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Article

Editorial: Digital learning and education in a project society

Project Leadership and Society (PLAS)

Provided in Cooperation with:
International Project Management Association (IPMA), Zurich

Suggested Citation: Konstantinou, Efrosyni; Nachbagauer, Andreas; Wehnes, Harald (2023) : Editorial: Digital learning and education in a project society, Project Leadership and Society (PLAS), ISSN 2666-7215, Elsevier, Amsterdam, Vol. 4, pp. 1-6, https://doi.org/10.1016/j.plas.2023.100083

This Version is available at:
https://hdl.handle.net/10419/339856

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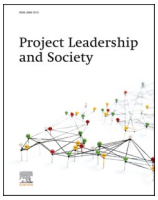
Project Leadership and Society 4 (2023) 100083



Contents lists available at ScienceDirect

Project Leadership and Society

journal homepage: www.sciencedirect.com/journal/project-leadership-and-society



Editorial



Editorial: Digital learning and education in a project society

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1. Introduction

The starting point for this special collection was the dramatic shift in the learning environment following the outbreak of the Covid-19 pandemic. While digital learning and education have been around for decades and have increased in recent years (Allen and Seaman, 2016), the discussion in project management education so far has been limited to a few special interest groups, confined to some specialised organizations and exceptional emergency events (Hodges et al., 2020). However, the pandemic was the catalyst for a global shift to distance learning and remote teaching (Winch et al., 2021). With the widespread cessation of face-to-face teaching in much of the world, all educational institutions had to adapt very quickly to the new circumstances – no matter how well they were prepared for them. In retrospect, the pandemic triggered a wave of use of digital tools in education and learning, a development that has come to stay and is part of the "New Normal". Therefore, we have decided to close the Special Collection at the end of 2022 and hope to continue the discussion under the Project Leadership and Society format "Enable".

In recent years, the technical push that learning has received in an institutional setting has been evident to all. Students and teachers have quickly learned to embrace new tools and technical solutions. However, digital education and learning are more than just the skilful application of tools and processes; the value of education does not depend on the use of technical means only. This change requires educators to be pedagogically competent and digitally literate – but still, that is not enough. Traditionally leadership education has been seen as the learning of skills; accordingly, the learning of management techniques was essential. We are convinced that this view is out of date. Digital education opens up the space for a paradigm shift in project management education, or at least reinforces a process already underway away from fact-based teaching towards reflexive learning modes (Dyke, 2009; Gewirtz and Cribb, 2009). Educating for project management centres on the development of critical thought and learning as a life journey (Bredillet et al., 2015; Lindgren and Packendorff, 2006). The goal is no longer completeness and learning a canon of knowledge, but the ability to acquire new content in a critical and reflexive way (Berggren and Söderlund, 2008).

2. The context of educational reform and digitalisation

Education, like any other discipline or practice, evolves throughout time. Traditional education involved fixed patterns of organisation, aims and methods of instruction which framed the learning experience of the student in the class, and where students had to be and remain passive receptors of the knowledge taught in the class to make the most of their learning. A traditional interpretation of education was succeeded by a movement of progressive education which introduced and built on the student experience in learning (Dewey, 1986). Similarly, the educator's professional judgement took centre stage (Biesta, 2015), as did digital technology and its promise for widespread change and reform of education (Selwyn, 2016). Global education reform focused on the development of high-achieving educational systems by governments and private initiative in their attempts to respond to neoliberalism and to define quality and equity in education with a stronger focus on business priorities and agendas (Adamson et al., 2016; Thompson and Parreira do Amaral, 2019). In this context, digitalisation promises to build a *global knowledge space* where "minds and technology work and learn together [and] global wisdom can grow" (Sendov, 1997). As it so happened, digitalisation also helped address the aftershock of the Covid-19 outbreak, by enabling the continuation of education albeit with significant concerns over the quality of education being delivered and as student academic performance declined worldwide (Cheng et al., 2020). Three years on, and as most of us have returned to the class, the impact of digitalisation on learning and education persists and blockchain, vr-technologies, artificial intelligence and Chatbots reflect some of the digital technologies we will need to learn to manage in the years ahead (Neborsky et al., 2020).

Research endeavours, such as this special collection, usually begin by claiming that something completely new and previously unheard of is coming our way. It is true, the dramatic change in teaching and learning in the wake of the recent pandemic caught us all unprepared and unleashed a wave of social dislocation, new methods, and technical challenges. Now, with the distance of three years, our view is somewhat

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https://doi.org/10.1016/j.plas.2023.100083

Available online 9 March 2023
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more differentiated.

A main contribution of this special collection is the realisation that online teaching does not bring any fundamentally new developments, as the papers show, but reinforces trends that are already underway and makes the necessity of parting with a traditional understanding of teaching more apparent. Based on the insight that student's affective response to their educational environment plays a substantial role in their ability and desire to learn and succeed, the focus of the papers in this special collection is on approaches that rely on the personal responsibility, commitment, and the interest and priorities of the students themselves. In summary, most authors advocate a mixed approach to teaching methods in higher education and a strong emphasis on student-centred methods, especially in complex contexts such as project management. In addition to the necessary explicit knowledge to be acquired through traditional teacher-centred means, they recommend teaching methods that help students challenge their preconceptions and motivate them to learn by involving them in real-life situations in and beyond the classroom. The contributions to this special collection, indicate that especially game-based and role-play learning solutions in an online setting can be used to motivate students and to prepare learners to deal with the uncertainty they will face not only in their professional lives, but also more broadly in life, as disruption in the world persists.

The papers stress the capacity of educators and learning institutions to implement online, blended and distance teaching and learning to develop and to deliver high quality inclusive digital education. This may also include the development and use of high-quality digital content, such as innovative online resources and tools that address the learning needs of students. The development and implementation of digital content is not a simple transfer of previous teaching concepts to online platforms and media. It requires a fundamental revision both on the technical and on the pedagogical level. As such, it often requires the cooperation of different disciplines, from subject specialists to pedagogues and from andrologists to technicians and IT specialists. Equally important is the organisational embedding: online turnaround means - at least at the beginning - an increased need for resources and a greater freedom for experimentation and thus also an enterprising culture.

This also means that educators in an online environment need to develop technical expertise which matches, or at least does not fall short of, the skillset of a generation of students of digital natives. As the papers in this collection show these are skillsets that are not readily available across the teaching generation (Handley, 2018). Further, educators are certainly no longer the guardians of a canonical knowledge that cannot be questioned. In the midst of digital ecosystems, educators need to work in equal measure with the experience of the student and the potential impact of these experiences at the individual and social level. Education in a globalised world is more firmly embedded in the global community (Spring, J., 2015). It stands further apart from the classroom, and is enabled by digital tools and broader research insights which become readily accessible, or perhaps need to be provided even in an 'on demand' mode in and beyond the traditional classroom. This requires a much broader and socially aware experience of the educator's own understanding of their discipline. The papers in this collection stress that it also requires sufficient humility and the freedom to transition from a traditional identity which prioritises knowledge and its unobstructed dissemination to a progressive identity which prioritises the effective use of knowledge for the development of others in and beyond the classroom (Dewey, 1986).

The papers in this collection show that the planning and implementation of online teaching approaches, especially when they come as an emergency transition, must take the students' stresses and strains into account. However, this does not mean that students cannot play an active role in framing the learning experience and how this is shaped against life's challenges, such as at the time of a pandemic. It also does not mean that learning spaces need to be sterilized or heavily controllable. Even more so, contributions show that challenges in learning and life, however dramatic, need not become reasons for excluding the student from being engaged in the framing of the very experience that is being designed for them. Freedom to experiment and learn are key and raise significant considerations for student assessment, which may need to be revisited altogether. Project management is characterised by unexpectedness and complexity, it is shaped by teamwork and characterised by external dependencies on stakeholders, technology, and the natural, social, political and digital environment. Projects are inherently risky - otherwise they would not be projects. And as project managers, our students will need to claim and legitimise the use of good, even evidence-based, knowledge along with practical wisdom and a duty of care and ethical concern for the communities that their projects will change for the better. It is precisely these principles that need to be reflected in the pedagogical concepts of project management.

3. Possible further research

Several new pathways for further research are suggested at the end of each paper, and we present broader possibilities based on them.

3.1. Issues raised in the contributions

As the papers in this special collection were written throughout the pandemic, most authors noted the limited scope of their research in their contributions: this involved geographical restrictions to one or only few countries, or limitations in sample size. Other papers are based on cases studies, which are suitable for gaining deeper insights in an area but require both comparative analyses and methodological variation to better assess the generality of the findings and interpret research findings and insights in a more nuanced way.

Most studies used single survey methods like self-reports of students and teachers, which could be combined with non-reactive measurable constructs such as assessments, exam scores or grades. Episodic data can contribute to further, more structured qualitative approaches. Even more so, while qualitative approaches are valuable on their own, triangulation with quantitative date promises added value.

With regard to the affective reactions of students, the question of stability of perceptions over time and in different settings arises. A habituation effect cannot be ruled out, especially with the increasing normalisation of the use of online and mixed online-on site methods and the dissemination of activating teaching approaches. Similarly, most studies focused on teachers and students and their interaction in a one-class setting. While most authors consider the institutional environment to be very important for the implementation of the desired pedagogical approaches and the relationship between learners, content, forms of instruction and teachers, the influence of the organization – with one notable exception – has not been systematically studied. Therefore, a comparative approach which would take into account relevant organizational variables remains a desideratum.

In addition to the further research questions raised in the papers, the guest editors' discussions resulted in issues that were not addressed in this special collection but that we believe are important for the future development of digital learning and education in a project society, not least as further considerations for the Project Leadership and Society format "Enable". These include, but are not limited to.

3.2. Social and institutional inequalities

Often enough, there is a wide gap between student requirements, teaching needs, technical possibilities, and organizational readiness. Traditional educational organizations are under-equipped, both technically and conceptually, and slow paced. Other institutions and education providers have begun to build modern learning and teaching centres for digital use which frequently requires significant capital investments. How can we address the divide between large universities and institutions with significant financial potential and smaller, peripheral organizations with less funds available to address digital reform

in education at the national and global levels?

In contrast, digitization allows reach and helps address social inequalities, especially for students who are not able to afford expensive education. It is easier than ever to participate in events worldwide and to interact directly with outstanding people in the field of study. Can digitization in education help build a worldwide community of project management for the betterment of society? Or does digital create new inequalities that we have not experienced up to this point?

3.3. New stakeholders and institutional change

Digitization is accelerating the penetration by new players into traditional education markets and as a result, we observe the emergence of an online education industry that does not involve academics. Large education groups, often originating from publishing houses, are increasingly offering their own learning platforms, using MOOCs and other forms of distance learning for large audiences, including materials from the traditional academic sector. Who benefits in digital markets that allow (didactic) goods to be duplicated and offered at almost no cost, and the ability of modular content to be customized and delivered easily and even digitally?

3.4. Educating for a better (project) society

Finally, we see education beyond learning as one of the key catalysts which will enable society and humanity as a whole to address Grand Challenges, such as climate change, rising and ongoing geo-political tensions, social inequalities and injustices which characterize project societies. What are the opportunities that arise from working internationally, interprofessionally and across disciplines, and how does digital learning and education enable or restrict our *global knowledge space* and wisdom for future challenges? As digital learning and education are shifting the boundaries of work worldwide, does a digital learning and education agenda allow or prevent us from organizing around values and towards creating a better, more equitable world?

4. In this collection

This special collection focusses on the capacity to implement online, blended and distance teaching and learning, and developing and delivering high quality inclusive digital education. Furthermore, the special collections track the shifts in identity, roles and new requirements in teaching and learning triggered by digitalisation – ultimately a mindshift towards a more agile approach to teaching/learning. Another focus is on the digital competences needed in our world – and on the competences that make digital competences work. That requires rethinking institutional and non-institutional learning environments.

Taken together, the papers in this special collection cover four broad themes that represent particularly new and interesting contributions to this topic.

1. One of the first paper we received argues that digital intelligence is a must-have for project management in age of the fourth industrial revolution, bringing together form and content of the requirements for learning processes. On the other hand, digitalisation can open up new forms of interacting and informal learning. A paper dealing with virtual communities of practice in the tourism sector argues that the digital transformation can foster professional development. Focusing on value-based and ethical decision making in projects a third paper proposes using specific audio-visual material – popular films – to train students to detect and avoid unethical behavior, especially corruption in construction projects.
2. Flipping to remote teaching came – for most of institutions – as an emergency transition. One paper tries to understand how science, technology, engineering, and mathematics (STEM) undergraduates responded affectively to this shift to online teaching. In stark contrast to the approach of the previous paper, another one argues that online role-plays boost learning by exposing students to a challenging environment that contains tasks that stretch their abilities. Embedded into an institutional learning environment, another paper explores the impact and value of a relational approach in introducing an executive MBA during a global pandemic.
3. Based on thorough theoretical considerations and empirical evidence, a couple of papers examine student's engagement, affective responses and motivational climate in online project management education and their impact on performance with a particular attention to the challenges that arise in a remote setting. They repeatedly emphasize the need for student autonomy and self-motivation, especially in comparison to face-to-face courses.
4. Online teaching is not a new phenomenon. Nevertheless, forms of learning that rely heavily on interaction are usually designed to be presence oriented. However, this does not have to be the case: Three papers are dedicated to serious games and game-based learning in a virtual environment management. They report from longtime experience, reflect the view of the students and the teachers, and give recommendations for using online serious games.

4.1. Digital competences, non-formal learning and ethics

Project management is, on the one hand, a set of highly standardized management methods worldwide. On the other hand, project management involves the day-to-day management and collaboration with a team under very specific local conditions (Hodgson and Paton, 2016; Söderlund, 2005). The digital revolution shifts competency maps needed for modern project management (Project Management Institute, 2018). Some arguments suggest that digital competences will not replace other competences but enrich them (European Commission, 2019). Even more, digital competences seem to rely on non-digital competences. Digitalisation might also change the institutional anchor of learning. In the field of applied professions, such as project management, non-formal training paths, such as vocational and job-related training offered by consultant firms, are common. In-company further training set up in large organizations and individual further training activities are characteristics of the field. Digitalisation opens up new perspectives for continuous, lifelong learning across boundaries to include new concepts, ideas, methods, and tools from a wide range of actors. This also enables small and medium-sized enterprises to better participate in trainings, especially in the form of networks.

The paper series opens with Marnewick and Marnewick (2021) making a strong cases for the digital intelligence that is necessary in the (project) world shaped by the fourth industrial revolution and for a concerted effort needed to upskill project managers. Digital intelligence requires new skills, but these do not yet seem to be sufficiently developed. Obviously, the project manager should have digital skills and competencies, but these must be rooted in moral values that enable individuals to rise to the challenges and adapt to the digital age. The focus is thus not only on technology, but also on how individuals use their cognitive and socio-emotional competences to deal with the consequences and impacts of technology. Areas of individual digital intelligence comprise eight factors ranging from digital identity, use and literacy to digital safety, security and rights. With regard to humans as social beings, digital emotional intelligence and communication are added to the list. Using Q-methodology, the authors identify three perspectives: Communication and collaboration; digital rights; and (technical aspects of) communication, and one emergent perspective: Online identity. From this perspective, the authors believe that "it is of the utmost importance that project managers skill themselves in online communication and collaboration." They also point out that a holistic approach is needed to manage projects in the future.

Learning, especially in a practical field like project management, takes place to large extent outside traditional education and training

organizations in the form of vocational and job-related training. Especially in an industry characterised by small and medium-sized enterprises like the tourism sector, network-based learning approaches seem to be promising and to benefit from digitalisation. The contribution of Marx et al. (2021) investigates inter-organisational, digitally facilitated virtual communities of practice (VCoP) as a means to support continuing professional development for digital transformation in the tourism sector. Based on a transnational survey, the study shows that individual interests, social interaction and learning from peers with self-paced learning, as well as organisational challenges constitute the motivational factors for joining a VCoP. The open framework of a VCoP allows participants to shape their engagement as individually and flexibly as possible, be it in terms of roles, content, or forms of collaboration. While the study found a high appreciation of learning online regardless of the organisational type, the high appreciation of social interaction and peer-to-peer learning along with self-paced learning requires flexibility of various modes of sharing practices, asynchronously and synchronously, facilitated by diverse digital tools. The open organizational and member structure results in volatile requirements, thus, the authors propose agile project management methodology for VCoP delivery, both as organizational means to cope with changing demands and as an opportunity for a peer-based learning by doing.

One central aim both of education and of the journal is to contribute to a better society, which includes also looking at the "dark side of projects" (Locatelli et al., 2022). Unethical conduct and corruption is one of the key issues for project management, especially in large infrastructure and construction projects (Locatelli et al., 2017). While most anti-corruption measures address project and ecology levels directly by regulation, penalties, incentives, enhancing transparency and incentivising stakeholders (Lehtinen et al., 2022), most scholars agree that corruption might best be reduced by enhancing education. Chilakamarri (2023) in her contribution considers one such educational intervention – training in values and ethics for construction project managers using popular films. She proposes a transdisciplinary approach to address and discuss importance of value-based decision-making. This paper conceptualizes the phenomenon of corruption in the construction domain, formulates key criteria for selecting films and proposes theoretical lenses through which learning outcomes can be enabled at both the cognitive and affective levels of learning. Popular films, notwithstanding some limitations, provide a comprehensive input and narratives to discuss value-based decision-making on relevant topics which would otherwise remain abstract concepts. Films offer the possibility of 'showing' the values in action, thereby providing for a more comprehensive engagement with corruption in the context of a construction project.

4.2. *Shifting to digital – challenges and solutions*

Digitization is said to be shifting the balance of programmed academic offerings towards more individualized ones (Al-Mahmood, 2020). Where there used to be well-planned schedules and roles, teachers are now expected to be responsive on the spot, flexible and interact with students in an individualized way. Online learning places press on learners stress due to autonomy of time, space and content enabled by self-learning materials (Torres Martín et al., 2021). To overcome these challenges, teachers now need to take a more open and inclusive approach to working with learners.

Minichiello et al. (2022) address the emergency change to distance learning following the Covid-19 outbreak. They examined students' affective responses in 27 science, technology, engineering, and mathematics (STEM) undergraduates courses across seven U.S. institutions to unexpected and unplanned changes in their teaching programmes. The results show a complex mix of positive and negative emotional reactions. Only a smaller group of participants reported feeling comfortable, confident, and independent in the emergency online learning environments. The most common reactions included feelings of stress and uncertainty, which were attributed to a variety of external, internal and contextual factors. The findings suggest that teachers need to take steps to reduce anxiety, stress and insecurity among students, especially during emergency-related events. Concrete actions should take into account the following factors: Adjusting course requirements and expectations; Student schedules may change, so it is advisable to make courses as flexible as possible; Students may struggle with managing and organizing assignments; Students are most likely stressed about events outside the scope of the course. Above all, be accessible online in person and provide a clear and simple instructional design – ideally coordinated with other courses and consistent with policies and procedures within a programme. In the long term, instructors should provide low-risk opportunities for students to engage in distance learning activities that include specific goals for self-direction and self-regulation of their own learning.

In contrast to the compassionate approach in the previous paper, van der Hoorn and Killen (2021) warn against succumbing to the temptation to "sanitize" project management education. There is a tendency to avoid risk in teaching, especially when moving online. However, real projects are complex and take place in a fast-paced environment, project work is ambiguous and dependent on external factors. This, the authors argue, needs to be reflected in realistic learning environments to prepare the students for their professional practice, including interactions with different groups of people, change, improvisation, and adaption. Using an online role-playing game as an example, they show how embracing unpredictability and authenticity – without overstretching the requirements – can enhance learning in project management. In addition to technical and procedural knowledge, this also resulted in unplanned learning about contextual project management practices, confidence in using appropriate techniques, especially agile project management, as well as human skills for interaction, collaboration, reflection and appreciation of diversity. Testing capabilities by desired difficulties triggered learning through reflection on and questioning practice, discussing with peers, or receiving feedback on performance. As actual performance during the role-play was not measured or assessed, mistakes could encourage reflection and help to embed learning more deeply. Additionally, the online setting was seen to have benefits for learning, reflecting the increasing virtualisation of project work. The online mode of the role-play provided students with insights into how tools and methods work in real-world contexts, thus bridging classroom and practice.

Hatt and Davidson (2022) reflect on the impact of an extended relational approach to the launch and delivery of an Executive MBA programme for post-experience learners during the pandemic. Among other changes, the shift to online learning disrupted the common interaction between teachers and students and among students, creating the risk of alienation. A relational approach, the authors argue, offers a counter to widespread "consumerism" among students by enabling teachers to mediate the relationships between the learner, the content, and the learning process, and to navigate the additional interfaces of online learning. By understanding education as a series of processes aimed at enhancing relationships, three themes are elaborated: Through digital residence – as opposed to simply visiting the digital space – students and teachers can relate to each other and to the content. While this may be trivial in physical space, great effort is required in digital space to achieve anchoring. Seemingly trivial additions to delivery plans, such as consideration on privacy in home learning or the aesthetics of the learning platform, led to significant improvements in the learning experience. Being close to, or rather in the middle of, each other's homes, and lacking the professional environment common in physical universities, led to a feeling of what the authors called 'weird intimacy'. This can lead to a more authentic presence of teachers and learners and facilitate the social construction of knowledge but requires a paradigm shift for some learners and teachers about the nature of knowledge and the role of teaching in learning. Even experienced educators felt insecure and socially anxious in the digital space, sensing the lack of feedback and at the same time exhausted by the constant display.

Both team teaching and debriefing sessions served as mutual support, reassurance, and reflection on their own practice.

4.3. Motivation, engagement and affection in virtual settings

Ang et al. (2021) assert, "project management teaching and learning designed to develop future project leaders requires both knowledge acquisition and practical application to ensure that theory and practice converge with deep learning." Recent research emphasises the importance of student engagement and participation for motivation, satisfaction and success in teaching (Kirschner et al., 2006; Westwood, 2008), a role shift from a hierarchical teacher-centred to student-centred approaches to learning is required (Ammenwerth, 2017; Ó Ceallaigh, 2021). A change of role also seems to be necessary on the part of the learners (Bovill, 2020), as well as a change in the culture of the host organization.

In their contribution, Afzal and Crawford (2022) prove that "student engagement is considered an essential element of student's learning experience and performance." While we know much about student engagement in the face-to-face environment, less is known about its impact on student performance in online learning. In line with the theoretical underpinnings of self-determination theory (Ryan and Deci, 2000, 2019) student engagement is embedded into peer, teacher and content engagement, while the effect of student engagement is correlated to performance, with self-motivation acting as a mediator. Using data from undergraduate and postgraduate project management programs delivered online, the authors found that self-motivated students are likely to engage better with their peers – an essential feature since project management learning is activity based and therefore interaction with fellow students is the most important dimension of student engagement. Moreover, student engagement is significantly related to student performance, and self-motivation is essential to perform in the online environment. Based on these findings, the authors argue for a careful design of online learning to promote student collaboration through the design of learning steps.

The high importance of the motivational climate for student engagement in online courses is also the starting point of the contribution by Jones et al. (2022). The widely used MUSIC model (Jones, 2018) was developed to provide instructors with a framework to organize motivational teaching strategies. Five student perceptions — empowerment, usefulness, success, interest, and caring — are particularly important in creating a positive motivational climate and are related to student engagement and teaching evaluation. The model and the research findings based on it make a strong case for student-centred approaches to learning, particularly when it comes to management teaching. Results of teaching and learning, the authors argue, are based on complex interactions between the instructor, students, content, and instructional activities that lead to emergent outcomes and behavioural changes over time due to the dynamic nature of the complex system. In this paper, the authors describe the application of an online survey tool to assess the motivational climate in an online asynchronous course over time based on the MUSIC model. Drawing on the feedback from the repeated application of the online survey, targeted interventions to improve the course are possible during training, provided teachers are flexible and willing to make changes on the fly to foster students' motivation and learning. The digital assessment tool thus leads instructors to become more effective course managers, allows for more effective individualized instructions for students, and provides a means to train instructors to become better teachers.

4.4. Interactive learning settings in virtual environments

Jonasson and Ingason (2022) believe that "active practice-based learning is the ideal teaching method in project management education." They argue for the importance of active learning and actual project experience as an integral part of students' education and that working in teams on a real project is an important motivational factor for learning. While flipped-blended learning (Ashleigh et al., 2012) and case-based teaching methods are widely used and well understood in project management education nowadays (Erbas, 2016; Vega and Aubry, 2018), more recent trends in project management education are role-plays and game-based learning approaches (Freitas, 2018). Studies assembled in this special collection underpinned the importance and effectiveness of this methods especially for project management:

Jääskä et al. (2022) report on a quasi-experimental study with project management students in six European higher education institutes. Guided by Keller's ARCS (attention, relevance, confidence and satisfaction) model of motivation (Keller, 1999), students were asked to assess how the game-based learning affected their motivation and learning. The authors emphasize the impact of game-based learning on dealing with uncertainty, as is common in real projects. Findings included students' positive and negative perceptions, which ultimately affected students' motivation to study and learn project management. On a positive note, game-based learning methods can sustain students' attention if they are complex enough and provide challenge and excitement, and enabled students to understand real life implications, provided the game narrative and contextualisation is coherent and provides possibilities for trial and error. Above all, games may be fun in a straightforward learning environment. Careful planning and implementation are required to achieve the desired impact. Among the most important factors for successful implementation of these methods are: Plan for excitement and enjoyment, but at the same time games need to be realistic; Appropriate challenges for learning through trial and error; Features to practice skills such as decision-making and problem-solving under uncertainty and change; Integration of relevant instructions, materials and tools into comprehensive learning solutions; Assessment with caution.

In another paper Jääskä and Aaltonen (2022) turn to the teachers' perception of game based learning using in-depth interviews with 22 experienced university lecturers teaching project management. Complementing the above findings, the teachers agreed that game-based learning has positive effects for students, such as increased interest and knowledge acquisition with a memorable learning experience. Even more so, teacher inspiration and motivation are boosted by a novel method to motivate and engage students. Even though business games are not a stand-alone teaching method, game-based learning has the potential to facilitate teaching and complement more conventional methods in project management education. On the downside for teachers, obtaining, learning, and teaching the business game may involve considerable extra work and they may find it difficult to adequately monitor and measure learning. And teachers have to deal with reactions of students that may be exposed to increased cognitive load and stress. Additionally incorporating this cumbersome method into lectures and curricula requires resources and preparation on the part of teachers to avoid technical and pedagogical risks, as well as appropriate technical and organisational arrangements on the part of the host institution.

Jaccard et al. (2022) report on the pedagogical implementation of serious games and how they influence project management education based on 10 years of qualitative observations and discussions with teachers who have used project management games. They show that serious games can lead to demanded changes such as moving toward active pedagogies, developing new competencies such as soft skills, and changing teachers-students relationship. In a synthesis of semi-structured observations, six crucial themes are introduced and complemented with general recommendations for serious games development and pedagogical implementation. The authors conclude that serious games have the potential to trigger a change in project management education, provided they have been designed, developed, and implemented as an integrated concept. The integrated gaming concept has to include hybrid simulation modalities such as software simulation and role-plays and provide both virtual and augmented

learning environments. At the learning level, the serious game has to be embedded into an overall pedagogical concept. As such, using a serious game is a time-consuming endeavour, both for teachers and student. Therefore, the advantages of a serious game need to be carefully weighed against the potential disadvantages, the time and resources one is willing to invest in the process and the compromises one is willing to make in terms of the pedagogical approach.

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