for the consequences of action and metacognitive management of the activity. Learners thus evolve in a learning eco-system that includes not only the learner himself but also his physical and social environment: his tools available (notepad, tablet, etc.), his resources (procedures, methods, instructions, course materials, notes, documentation, etc.) and its partners who also have some knowledge (pair, teachers, expert network, colleagues, etc.). This ecosystem can be seen as a virtual learning space in which technologies that contribute to learning (hardware, software and network) are used with the aim of fostering interactions between stakeholder and content communities. The knowledge is distributed and accessible through the memory of the learner himself or through his tools, resources or partners. It is therefore in the elaboration of the learning mechanism mobilising all the actors to meet the needs of the learners that the innovation can be efficient and effective.

In Chapter 3, titled 'A Review of Educational Innovation from a Knowledge-building Pedagogy Perspective', knowledge-building (KB) pedagogy is a framework that promotes collective inquiry. The authors, Calixto Gutiérrez-Braojos, Jesús Montejo-Gámez, Ana Eugenia Marín-Jiménez and Fátima Poza-Vilches, elaborate on KB pedagogy framework and principles that define KB pedagogy. The aim of this chapter is to examine the influence that these principles have on KB and the importance of technology in such investigations, in order to understand the research trends on this pedagogy. Results of this research suggest the addition of the sixth principle in the KB pedagogy, that is, a technological principle. The latter highlights that KB is mediated by technology, which in turn facilitates communicating and sharing ideas within a community.

Chapter 4, is devoted to the examination of agile digital skills for digital economy. The authors, Fragkiskos Filippaios and Vladlena Benson, examine knowledge and social capital management frameworks through social networking to argue that emerging technologies make new graduates more employable. Social media is one such technology. Although emerged as a leisure communication medium, it has reached business and entrepreneurial spaces. Yet, few business schools maintain an innovation-led approach to teaching their graduates (particularly destined for leadership roles such as MBAs) social networking skills. In addition to career management opportunities reflected through social capital formation, social network has the potential to serve as a knowledge-accumulation platform and enable lifelong learning. This chapter proposes such framework and opens further questions for researchers for investigation.

In Chapter 5, Saad Haj Bakry explores the question of innovation in higher education as seen through the perspective of sustainable development. The argument in this chapter looks forward towards enhancing 'sustainable development', using 'innovation' enabled by 'higher education' institutions (HEIs). Therefore, sustainable development is the 'target'; innovation is the 'means' and higher education is the 'enabler' of the means for achieving the target. The chapter starts by addressing the 'target' through explaining the 'long time scale' and the 'wide scope of issues' of sustainable development, in addition to elaborating on the past efforts, and considering the current directions expressed by the 'sustainable development goals'. It then moves on to the 'means' that is the innovation that drives sustainable development, considering its various types and its correlated components given by the 'Global Innovation Index'. Higher education, as an important enabler of innovation, is then addressed by considering its impact, its missions and its contribution to innovation, in addition to its challenges and the future development. The chapter finally emphasises views on the future role of 'higher education' in promoting 'innovation' towards enhancing 'sustainable development'. The discussion in this chapter closes Part I of the volume that examines issues and processes that emerge at the intersection of ICT, ICT-enhanced teaching and learning and the society. Against this backdrop, Part II of this volume engages with a more detailed examination of how sophisticated ICT can enhance the teaching and learning experience, and therefore contribute to excellence in teaching and learning.

In Chapter 6, titled 'Collaborative Writing and Knowledge Creation in a Social-Media Online Community', Anu Suominen and Jari Jussila address the

question of teaching and learning knowledge creation in HEIs via collaborative writing. They argue that the challenge of HEIs is that teaching should build capabilities that enable learners to make use of and advance academic knowledge while simultaneously developing skills relevant for the future work life. In practice, teaching at university is often disconnected from authentic work life and the tasks are far more simplified than those in future jobs. Therefore, to address the challenge HEIs face, this chapter focusses on knowledge creation, expanding it from bounded-learning communities to online communities in social media. In online communities, it is intrinsic to act and think globally, as demanded by the new imperative. This chapter portrays the case of one knowledge-management (KM) course at an HEI in which the syllabus included collaborative writing for both a bounded-learning community and the online community of Wikipedia. The results show that although prior to the course many students held a prejudice and lacked knowledge about social media as part of KM, they expressed that they had eye-opening learning experiences because of the expanded learning community from the traditional bounded to the online community. Based on the results of the study and the experience of teachers, recommendations are provided for developing learning activities of knowledge creation in HEIs.

Theoni Tsinonis in Chapter 7 asks the following question: How to use ICT in classroom effectively? The author argues that over the past years, across the OECD member states, major investments in ICT in schools have been made and a shift towards a more technology-oriented curriculum is observable. However, evidence exists that literacy levels and mathematic skills of students who have computers and other ICT equipment/devices in their classrooms dropped. This highlights a challenge that the education systems worldwide have to address today, that is, how to use ICT in a classroom in a way that boosts the skills' acquisition process rather than undermines it.

In the following chapter, that is, Chapter 8, Margarida Lucas explores the issue of the use of tablets in secondary education. The author argues that current trends and recommendations regarding one-to-one (1:1) educational initiatives suggest that they are efficacious ways to achieve innovative change in education, namely through the promotion of active and innovative teaching practices. From a constructivist point of view, tablet devices offer teachers the potential to adopt interactive student-centred activities and to facilitate a process of learning in which students are actively involved and encouraged to be responsible and autonomous.

In Chapter 9, titled 'School Website as a Media: Practice and Potential of the School Website Content', Baiba Arina looks at the school image as one of the aspects that the school needs to take into account in the context of the website, thinking not only about the good image, but, in particular, about the goals and values as a whole. The author argues that the school website still has a lot of unrealised potential. Nonetheless, the website as a technological tool can improve both the learning process and the school image as well as serve as an information channel in the local community. Schools, for the most part, do not control their self-image, and the choice of content on the website is often not strategic enough. Overall, schools focus on regularly informing the audience, but much less on the marketing and learning solutions on the website. The represented image

of the schools includes both the characteristics of the local community and the formal institution. Identifying audience and its desires, as well as redistributing resources, is one of the necessities for realising the website's potential.

In Chapter 10, Dries Van De Weghe and Yves Wautelet dwell on the advantages of using Facebook as a Massive Open Online Course (MOOC) environment. The authors explain that in the past 15 years, virtual learning environments have radically changed the way learning objects are spread among students and the way learners communicate with teachers. In parallel, social networks are now widely used by users with all kinds of profiles. Among social networks, Facebook is the one offering the largest array of functions and possibilities to be used as an open platform for various kinds of applications. The findings of the discussion outlined in this chapter suggest that except for the assessment, Facebook can support all of the functionalities required by a modern MOOC platform while offering a high social presence. Although not vital for most MOOC followers, further developments can nevertheless be made to customise Facebook for ensuring this assessment functionality.

In Chapter 11, titled 'Assessing the Impact of Virtual Reality on Engineering Students' Spatial Ability', Rafael Molina-Carmona, María Luisa Pertegal-Felices, Antonio Jimeno-Morenilla and Higinio Mora-Mora make a very interesting case for using virtual reality (VR)-enhanced learning to boost spatial ability of engineers. The authors argue that VR is an emerging technology that is proving very useful for training different skills and improving spatial perception. In this chapter, they present previous works that use VR to train students, mainly in the area of engineering studies, and to demonstrate that VR can improve some aspects of spatial perception. Then, based on the outcomes of a study involving a group of engineering students who used VR technologies to carry out learning activities designed to improve their spatial perception, the authors prove how and to what extent students' spatial ability was enhanced. Interestingly, the authors suggest as well that the proposal is easily transferable to other educational contexts. On the one hand, it could be implemented to improve spatial ability in other engineering studies, and on the other hand, with simple adaptation, it could be used to enhance other skills.

In Chapter 12, titled 'Immersive Experiences in Online Higher Education: Virtual Presence and Flow', Inma Rodríguez-Arduraa and Antoni Meseguer-Artola argue that recent research on immersive experiences in online environments for HE has attributed a fundamental role to two distinct yet connected psychological phenomena: the feelings of being virtually present in the education environment, often simply called presence, and peak episodes of flow. We conceptually delimitate these two psychological facets of e-learners' experiences and examine their interplay. We show how flow episodes are elicited by students' sense of control over the online education environment, their attention being focussed on the learning tasks and their feelings of being physically placed in the online education setting. Also, the interactivity created by the online education environment evokes an e-learner's imagery, which in turn triggers presence feelings and episodes of flow. We further show that although presence and flow are triggered by some common antecedents, they differ in the object of the individual's immersion, and

that presence feelings facilitate flow. Moreover, we provide practical recommendations for higher education institutions (HEIs), policymakers and the academic and ICT community involved in e-learning to make sure that e-learner experiences reach their fullest potential.

In Chapter 13, Maria De Marsico, Filippo Sciarrone, Andrea Sterbini and Marco Temperini explore the issue of 'Educational Data Mining for Peer Assessment in Communities of Learners'. The key line of argumentation in their chapter is that over the past years, the design and implementation of web-based education systems have grown exponentially. These systems accumulate a large amount of data: educational data mining and learning analytics are two much related fields of research with the aim of using these educational data to improve the learning process. Against this backdrop, the authors investigate the peer assessment setting in communities of learners. Peer assessment is an effective didactic strategy useful to evaluate groups of students in educational environments such as high schools or universities where students are required to answer to open-ended questions to increase their problem-solving skills. Furthermore, such an approach could become necessary in those learning contexts where the number of students to evaluate could be very large as, for example, in MOOCs. The authors focus on the automated support to grading open answers via a peer evaluation-based approach, which is mediated by the (partial) grading work of the teacher, and produces a (partial, as well) automated grading. This chapter closes the Part II of the volume and paves the way towards case studies that add further evidence to arguments and examples outlined and discussed in the preceding chapters.

For instance, in Chapter 14, the focus of the discussion turns to the relationship between students and teachers and their ability to implement competency approach. By reference to the case of the University of Latvia, Linda Daniela, Raimonds Strods, Zanda Rubene and Sandra Kalniņa argue that even though it has already been 25 years since the collapse of the Soviet Union and the regaining of independence for the Republic of Latvia, teacher education faces various and specific problems brought forth by the experience behind the 'iron curtain' spanning five decades. Ever since regaining its independence, Latvia has implemented ambitious education reforms. A new education reform has been launched in Latvia, which will implement the competency approach in general education by 2018. A vital aspect of this reform is teacher education. In preparing teachers, universities have an extra task – to promote competency of future teachers to implement the competency approach in schools in a student-centred study process. The organisation process must change during the university study process in order to accommodate that future teachers acquire actual competencies by using modern technologies and modern learning strategies, thus later promoting active involvement of students in the construction of their competencies.

In Chapter 15, on the other hand, Muqiang Zheng, Chien-Chi Chu and Yenchun Jim Wu discuss the online to offline (O2O) teaching reform in China. The authors explain that with the continuous development and penetration of the Internet there has been vast amounts of changes to the traditional method of classroom teaching. The MOOC shows a significant combination of network information technology and educational resources. However, in order to make up

for the disadvantages which occur when making the transition from classroom to online learning such as 'large scale' and 'no feedback', the O2O mode was created and developed. Using the course of 'microeconomics' taught by Chinese university professors as a reference, this chapter aims at explaining the course design and innovation which is a modification of outcomes-based education theory, the introduction of O2O teaching reform and application.

Allaa Barefah, Elspeth McKay and Sulaiman Alqahtani, in Chapter 16, explain that there is continual evidence of ineffective e-learning programmes that are set amid emerging ICT tools by HE providers. While many of the existing accounts outline the potential of integrating such educational technology into their teaching and learning practice, other studies point out the adoption challenges of such programmes. In their chapter titled 'A Prescriptive Instructional Systems Design Model: A Rasch-model Case for Saudi Arabia', the authors examine the limitations surrounding the instructional systems design models and investigate the effectiveness offered by ICT tools under different instructional environments to facilitate the effective application of e-learning.

In Chapter 17, Evi Hatziandreou, Anthi Soulitsioti and Yannis Mastrogeorgiou describe how ICT-enhanced learning can be employed to increase young people's awareness of the foundational values and ideas underpinning the functioning of the European Union (EU). The authors describe an educational game that they developed and successfully applied. As the authors argue, the most valuable resource of the EU is its youth. The EU's future depends on young people's ability to identify themselves as Europeans, that is, united by a shared European identity and a solid commitment to be active EU citizens. Young people want and need to know more about what it means to be an EU citizen. However, the younger generation needs better education as to what the EU is, what it represents and how their daily lives are positively influenced because of the EU. This innovative and user-friendly educational game, titled 'Do We All Speak the Same Language in Europe?', conveys to the audience an essential message, that is, there are common roots that over centuries have shaped who we are.

The discussion in Chapter 18 shifts the focus towards the complex issue of day-to-day management of student affairs at HEIs as seen through the lens of the dean's office and the use of ICT therein. Considered as a part of educational processes, whereby students need to take care of their student life, this chapter, elegantly written by Katarzyna Górak-Sosnowska, also serves as an introduction to the discussion in the concluding chapter.

Indeed, in Chapter 19, titled 'Education, Innovation and the Prospect of Sustainable Growth and Development', Anna Visvizi, Miltiadis D. Lytras and Linda Daniela entrench the discussion on education and ICT in broader context of the debate on inclusive sustainable growth and development. The authors argue that tacit in the debate on sustainable growth and development is the recognition that dialogue, best practice sharing, peer review and evidence-based and coherent policies and strategies can effectively address the problem of inequality and exclusion worldwide. Central in the debate on sustainable development is the imperative of advancing equality in opportunities. This requires a careful focus on promoting societies' and individuals' worldviews, knowledge and skills conducive to their

ability to recognise, seize and multiply opportunities that exist. Education plays the role of a key enabler in this process today. In this context, the relevance and utility of advances in ICT boost. Their skilful use may enhance the efficiency of teaching and learning process and, thus, may substantially contribute towards the goals and objectives associated with sustainable inclusive growth and development. The argument in this chapter is structured as follows: First the relationship between innovation, education and sustainable inclusive growth is outlined. By advancing the argument of the need to conceive education and its role in society in a holistic manner, a case for education as upbringing is made. Against this backdrop, it is argued that the agency of both the learner and the teacher/professor has to be brought back to the analysis in education to regain its role of the major driver of change and innovation in the society, and indeed the key enabler of sustainable inclusive growth. Conclusions and recommendations for education systems in the post-truth era are then outlined.

Overall, this edited volume brings together voices of a group of leading educators, researchers and experts to present and discuss an outstanding body of research. The findings included in this volume address the question of how advances in ICT can enhance teaching and learning excellence and, therefore, contribute to making our societies more resilient to the challenges that the twenty-first century generates, thus undermining the coherence and inclusiveness of our societies. To use ICT in classroom can be both challenging and rewarding at the same time, and the chapters included in this volume attest to that. The effectiveness of teaching and learning processes enhanced by technology is a function of the relationship that develops between the learners and the mentors. At the end of the day, it is the commitment, motivation, ethos and mutual respect on the part of students and professors that will define the outcome of the teaching and learning process. This is the greatest challenge inherent in education.