Call for book chapter proposals:

Learning with Technologies and Technologies in Learning - Experiences, Trends, and Challenges in Higher Education

Edited volume to be published by Springer

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Modern instructional technologies such as online learning, cross reality, artificial intelligence, simulations, and online laboratories have become increasingly important for educational settings on all levels. This tendency is only reinforced by the growing digitalization, personalization, and internationalization of education. The COVID-19 crisis has only accelerated and strengthened these efforts. It is likely that even after the pandemic, many of the measures recently taken out of necessity will become part of the general canon of instructional approaches, methods, and tools.

Already prior to the challenges posed by the pandemic, many relatively new technological developments for education have been on the rise. The design of immersive virtual educational worlds opened up the opportunity for a learning experience well beyond traditional classroom settings. Furthermore, technology developments change the learners' access to educational laboratories, especially in fields in which experiments cannot be conducted following traditional science education approaches and respective limitations. Furthermore, personalization in education goes hand in hand with technology and data-based recommendation systems for further developments of the individual's educational profile. In data-driven approaches, human learning is combined with or supported by machine learning. The use of such data-driven approaches in education also impacts the analysis and evaluation of the educational methods, learning technologies, and learning outcomes.

However, the aforementioned developments represent only a fraction of new trends on the interface of technology development and higher education. All these new trends require a new understanding of learning quality assurance, validation, and improvement, to reach the wanted educational outcomes and standards. Furthermore, learning with technology requires changes in the appropriate pedagogical approaches, too. Nevertheless, on the way to effective and successful learning and teaching with technologies, there are also challenges and obstacles on the technical side concerning the necessary stable internet connections with sufficient bandwidth, on the organizational side concerning the roll-out of virtual teaching and learning solutions, and, finally, on the pedagogical side concerning needed learning habits in terms of learner autonomy, self-regulation, and self-responsibility.

In six sections (see sections' calls for chapters), this edited volume aims to contribute to the discussion about how to agree upon standards to design and organize learning with technologies, how to streamline future developments using online delivery, multimedia content as well as machine learning in educational settings in higher education and respective institutions, and how to put respective measures for quality assurance and validation processes into practice. This work will present a rich resource for contemporary and future design considerations in technology supported higher education.

In the following, each prospective section will be described in further detail with separate calls for chapter proposals:

Section 1: The Future of Learning

Section Editor: Martin Ebner, TU Graz, Austria

Keywords: *Future, education, technology, technology-enhanced learning*

In this section of the book, we aim to think about the future of education, which can be seen as the future of teaching as well as the future of learning. Today we are confronted with a world that has not only forced digital education but made it necessary. The CoVid-19 pandemic forced educational institutions to use digital technologies and to organize lessons exclusively online. Many experiences have been gained, many infrastructures and equipment have been established or legal frameworks for online teaching have been created. So the question is, what does the future hold? What will remain and change the (educational) world in the long term? There are many (technical) topics on the agenda, such as Artificial Intelligence, Micro-Credentials, Learning Analytics, or Open Educational Resources. We use different designs of teaching and learning settings. We distinguish between blended, inverse blended, or hybrid learning. In the next few years, a significant increase in remote learning and teaching can be expected.

In this section, we would like to call for contributions that take up the topic from a meta-perspective and try to reflect on the developments and effects of digital technologies in education with a comprehensive view. Evaluations, surveys, studies can and should show how we have to imagine education in the future.

Consideration will be given, but not limited, to the following:

- Research about future technologies for education
- Research about future learning and teaching behaviors
- Meta-reviews about the future of education
- Literature research about the COVID19 situation in Higher Education separated by institutions, countries
- Evaluation, surveys, interviews, case studies about future situations in Higher Education

Section 2: Learning in a Digital World

Section Editor: Lisa Bosman, Purdue University, USA

Keywords: *Information and communication technology (ICT), artificial intelligence, blended learning, smart learning environments*

Society and technology continue to evolve given the ever-increasing access to data and information technology. This has made an impact across industries including healthcare, manufacturing, transportation, energy, agriculture, financial services, and even education. Thus, new approaches to teaching and learning must be made to prepare graduates for the modern workforce.

The purpose of this section is to showcase the potential of learning through technology and with technology. New approaches should consider how to blend the physical and virtual worlds to optimize the learning context and pedagogical intentions of the learning experience. The only way to make this transition is “by reengineering the fundamental structure and operations of current educational systems to better integrate these new technologies with the required pedagogical shift” to the digital world. (see Kinshuk, Chen, NS., Cheng, IL. et al. Evolution Is not enough: Revolutionizing Current Learning Environments to Smart Learning Environments. Int. J. Artif. Intell. Educ. 26, 561–581 (2016))

Consideration will be given, but not limited, to the following:

- Case studies, autoethnography, and/or lessons learned highlighting learning experiences using technology
- Learning technology impacts on students, teachers, and administration
- Overcoming technology adoption challenges
- Role of technology in emergency situations and low-resource settings

- Using technology to broaden participation in higher education by increasing equity and access
- Effective assessment protocols to measure the effectiveness and efficiency within the digital world of higher education
- Best practices in implementing e-learning, b-learning, and m-learning
- Professional development strategies for training instructors and teaching assistants on digital learning tools
- Utilizing technology to connect classroom concepts to the workforce
- Humanizing, personalizing, and customizing technology learning experiences
- Technology-based learning experiences which promote consumption and creation
- Digital literacy, visual literacy, and information literacy in the digital world

Section 3: Eruptive Technologies in Learning

Section Editor: Ian Grout, University of Limerick, Ireland

Keywords: *Eruptive, disruptive, technology, flexibility, inclusion, diversity*

In this section of the book, the uses of technology to support change and future educational requirements are presented. In today's education environment, there are sustained and significant changes in how educational content is prepared and delivered, how the student demographic is changing with a greater level of internationalization of education, a greater level of inclusion for individuals from non-traditional backgrounds, and changes to student engagement and student assessment mechanisms. To realize the need for change, many education institutions are engaging with the idea of disruptive education where traditional approaches are being broken and replaced with new approaches that are more student-centered. However, taking disruption further introduces the idea of eruptive education.

Eruptive education is considered here as education that utilizes eruptive technology to improve the education experience for the student. Eruptive technology is the technology to support new education support models, new content creation methods, multiple content distribution channels, and support for multiple user platforms. Such a forward-looking and diverse set of requirements can lead to enhanced student support whilst being deliverable by the education institution.

Consideration will be given, but not limited, to the following:

- Supporting students from non-traditional backgrounds by adopting a universal design approach
- Supporting distance learners
- Increased internationalization
- Education content preparation and delivery using multiple means
- Delivery of education content on a large scale whilst maintaining support for the individual learner
- Virtual reality (VR) and augmented reality (AR) in education
- Automation of administrative and academic processes
- Inclusion of artificial intelligence in student support and assessment
- Support for academics to create and deliver content suited for all learners
- Academic experiences in using and adapting education technologies
- Academic experiences during the Covid-19 pandemic
- Ensuring academic quality levels within an ever-changing world
- Use of technology for collaboration on national and international levels (collaboration platforms)

Section 4: Pedagogy of Active and Practical Online Learning

Section Editor: Alexander Kist, University of Southern Queensland, Australia

Keywords: *Teaching laboratories, constructive alignment, online and distance learning, competency-based assessment, remote laboratories*

Practical learning activities play an essential part in science and engineering education. Traditionally these learning experiences are delivered through face-to-face laboratory classes. Modern technology allows educators to deliver these activities remotely and face-to-face using new innovative learning tasks. Approaches include remote laboratories, virtual and augmented reality, simulations, emulations and take-home kits. Remote or online delivery has always been of interest in the context of distance education, the current pandemic and related lockdowns have made these considerations relevant for mainstream education providers.

While outcome-based design is used in many professional disciplines; these approaches are often not applied in the learning and teaching context. If intentional learning design is considered, it mostly focuses on academic courses. Sound educational practices are generally not the driver behind curriculum design considerations for laboratory and practice classes. However, purposeful design of learning in the context of practical and active online learning is even more important as instructors and peers are often not readily accessible.

This chapter aims to explore suitable pedagogical approaches to facilitating practical and active learning activities online. This includes the application of well-known principles such as constructive alignment, competency-based assessment and project-based learning, but also innovative new approaches to learning in teaching laboratories at a distance.

Consideration will be given, but not limited, to the following:

- Research reviews that discuss the current state-of-the-art in this field or a subfield
- Research led frameworks that guide educators to select or apply appropriate methods of teaching through laboratories and practical learning activities online
- Case studies and applied research that demonstrate effective use of innovative learning and teaching approaches in educational laboratories and practice classes in the context of remote laboratories, virtual and augmented reality, simulations, emulations and distance education
- Studies that explore constructive alignment in the context of practical and active learning online
- Studies covering competency focused teaching and competency-based assessment in the context of practical online learning
- Theoretical studies that explore the pedagogy of active and practical learning activities
- Any other theoretical, applied or empirical studies that provide a better understanding of learning and teaching in the context of laboratory classes and practical learning activities

Section 5: Machine Learning and Human Learning

Section Editor: Olga Viberg, Royal Institute of Technology, Sweden

Keywords: *Artificial intelligence, machine learning, deep learning, learning opportunities, learning analytics, higher education*

In this section, we aim to discuss how machine learning systems, which become important to our education systems can be designed and employed for learning purposes in higher education. Machine learning is becoming more widespread and has been used for predicting students' grades, recommending courses, modeling student behavior, and improving curriculum design in higher education. In general, the opportunities provided by machine learning (e.g., in terms of personalization) can improve students' conditions for learning, and facilitate their learning progress. Recent developments in machine learning relate to a deep learning approach that refers to a subset of machine learning (i.e., a component of artificial intelligence) and describes algorithms that analyze data with a logic structure similar to how a human would reason. It is non-deterministic as it frequently depends on the backward propagation of weighted neural networks; the system adapts through practical experience and practice. The idea is that deep learning – a challenging process that involves higher-order cognitive processing to reach a deep understanding of the target content and achieving learning goals - is beneficial in higher education.

In this section, we are calling for related review studies, theoretical contributions, and empirical examples of machine learning, with a specific focus on deep learning approaches in higher education. In particular, we encourage authors to focus on learning opportunities that can be enabled by machine learning systems and related challenges to overcome. Also, considering the increasingly important role of machine learning in future learning, we encourage authors to contribute with reflection papers discussing what this means for different stakeholders, including educators, students, learning advisors, policymakers, and researchers. Finally, we are looking for studies that target the ethics of artificial intelligence in higher education. That is, what are the existing challenges in terms of protecting students' privacy, and how a more responsible and safe deep learning approach in higher education can be enabled?

Consideration will be given, but not limited, to the following:

- Review contributions that present the existing state-of-the-art research in the field
- Empirical (case) studies of machine learning in higher education, with a particular focus on deep learning approaches
- Design-oriented studies that demonstrate relevant machine learning systems to be used in higher education
- Methodological contributions
- Reflection papers that discuss opportunities and challenges for the use of machine learning approaches for different stakeholders (e.g., students, educators) in higher education
- Studies, both theoretical and empirical, that target the issues of privacy, security and ethics in relation to the use of machine learning systems for learning purposes

Section 6: Reimagining and Rapid Transition of Learning

Section Editor: María Isabel Pozzo, National University of Rosario, Argentina

Keywords: *Educational transition, didactic changes, learning transformation*

Historically, changes in learning have been due to various factors: theories' decline, contextual needs, striking events such as wars or natural disasters, the emergence of new resources and concepts, etc. The development of technologies has been one of the great promoters of change, and its dynamism seems to be endless. Currently, the crisis caused by the Covid-19 pandemic has challenged educators from all over the world, all areas of knowledge, and educational levels to a rapid transition in their approach to learning and teaching, leading to forced virtualization of education. Quick, abrupt, or violent transitions lead to sudden decisions, sometimes appropriate and sometimes not. In this context, evaluations of the decisions, activities, class' interactions, and technological resources are needed, together with their impact on students' competencies, whether technical or personal, such as the ability to adapt to new situations, oral and written communication, autonomy, teamwork, creativity, critical thinking, etc.

This book section aims at the exchange of theoretical and empirical studies which make visible the reimagining and rapid transition of learning with technologies in higher education. It does not aim at mere descriptions but also the assessment of learning achievements, from quantitative, qualitative, or combined methods. By sharing challenges, drivers and obstacles, didactical implementations can be improved. Therefore, theoretical reflections and experiences about teaching practices and learning processes in rapid transitions are welcome.

Consideration will be given, but not limited, to the following:

- Theoretical pieces to lay out the foundation for applied research
- Empirical studies of best-practice examples, projects, and applied research of learning outcomes
- Future-oriented work on how this field may develop in the near to middle-term future, and focus on potential accelerators or barriers
- Empirical studies may contain some of the following components, although not exclusively, in a rapid transition of the learning environment

- The students' point of view about which learning experiences have been more enriching,
- Ways to assess students learning according to the pedagogical approach
- Strategies to potentiate the students' work with empirical evidence of the results
- Learning situations, tasks, and assessment which allow students to develop scientific, technical, personal, and social competencies
- The way classes are carried out, through which resources and activities, and their learning outcomes

Call details:

This book project will follow a 2-step review process. Prospective authors are invited to submit a chapter proposal to one of the sections first, no later than 30 April 2021. On the basis of the 2-page proposal, the editorial team may invite the authors to submit a full manuscript or reject the submission. The chapter proposals should include a title, authors, affiliations, chapter abstract describing the content of the chapter (max. 2 pages), keywords, key references, and a 2-3 sentence describing how the chapter fits the theme of the respective section (see above).

The proposed chapter should be a previously unpublished work. Upon acceptance of the chapter proposal, the full manuscript should be completed no later than 15 September 2021. Guidelines for preparing chapters will be sent to authors upon acceptance of the chapter proposal. Contributions will undergo a peer-review process where the authors identity will be concealed. Authors are expected to peer-review one or two chapters for other book sections (review-to-publish policy). Comments to authors will be returned by 15 October 2021. Finalized full chapter manuscripts are due no later than 29 October 2021.

- All manuscripts should be submitted online on https://www.conftool.org/learning-technologies/index.php?page=login
- Authors are requested to choose one of the above-described sections for abstract submission
- Abstract submissions are strictly requested to use the abstract template and should not exceed 2 pages of length
- Abstract template: http://online-engineering.org/dl/learning-technologies/template_structured-abstract.docx

Timeline:

We plan to publish this book in the first half of 2022 in Springer publishing house (Cham). At this point, we are in negotiations about the book with the publisher and expect a final decision by and contract signing with Springer by mid-April. Nevertheless, not to lose time, we start our work already now and invite you to participate with your valued knowledge and experience by submitting an abstract.

• Call for Paper publication:	March 31, 2021
• Chapter manuscript proposals due (2-page abstract):	April 30, 2021
• Feedback and manuscript invitation (pending publisher decision):	May 15, 2021
• Full chapter manuscripts due:	September 15, 2021
• Notification of reviewers' feedback:	October 15, 2021
• Final chapter manuscript submission:	October 29, 2021
• Notification of final decision:	November 15, 2021
• Expected publication date:	First half 2022

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