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**Original Article**

# Teaching and learning in Project Management: what are the challenges?

## Ensino e aprendizagem em Gestão de Projetos: quais são os desafios?

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## ABSTRACT

**Purpose:** The objective of this work is to understand how teaching and learning in project management happens and what their challenges are.
**Design/methodology/approach**: To achieve this objective, we developed a Systematic Literature Review about teaching and learning in project management. Initially, we found 667 works. After reading the title, we selected 150 works for a full reading. 120 were suitable for the proposed objective.
**Findings:** We found five categories: (1) learning; (2) teaching; (3) education; (4) skills; and (5) knowledge.
**Originality/value:** We observed that there are gaps in the studies dealing with these themes concerning project management. Topics such as management of learning processes, the relationship between learning in educational institutions and organizational environments, the impact of informal learning, experiential learning, comparison of serious games and simulations with other learning methods, serous games in projects, hard skills, and soft skills, are still not widely published in academic journals on project management.

**Keywords**: Learning; Teaching; Education; Project management; Systematic literature review

## RESUMO

**Objetivo:** O objetivo deste trabalho é compreender como acontece o ensino e a aprendizagem em gerenciamento de projetos e quais são seus desafios.
**Desenho/metodologia/abordagem:** Para atingir esse objetivo, desenvolvemos uma Revisão Sistemática da Literatura sobre ensino e aprendizagem em gerenciamento de projetos. Inicialmente, encontramos 667 trabalhos. Após a leitura do título, selecionamos 150 obras para leitura completa. 120 eram adequados ao objetivo proposto.
**Constatações:** Encontramos cinco categorias: (1) aprendizagem; (2) ensino; (3) educação; (4) habilidades; e (5) conhecimento.

**Originalidade/valor:** Observamos que existem lacunas nos estudos que tratam desses temas no que diz respeito ao gerenciamento de projetos. Tópicos como gestão de processos de aprendizagem, relação entre aprendizagem em instituições de ensino e ambientes organizacionais, impacto da aprendizagem informal, aprendizagem experiencial, comparação de jogos sérios e simulações com outros métodos de aprendizagem, jogos sérios em projetos, hard skills e soft skills, ainda não são amplamente publicados em revistas acadêmicas sobre gerenciamento de projetos.

**Palavras-chave:** Aprendizagem; Ensino; Educação; Gerenciamento de projetos; Revisão sistemática da literatura

## 1 INTRODUCTION

Every year, the project management environment becomes more dynamic and complex (Chhetri & Du, 2020). In addition, the increased demand for quick delivery of projects with changing conditions has accentuated the need for project managers to seek better project management solutions and resources (Chhetri & Du, 2020). Given the complexity and dynamics, managers are challenged to achieve project success.

However, success is not achieved in many projects due to project managers' failures to communicate problems, work within the organization's culture, motivate their team, manage stakeholders, understand strategic objectives, solve problems effectively and take action and the right decisions (Rumeser & Emsley, 2019). Therefore, organizations are challenged to seek alternative ways to develop the project management team (Lee-Kelley, 2018).

Among the most effective ways to develop project teams are education and teaching. However, there are deficiencies in identifying educational demands and challenges for training a professional in the area (Córdoba & Piki, 2012; Nijhuis, Vrijhoef, & Kessels, 2018). Conventional methods, courses, and training are business schools' most common educational forms (Nijhuis et al., 2018). However, project learning can happen not only formally but also informally.

In this way, the paths for the development of project managers are paved with formal and informal learning experiences. Knowledge of learning experiences that project managers indicate as important for their development as professionals

are limited in both the academic and professional worlds (Säisä, Tiura, & Matikainen, 2019). One of the demands for developing professionals who deal with projects is the approximation between theory and practice (Säisä et al., 2019).

Project management education strives to help students and professionals deal with complexity to create a rapprochement between theory and practice (Rumeser & Emsley, 2018a). Project management knowledge alone (knowing what) is not enough to deal with complexity. Training professionals and students need to be able to apply their knowledge (know how) in the right situations (know when) and for the right reasons (know why) (Rumeser & Emsley, 2018a).

However, as project research is relatively young, with an underdeveloped theory, the role of learning processes and knowledge integration in traditional and contextual project management is also underdeveloped in the literature (Ahern, Byrne, & Leavy, 2016). In this way, this study aims to understand how teaching and learning in project management happens and its challenges. A Systematic Literature Review was developed to review the topics involved in achieving this objective.

## 2 MATERIAIS AND METHODS

This research used the Systematic Literature Review (SLR) to understand how teaching and learning in project management happens and its challenges. RSL is not the same as conventional methods, representing a replicable and transparent process (Penha, Kniess, Silva, & Silva, 2020).

We observed the six steps indicated by Pollock and Berge (2018) to carry out this RSL. First, the objectives and methods of the research were clarified. Second, significant scientific work was located. Third, data were collected. Fourth, the quality of the studies was appreciated. Fifth, the evidence was summarized. Finally, sixth, the information found was understood and interpreted (Pollock & Berge, 2018).

As an initial step, the research was oriented based on the question, “how does teaching and learning in project management happen and what are its challenges?”

For this, the Scopus database was used as a research source. On this basis, the ten most relevant and prolific scientific journals in the field of Project Management were selected (Table 1).

Table 1 – Selected Project Management Journals and H-Index

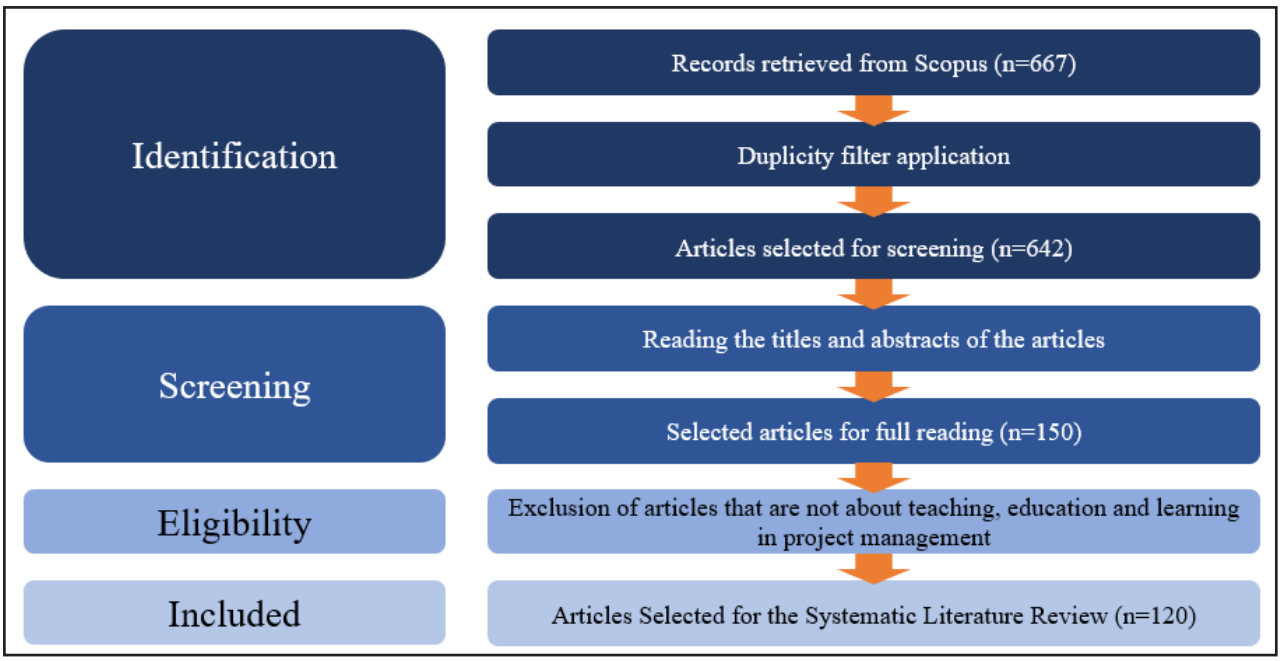
| Journal | H-Index | CiteScore |
|---|---|---|
| International Journal of Project Management | 153 | 9,05 |
| Impact Assessment and Project Appraisal | 55 | 2,09 |
| Project Management Journal | 48 | 4,65 |
| International Journal of Managing Projects in Business | 38 | 3,15 |
| International Journal of Project Organisation and Management | 22 | 2,1 |
| International Journal of Information Systems and Project Management | 16 | 2,06 |
| Impact Assessment and Project Appraisal | 15 | 1,32 |
| Journal of Modern Project Management | 9 | 0,59 |
| International Journal of Information Technology Project Management | 6 | 1,13 |
| Project Management and Risk Management in Complex Projects: Studies in Organizational Semiotics | 3 | - |

Source: Elaborated by the author based on the Scopus database (2022)

After choosing the research base and journals, the search string TITLE-ABS-KEY ((“learn*”) OR (“education*”) OR (“teach*”)) AND SRCTITLE (“International Journal of Project Organisation and Management” OR “International Journal of Project Management “OR” ImpactAssessmentandProjectAppraisal”OR“ProjectManagementJournal”OR“International Journal of Managing Projects in Business” OR “International Journal of Information Systems and Project Management” OR “Impact Assessment and Project Appraisal” OR “Journal of Modern Project Management” OR “International Journal of Information Technology Project Management” OR “Project Management and Risk Management in Complex Projects: Studies in Organizational Semiotics” OR “International Journal of Agile Systems and Management”). The word “education” was inserted to contribute to the search on teaching and learning. The survey was initially conducted on September 11, 2021 and was updated on January 25, 2023. The search was limited to articles up to the year 2022.

In this search, as mentioned earlier, 667 articles were found in the database, and the analysis took place using the online software Rayyan (2022). It made it possible to read the titles and abstracts of each work, divide the articles into three groups (Included, Excluded, and To be defined) and create exclusion criteria and labels. Figure 1 presents in detail the analysis and screening that were developed.

Figure 1 – Identification and screening steps in the Scopus database




Source: Prepared by the author based on Penha et al. (2020) and Pollock and Berge (2018)

In the first stage, identification, 667 articles were found in the Scopus base after defining the search string. Using the Rayyan software, we applied a duplicity filter, and three articles were removed. In the second stage, screening, we read the titles and abstracts to identify the works that dealt with teaching, education, and learning in project management.

We included all articles with the terms and their derivatives in the title, abstract, and keywords: teaching, learning, education, and project management. Articles not directly related to the terms and their derivatives were excluded: teaching, learning, education, and project management. From this screening, 150 papers were selected for a full reading.

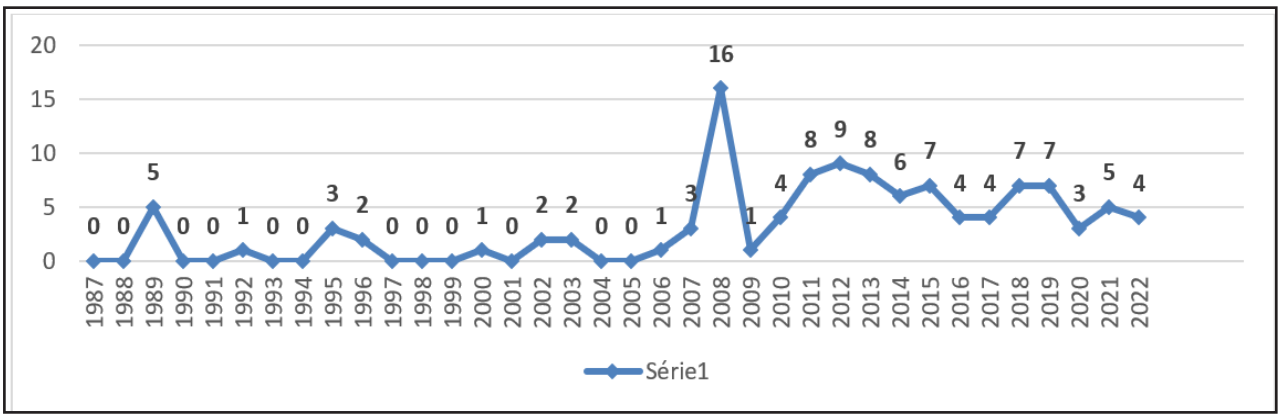
Therefore, in the last phase of analysis, the 150 articles on education, teaching, and learning in project management were selected for a full reading. In this phase, diligent reading of each of the works was carried out, categorizing and grouping them in a spreadsheet in the Microsoft Excel® software to compare the categories. After reading the articles, 30 works that did not involve education, teaching, or learning project management were excluded. In this last step, the evidence was synthesized, and the data obtained were interpreted (Pollock & Berge, 2018).

## 3 PRESENTATION AND ANALYSIS OF RESULTS

### 3.1 Article Mapping

Elected articles from the ten scientific journals mentioned in the topic Materials and Methods (Table 1) were selected and analyzed. As indicated, the articles underwent careful analysis that made it possible to understand how teaching and learning take place in project management. Of the 150 articles selected for reading, 120 were suitable for the proposed objective. These works are between 1983 and 2022 (Figure 2).

Figure 2 – Articles temporal analysis




Source: The authors (2022)

Figure 2 shows that articles on education, teaching, and learning in project management had a peak of publications in 2008 (sixteen works). In the following year,

there was a decrease. However, from 2010 onwards, publications grew about the average number of publications before 2008. As searches for articles were carried out in December 2022, it is believed that future investigations will find other works on the theme this year. Another relevant point for analysis is the frequency of articles per journal, as shown in Table 2.

Table 2 – Journals and number of articles published

| Journal | Number of Articles |
|---|---|
| International Journal of Project Management | 73 |
| International Journal of Managing Projects in Business | 24 |
| Project Management Journal | 15 |
| Journal of Modern Project Management | 4 |
| International Journal of Information Technology Project Management | 2 |
| International Journal of Agile Systems and Management | 1 |
| International Journal of Information Systems and Project Management | 1 |
| *International Journal of Project **Organization** and Management* | 0 |
| Impact Assessment and Project Appraisal | 0 |
| Project Management and Risk Management in Complex Projects: Studies in Organizational Semiotics | 0 |
| **Total** | 120 |

Source: The authors (2021)

Of the ten selected scientific journals, only five contained articles contemplated by the research objective. The journals that did not have works for the composition of the analysis were:

- International Journal of Project Organization and Management.
- Impact Assessment and Project Appraisal.
- Project Management and Risk Management in Complex Projects: Studies in Organizational Semiotics.

Table 3 – Categories

| Category | Authors |
|---|---|
| Learning | Aerts, Dooms and Haezendonck (2017); Agbejule, Rapo and Saarikoski (2021); Ahern, Leavy and Byrne (2014); Aramo-Immonen, Koskinen and Porkka (2011); Ayas (1996); Bartsch, Ebers and Maurer (2013); Bourgeon (2007); Carmeli, Levi and Peccei (2021); Cavaleri and Reed (2008); Chan, Oerlemans and Meslec (2021); Chang, Wiewiora and Liu (2021); Chipulu, Ojiako, Ashleigh and Maguire (2011); Chronéer and Backlund (2015); Cooper, Lyneis and Bryant (2002); Dixon (2011); Duffield and Whitty (2016); Duffield and Whitty (2015); Dutton, Turner and Lee-Kelley (2014); Egginton (2012); Eriksson, Leiringer and Szentes (2017); Fuller, Dainty and Thorpe (2011); Hällgren and Wilson (2011); Ndoni and Elhag (2010); Heravi and Gholami (2018); Iftikhar, Ahola and Butt (2022); Jugdev and Mathur (2013); Khalfan, Ng, Haas, Kashyap and Maqsood (2022); Khedhaouria, Montani and Thurik (2017); Killen, Hunt and Kleinschmidt (2008); Konak and Kulturel-Konak (2019); Koskinen (2012a, 2012b); Lee-Kelley (2018); Lee-Kelley and Blackman (2012); Love, Teo, Davidsson, Cumming and Morrison (2016); Matthews, Stanley and Davidson (2018); McClory, Read and Labib (2017); Midler and Silberzahn (2008); Nauman, Bhatti, Imam, and Khan (2022); Ngereja and Hussein (2021); Ojiako, Chipulu, Ashleigh and Williams (2014); Nilsen (2013); Rezania and Lingham (2009); Rumeser and Emsley (2018b, 2019); Russell-Hodge (1995); Säisä et al. (2019); Savelsbergh, Poell and Heijden (2015); Savelsbergh, Havermans and Storm (2016); Sense (2003, 2007b, 2008, 2011, 2013); Shelley (2015); Thiry (2002); Vanhoucke (2014); Wiewiora, Chang and Smidt (2020); Wong, Cheung, Yiu, and Hardie (2012); Zhao, Jiang, Lin, Liu and Wu (2022) |
| Teaching | Borg and Scott-Young (2020); Cohen (2015); Divjak and Kukec (2008); Lebcir, Wells and Bond (2008); Ojiako, Ashleigh, Chipulu and Maguire (2011); Ojiako, Ashleigh, Wang and Chipulu (2011); Woodward (1983) |
| Education | Archibald (1989); Ashleigh, Ojiako, Chipulu and Wang (2012); Atkinson (1986); Berggren and Söderlund (2008); Björnsson, Gunnarsspn and Hammarlund (1989); Bredillet, Conboy, Davidson and Walker (2013); Campbell (1985); Cicmil and Gaggiotti (2018); Córdoba and Piki (2012); Crawford, Morris, Thomas and Winter (2006); Dan (1995); Hällgren, Nilsson, Blomqist and Söderholm (2012); Harland (1989); Harris and Flower (1984); Helgadóttir (2008); Hutcheson (1984); Knoepfel (1989); Lauridsen (1989); Louw and Rwelamila (2012); Martin (2000); Mengel (2008); Pant and Baroudi (2008); Ram, Wu and Tagg (2014); Ramazani and Jergeas (2015); Ramsay, Cole and Boardman (1996); Rumeser and Emsley (2018a); Sewchurran (2008); Shelley (2015) Ssegawa and Kasule (2015); Stoyan (2008); Thomas and Mengel (2008); Tsoukanas (1995); Turner (2016); Turner, Scott-Young and Holdsworth (2019); Wearne (1985); Wirth (1992); Woodward (1986) |
| Competences | Alam, Gale, Brown and Kidd (2008); Alam, Gale, Brown and Khan (2010); Buganza, Kalchschmidt, Bartezzaghi and Amabile (2013); Eskerod (2010); González, Casas and Coronado (2013); McCreery (2003); Nijhuis et al. (2018); Sense (2007a); Skulmoski and Hartman (2010); Söderlund, Vaagaasar and Andersen (2008); Walker and Lloyd-Walker (2019) |
| Knowledge | Hydle and Breunig (2013); Hoorn and Whitty (2019); Yap and Skitmore (2020); Zhang and Min (2019) |

Source: The authors (2021)

Of the seven journals that submitted articles for analysis, the International Journal of Project Management stands out as the most prolific journal, with 73 publications. The journals International Journal of Managing Projects in Business, with 24 articles, and Project Management Journal, with fourteen articles, also stand out among the journals with the highest number of publications. Finally, the Journal of Modern Project Management, International Journal of Information Technology Project Management, International Journal of Agile Systems and Management and International Journal of Information Systems and Project Management appears with the lowest number of publications, with four and two, respectively.

After mapping the articles that were part of the analysis, we in-depth analyzed the published content. Based on this reading, the works were categorized into five groups, as shown in Table 3.

Learning, teaching, education, skills, and knowledge were abstracted from the readings. It should be noted that the skills and knowledge categories are composed of articles that interact with learning, teaching, and education items. However, as the work's central theme was skills and knowledge, these two terms were added as categories. The categorization process was carried out based on the main subject of each of the works.

## 3.2 Analysis and Discussion of the Found Categories

### 3.2.1 Learning

Learning is a relevant topic in project management, mainly because projects are temporary, unique undertakings composed of individuals and developed by one or several organizations to achieve established objectives and generate value (Rezania & Lingham, 2009; Wiewiora et al., 2020). Thus, it is not uncommon for the subject of learning to appear in research divided into three levels: (1) individual, (2) team, and (3) organization (Aerts et al., 2017; Carmeli et al., 2021; Chan et al., 2021;

Khedhaouria et al., 2017; Konak & Kulturel-Konak, 2019; Koskinen, 2012a; Wiewiora et al., 2020). It should be noted that learning also involves work on educational methods and training, which involve practice (experiential learning) (Carmeli et al., 2021; Rumeser & Emsley, 2019), project learning, and learning through university courses (Chipulu et al., 2011; Dixon, 2011; Ojiako et al., 2014; Vanhoucke, 2014).

The category of learning is also discussed in articles that study inter-organizational and multilevel learning (learning between different organizations and between different organizational levels) (Iftikhar, Ahola, & Butt, 2022), learning between projects (Zhao et al., 2022) and social learning (importance of social agents - for example, leaders - as sources of behavioral patterns) (Nauman et al., 2022). In addition to these themes, there are articles that involve specific aspects of the organization, such as: (1) relationship between organizational climate and learning of project teams (Agbejule et al., 2021); (2) learning in projects as a mediator of innovation (Ngereja & Hussein, 2021); and (3) influence of leadership on the learning of the participants of a project.

It is worth noting, that in addition to organization-related and cross-organization learning, there are works that aim to study learning through educational methods and training, which involve practice (experiential and participant or learner-centered learning) (Khalfan et al, 2022; Carmeli et al., 2021; Rumeser & Emsley, 2019), project learning (Chang, 2021), and learning through university courses (Khalfan et al., 2022; Chipulu et al., 2011; Dixon, 2011; Ojiako et al., 2014; Vanhoucke, 2014).

Individual learning occurs through each project member and can be impacted by internal and external learning (Chan et al., 2021). Research shows that learning orientation and knowledge-gathering behaviors play a central role in developing creativity and coping with project pressures (Khedhaouria et al., 2017). Therefore, learning improves knowledge and creativity (Khedhaouria et al., 2017).

In addition to improving creativity, learning, and knowledge, they positively influence the engagement of the individuals who make up the project (Matthews et

al., 2018). It is worth highlighting that learning experiences can occur formally and/or informally both in the project environment and in environments outside the institution.

Due to day-to-day activity, the central learning in projects happens informally or accidentally (Savelsbergh et al., 2016). However, for the effectiveness of this learning, self-reflection and reflection carried out by others and, in particular, by the manager are a priority since the latter plays a leadership role in obtaining lessons and presenting learning opportunities throughout the year. project (Savelsbergh et al., 2016). For the authors Aramo-Immoren, Koskisen and Porkka (2011), learning takes place within project work practices. Therefore, for the authors, formal learning does not play a significant role in developing project-based companies.

As mentioned, learning takes place at the individual level. However, it can also happen at the team level since the lack of professional qualification in project teams is one of the most significant factors for the high failure rate of Information Technology (IT) projects, for example (Konak & Kulturel-Konak, 2019). Teamwork involves learning about team building, performance evaluation, team coordination, communications, conflict resolution, and resolution in both face-to-face and virtual environments (Konak & Kulturel-Konak, 2019).

In addition to the internal aspects of group work, teams create relationships with other teams to achieve higher levels of internal and organizational learning (Chan et al., 2021). In this way, teams can improve project performance through two knowledge creation mechanisms – access to knowledge and experiential learning – that support resilience and creative problem-solving (Carmeli et al., 2021). Another relevant factor when discussing the team is relationships. Relationally coordinated project teams develop resilience and creative problem-solving skills and improve project performance (Carmeli et al., 2021).

Team coordination, aiming to develop relationships between members and learning between projects, can transfer teams from one project to another (Aerts et al., 2017). The authors Aerts et al. (2017) presented the public sector as an example and

indicated that transfers develop interpersonal and individual learning. Therefore, learning is a basic building block for creativity, innovation, performance, competitive advantage, and, ultimately, the organization's survival (Chan et al., 2021; Killen et al., 2008).

Thus, project leadership behaviors should be people- and task-oriented, as they positively relate to team learning. Another significant role of leadership is to develop an environment of stability for the team (Savelsbergh et al., 2015). It is known that the environment of most projects is not stable. However, it is the manager's role to create a space for teams to develop learning, that is, to hit and miss (Savelsbergh et al., 2015).

Therefore, project teams are temporary organizational forms that are especially effective in situations that require learning and problem-solving (Rezania & Lingham, 2009). In the contemporary competitive environment, it becomes essential for companies to master, promote and maintain the collective learning developed during new product development projects (Bourgeon, 2007). Therefore, it is challenging for learning development projects at the team and organizational level.

As we look from the past to the future of project management, one of our most significant challenges is the largely untapped opportunity to transform project performance (Cooper et al., 2002). It remains to discern how to extract and disseminate management lessons as we move from project to project and manage and execute project portfolios (Cooper et al., 2002).

Learning can also happen through lessons learned (Love et al., 2016). The lessons-learned process aims to capture the results and experiences of successes, failures, and near misses and absorb them into the organizational structure for future use (McClory et al., 2017). Lessons learned to provide more value when they are part of a continuous learning process. Therefore, they must be documented, communicated, and archived throughout all stages of a project (Love et al., 2016).

Thus, using best practice directories, lessons learned reviews, and building performance review forums work well in some organizations (Duffield & Whitty, 2016). Therefore, they should identify that learning happens before, during, and after the

completion of projects and that reflection activities significantly affect learning (Duffield & Whitty, 2016). Therefore, having an infrastructure in place facilitates open and frank sharing of knowledge (Duffield & Whitty, 2016). A significant challenge for government and business project institutions is to ensure that lessons are learned, and that past mistakes are not repeated (Duffield & Whitty, 2015).

Lessons learned become relevant for organizational learning, given that past projects can help performing organizations deliver successful projects (Heravi & Gholami, 2018). Therefore, by learning from previous or similar projects, a project-based organization can increase and/or decrease opportunities and/or threats in current projects and achieve success.

Another form of organizational learning takes place through problem-solving. That is, learning occurs through identifying and resolving problems that arise in the execution of projects (Koskinen, 2012b). Because of this, the essence of "professional" project management lies in the organization's ability to improve processes and systems with each project undertaken continually. It requires continuous improvement of the underlying knowledge base and learning capacity (Ayas, 1996).

In addition to organizational learning, projects can also learn. Project learning is related to individuals' internal cognitive processes, interpretation, and integration of learning at the team and project level, as well as the organization's ability to institutionalize learning into practices (Wiewiora et al., 2020). It can be considered multidimensional and complex, given that it occurs between individuals, teams, projects, and various institution units (Wiewiora et al., 2020).

Project learning is multidimensional and complex, as systemic thinking and a holistic learning perspective are crucial (Chronéer & Backlund, 2015). Learning spaces become essential for organizing learning and creating knowledge. That said, learning has become the buzzword and is seen as a prerequisite for development and innovation, both in the private and public sectors (Nilsen, 2013). During project work, learning and knowledge creation processes happen mainly during social interaction in

the project group and later through the social interaction that project members have with colleagues external to the project (Nilsen, 2013).

Learning spaces are important. However, it is a significant challenge for project-based institutions to learn beyond project boundaries, making project-level knowledge available to the organization (Bartsch et al., 2013). This difficulty comes from the temporary and discontinuous nature of the projects, which creates specific intra-organizational barriers to learning, interrupting the flow of knowledge between the project and the organizational context (Bartsch et al., 2013). Learning barriers can be attributed to the lack of opportunities, capacity, and motivation for learning in project-based organizations (Bartsch et al., 2013).

At an organizational level, the main implication of conceiving projects and project teams as meaningful generative learning sites is that projects can be (and should be) recognized and better leveraged as vehicles to promote organizational learning (Sense, 2011). Organizations are most often focused on perceptually formalized and directly responsible programs of learning development and change in permanent organizational structures to guide the development of organizational learning (Sense, 2011). In contrast, social learning approaches are more organic and dispersed than structured and, therefore, more difficult to assess, track, and directly influence (Sense, 2011).

Therefore, organizations learn through crises. Crises can be managed according to at least four general responses (mobilization, prioritization, normalization, and accountability) associated with learning within the organization through the culture of practice, knowledge indicators, aesthetic understanding, conversations in and about the practice, mediation of knowledge and situated learning (Hällgren & Wilson, 2011).

Experiential learning, an educational method that aims to practice through games, simulations, and experiences in real environments, can be a path for the development of learning and preparation for the practical context of projects. Game-based learning is one way of developing skills through experiential and hands-on

learning. Usually, this type of learning is developed through Serious Games or educational games (Rumeser & Emsley, 2019).

Serious or educational games combine features of games and simulations (Rumeser & Emsley, 2019). Therefore, they can be used to develop skills and prepare to work on projects (Rumeser & Emsley, 2019). It should be noted that serious games can improve decision-making performance, regardless of the game's level of complexity (Rumeser & Emsley, 2019).

Just as learning to fly an airplane depends on hours of training in simulators and/or games to develop decision-making and skills, project managers must be trained to command projects (Rumeser & Emsley, 2019). Many projects fail because project managers fail to communicate problems, work within the organization's culture, motivate their team, manage stakeholders, understand strategic objectives, solve problems effectively and make the right decisions (Rumeser & Emsley, 2019). Points that could be adjusted through simulations and experiences in games (Rumeser & Emsley, 2019).

The simulation aims to encourage the reflective practice by providing participants with the opportunity: to work in teams to derive 'common' solutions; evaluate your mutual company's results and effectiveness against system-generated status reports (provided to teams after each iteration); ascertain explanatory lessons that will guide the development of alternative theories for action and apply the preferred solution (Lee-Kelley, 2018).

However, it is important that learning using games and simulations be compared with other teaching-learning methods (Rumeser & Emsley, 2018b). Rumeser and Emsley (2018b) indicated no preferred and dominant learning method. That said, games and simulations can be used together or separately. Games value fun, appeal, and teamwork. Simulations highlight clarity and accessibility. The authors also indicate that design games with a higher level of complexity are superior to those with a lower level of complexity, as the former offers a desirable unique experience, which is complex, challenging, and realistic, which the latter does not provide. This statement contrasts

with research by the same authors in 2019 (Rumeser & Emsley, 2019), which indicated that the game's level of complexity does not affect learning.

It is noteworthy that experiential learning and the essential knowledge and skills for project management can also occur through university education institutions (Chipulu et al., 2011; Dixon, 2011; Ojiako et al., 2014; Vanhoucke, 2014).

In general, education is a form of learning in which a group of people's knowledge, skills, and habits are transferred from one generation to the next through teaching, training, or research (Vanhoucke, 2014). The education offered at universities is a way of academic learning that aims to transfer knowledge of different types to university students through classic teaching methods, such as: group classes, discussions, or case study work, but also working independently, in small or large groups, using simulation tools or e-learning platforms and much more (Vanhoucke, 2014).

Students' project management learning experiences are likely to be influenced by five demographic variables (i) gender, (ii) program (level) of study, (iii) university, (iv) previous project management study, and (v) previous project management work (Ojiako et al., 2014). Therefore, higher education institutions should be concerned with the individual characteristics of each student and the educational methods that will be applied to teaching and learning project management (Ojiako et al., 2014).

It can be said that university education has a double thrust (Dixon, 2011). The first goal is to prepare students for life after graduation (Dixon, 2011). The second objective is to establish a level of maturity in students that promotes lifelong learning (Dixon, 2011). Two types of pedagogy must be combined to do so. The first is experiential learning, as mentioned, and the second is service learning (Dixon, 2011). Service learning focuses on providing the student with an understanding of the social context and the development of empathy. Finally, it is emphasized that incorrect learning can impact organizations' long-term profit (Cavaleri & Reed, 2008) and value delivery to projects.

Therefore, we perceived through the articles and the presentation that learning in project management may be divided into teaching-learning techniques and ways

learning takes place within the projects and the organization. Table 4 was created to facilitate understanding.

Table 4 – Learning Overview

| Teaching-Learning Techniques | Learning within the project and the organization |
|---|---|
| Training Courses<br>University courses<br>Serious Games,<br>Experiential Learning.<br>Business Games<br>Simulations<br>Service Learning<br>E-learning | Learning at organizational levels: individual, team, and organization.<br>Formal Learning<br>Informal Learning |

Source: The authors (2022)

Table 4 allows the synthesis of the topic and the relationship between the themes. Formal learning can be accomplished through training and university courses and facilitated by teaching-learning techniques: serious games, experiential learning, games, service learning, and e-learning. However, learning doesn't just happen at the level of the individual. It also occurs at the team and organizational levels. However, at these levels, learning can be formalized through lessons learned from the project (organizational level) and the team relationship (Informal Learning). Thus, effective learning must involve both theory and practice and move from a teacher- and content-centered approach to a learner-centered approach in disciplines focused on teaching-learning agile projects (Khalfan et al., 2022) and in disciplines focused on predictive design. Thus, practice can occur in a protected environment such as the classroom (experiential learning, simulations, serious games, and business games) or the experience of real projects in an organization.

### 3.2.2 Teaching

All articles involving the topic of teaching and project management focus on higher and postgraduate courses and institutions, as well as on students (Borg & Scott-

Young, 2020; Cohen, 2015; Divjak & Kukec, 2008; Lebcir et al., 2008; Ojiako, Ashleigh, Chipulu, & Maguire, 2011; Ojiako, Ashleigh, Wang, & Chipulu, 2011; Woodward, 1983).

The work of Borg and Scott-Yong (2020) indicates that the project management profession was normally considered an "accidental profession". That said, undergraduate and graduate courses began to create disciplines and courses focused on training professionals for the area. However, there is a need for educational institutions to focus on the competence demands required by companies (Borg & Scott-Young, 2020).

For the skills taught to be related to what is required by organizations, it is essential to improve the development of the project manager as an individual capable of not only functioning competently but also as someone who can deliver value to customers in a dynamic project environment. One possible means of encouraging learning in such dynamic environments might be to emphasize an approach to learning and teaching based on the constant adjustment of knowledge development (both tacit and explicit).

With an interest in learning and teaching, researchers in project management must develop a discipline in which learning takes place through fluid and dynamic environments (Ojiako, Ashleigh, Wang, & Chipulu, 2011). Another growing interest resides in need to create an identity for the disciplines, one that considers project managers as individuals and encourages the perception of roles (Ojiako, Ashleigh, Wang, & Chipulu, 2011). Finally, it is necessary to ensure that learning reflects the real world (Divjak & Kukec, 2008; Ojiako, Ashleigh, Wang, & Chipulu, 2011).

Teaching represents reality when it develops transferable skills, such as: interpersonal skills, time management, curriculum coherence, critical thinking, and communication (Ojiako, Ashleigh, Chipulu, & Maguire, 2011). For this, educators need to facilitate the learning process of project management learners to make them knowledge creators instead of simple knowledge receivers (Ojiako, Ashleigh, Chipulu, & Maguire, 2011). These demands call for an emphasis on broad learning experiences and changes in institutions that teach project management (Ojiako, Ashleigh, Chipulu, & Maguire, 2011).

One of the best ways to develop learning is by using the main teaching instrument, group work (Divjak & Kukec, 2008). Teamwork brings the reality of projects closer to the classroom context (Divjak & Kukec, 2008). In addition, an environment should be created that encourages the practice of different roles throughout the project lifecycle and breaks down disciplinary boundaries, allowing students to gain self-confidence in project management (Divjak & Kukec, 2008).

Self-confidence, satisfaction, and learning can be accompanied by resources that allow participants to provide feedback or a point of view on the teaching process (Divjak & Kukec, 2008). Therefore, the results of these assessments and the planning of concrete improvement actions must be shown to the students (Divjak & Kukec, 2008). It is a common mistake for some educational institutions to ask what needs to be adjusted but not indicate the planned corrective actions.

Three factors indicated by student's impact teaching: (1) Teaching Style, (2) Communication and Language, and (3) Assessment Methods (Lebcir et al., 2008). Educators should adopt different ways of teaching, allowing engagement in project-based modules where students become proactive problem solvers and critical thinkers (Ojiako, Ashleigh, Chipulu, & Maguire, 2011). At the same time, higher institutions need to change their business models (e.g., investing in technology that supports flexible learning) (Ojiako, Ashleigh, Chipulu, & Maguire, 2011).

One technology that should be used to develop knowledge and skills is online teaching (Divjak & Kukec, 2008; Ojiako, Ashleigh, Chipulu, & Maguire, 2011). Given that the reality of projects involves interactions with all parts of the world (global projects), the online environment since training will also be relevant for the development of skills focused on everyday life (Divjak & Kukec, 2008; Ojiako, Ashleigh, Chipulu, & Maguire, 2011). Therefore, project training should not focus exclusively on teaching management techniques and tools but on developing skills for everyday professional life (Woodward, 1983).

This topic can be summarized in four points. First, the teaching spaces must allow students to experience the real environment, so that what is taught must be

related to reality. Second, a project is group work, so teaching project management must involve working together. Third, the teaching process must involve teaching and feedbacks, that is, the learner learns, executes, and receives feedback on his actions and activities in order to adjust and execute them again. Finally, fourth, teaching is impacted by teaching style, communication and language, and assessment methods.

### 3.2.3 Education

Project management education is an important field for a growing group of universities and educators (Archibald, 1989; Berggren & Söderlund, 2008; Björnsson et al., 1989; Bredillet et al., 2013; Knoepfel, 1989; Louw & Rwelamila, 2012; Mengel, 2008). However, it is facing several challenges in helping people deal effectively with the complexities of work ahead. Therefore, it has become essential to expose students to real project situations in which they can use, develop and reflect on their skills, as well as learn from each other (Córdoba & Piki, 2012).

It should be noted that education in project management does not only occur in university environments. It also happens in organizational environments of different sectors (Crawford et al., 2006). Therefore, only the experience of professionals does not create project managers, which is why structured education with a significant duration is necessary (Woodward, 1986). So what is needed is not only new and better ways of thinking about projects and management but different ways of transferring knowledge and developing competencies that fit the new reality and that can be incorporated into the individual's personal and organizational experience (Crawford et al., 2006).

Project management education should be able to teach ways to become a reflective professional and allow contact with the best and new theories and research, as well as with daily management practice (Crawford et al., 2006). Cicmil and Gaggiotti (2018) presented four principles of responsible project management education (Cicmil & Gaggiotti, 2018):

1. Introduce theoretical plurality
2. Stimulate critical debate
3. Develop an informed resume
4. Creation of evaluation forms that encourage theorization, involving knowledge creation through reflection on lived experience and knowledge of situational ethics in a concrete project context.

Therefore, it is time to review the understanding of project management education and reflect on developing project managers to deal with the increasing complexity, chaos, and uncertainty in project environments (Thomas & Mengel, 2008). Project management education in a world that takes the complexity, and complex adaptive or responsive systems seriously requires much more than the transfer of know-what or know-how through traditional education methods and training (Thomas & Mengel, 2008).

Greater emphasis is required on educational models that support and promote continuous change, creative and critical reflection, self-organizing networking, virtual and cross-cultural communication, coping with uncertainty, and multiple frames of reference, increasing self-awareness and the ability to build and contribute to high-performance teams to meet the increasing requirements of complex projects (Thomas & Mengel, 2008). In addition to meeting the complexity requirements of projects, educational processes must consider that (Dan, 1995):

- Learning activities need to be relevant but not too constrained to current corporate practices.
- Students especially value courses that address the human dimension of project management.
- Students respond more enthusiastically and learn better through hands-on participatory learning activities.
- Classes should include ample opportunity for students to work collaboratively on their own 'real life' project management situations, past and present, to obtain student input and instructor advice.

Córdoba and Piki (2012) complement the points indicated above. The authors suggest that group-based activities should be emphasized, create environments similar to real life, and offer students the opportunity to perform roles and improve or develop existing or new skills. Therefore, in the educational environment, it is important that: (1) continuous group interaction and collaborative learning are allowed; (2) introduce authentic real-life tasks into group activities; (3) encourage feedback and communication with other team members and groups; and (4) facilitate proper interaction with the groups' external environments (practice-oriented) (Córdoba & Piki, 2012).

The method of case study and management games allows each of the points presented to be developed progressively in an environment suited to the students' absorbing abilities (Hutcheson, 1984). Methodologies that emphasize practice, such as serious (or educational) games and simulations, help create a complex environment with real problems in the area (Rumeser & Emsley, 2018a). However, training participants need to be able to apply their knowledge (know-how) in the right situations (know when) and for the right reasons (know-why). It requires experience rather than knowledge (Rumeser & Emsley, 2018a).

Martin (2000) presents the application of a Contract & Construct (C&C) simulator. C&C simulates a contract management approach on a large construction project. The author indicates that the simulation was successfully applied in postgraduate and master's courses. Key features of C&C include:

- Focus on management.
- Ease of use.
- A friendly, personal, and interactive approach.
- Design that effectively exploits the computer's strengths.
- Well-presented implementation.

It represents the central planning and controlling management functions and informational and decision-making behavioral roles.

Practical applications through business game simulations are relevant. To this

end, educational processes in project management should also aim at developing soft skills (socio-behavioral) and hard skills (knowledge) necessary to be an effective and efficient project manager in an increasingly complex world (Shelley, 2015).

Another educational possibility was cited by Harland (1989), self-training. Self-training can be thought of as individuals training themselves. Self-training does not exclude the participation of other individuals (teachers, bosses, and colleagues). There are people in the educational process. However, they will only transmit what they know. Only what they know may not be enough. Therefore, there is a need for the professional to seek knowledge in books, magazines, newspapers, and articles, as well as discuss what is being learned with other people.

Finally, Table 5 presents practical considerations for educating and developing project managers (Ramazani & Jergeas, 2015). Table 5 points out the critical factors in the development of project managers and associates them with educational models.

Table 5 – Practical considerations for educating and developing project managers.

Continue...

| **Critical factors in the development of project managers** | **Educational Considerations** |
|---|---|
| Development of skills to deal with complexity:<br>• Adaptability critical thinking<br>• Multidisciplinary<br>• Collaborative skills | Educational models:<br>(1) Must incorporate complexity as an interpretive paradigm of thinking,<br>(2) It must have sufficient flexibility to support and promote continuous change, creative and critical reflection, dealing with uncertainties and complexities,<br>(3) It must have a comprehensive development that considers project management's technical and human aspects and allows professionals to select the appropriate combinations of technical and interpersonal knowledge. It must promote critical thinking and responsible decision-making,<br>(4) It should consider the multidisciplinary nature of project management, including: cross-disciplinary with other project managers, interdisciplinary with other leaders and managers, and multidisciplinary with groups,<br>(5) It should reflect on the learning content and the learning process at different levels of its curriculum, case studies, simulations of problem-based learning and project-based learning, role modeling, mentoring, and other active education methods that can facilitate this process. |

Table 5 – Practical considerations for educating and developing project managers.

Conclusion

| Critical factors in the development of project managers | Educational Considerations |
|---|---|
| Develop interpersonal and technical skills:<br>• Technical abilities<br>• Planning, estimating, and scheduling skills<br>• Leadership<br>• Interpersonal skills<br>• Communication<br>• Problem-solving skills<br>• Team work | Educational models must:<br>(1) enable practitioners to select appropriate combinations of technical and interpersonal knowledge, practice, and behaviors that will increase self-awareness and the ability to build and contribute to high-performance teams.<br>(2) developing case studies, simulations of problem-based and project-based learning, role modeling, teamwork, mentoring, and other active teaching methods can facilitate this process. |
| Creating knowledge in the context of your application | Educational models:<br>(1) They must provide knowledge delivery in real contexts, such as simulations and real case studies,<br>(2) They should consider students (individually and collectively) as active agents in the construction of knowledge. Reconstruction between theory and practice at different levels is needed, including: course planning, teaching, research,<br>(3) They should encourage cooperation between universities and industries, as it provides a solid basis for both management development and capacity building.<br>(4) Requires faculty members in project management to have hands-on experience and be able to relate theory and practice. |

Source: Ramazani and Jergeas (2015)

### 3.2.4 Competencies

One of the main methods to meet educational needs is by identifying relevant and critical competencies to be addressed in education (Nijhuis et al., 2018). Universities offer different levels of training in project management, from undergraduate curricula, which only mention the profession, to doctoral studies focused exclusively on project management (Nijhuis et al., 2018). Therefore, for the educational development of project management, research must be carried out to

identify relevant and specific competencies for the various contexts in which projects are inserted (Nijhuis et al., 2018).

Walker and Llyod-Walker (2019) present, for example, research on competencies that should be fundamental for the project area in 2030. New skills and attitudes will be required, such as greater collaboration and relationship skills for working in networks (organizations and global sectors and virtual teams).

In 2025, will conduct the primary way organizations will deliver results in a socially responsible manner (Walker & Lloyd-Walker, 2019). For that, complexity management, abstraction, problem-solving, high-level communication skills, and the ability to collaborate and build relationships will combine with the need for high levels of initiative to work more autonomously (Walker & Lloyd-Walker, 2019). It will possibly enrich the professional lives of employees. However, it will require constant and continuous learning throughout their professional lives (Walker & Lloyd-Walker, 2019).

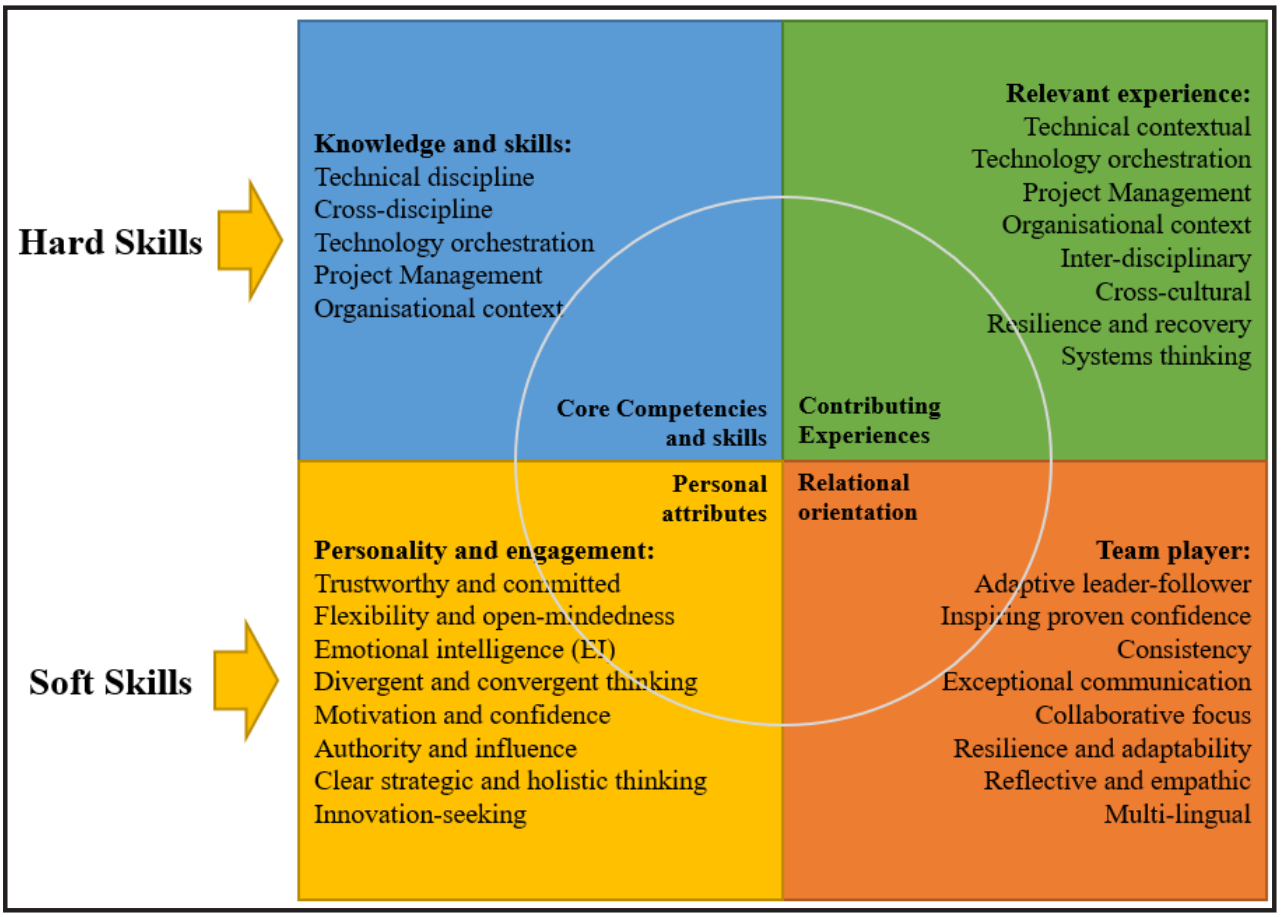
To accomplish any task or job, people (or artificial intelligence machines) will need to put four distinct skill traits into action: knowledge, skills, attitudes, and experience (Figure 3) (Walker & Lloyd-Walker, 2019). A physical-mental, organizational, governance, motivational, and knowledge infrastructure will be indispensable to any task or work. In the future, these collaboration skills will also be required between humans and machines (Walker & Lloyd-Walker, 2019).

Figure 3 shows four essential areas for developing competencies, as mentioned (knowledge, skills, attitudes, and experience). Therefore, professionals should extend knowledge and experience (hard skills) and personal, behavioral, and teamwork attributes (soft skills).

Knowing how to deal with technology is/will be paramount. However, these technologies' disadvantages are that more and more advances will require continuous learning and training on use and application (Walker & Lloyd-Walker, 2019). The current cycle of change, upgrades, and technological improvements will accelerate (Walker &

Lloyd-Walker, 2019). It can cause a feeling of frustration in professionals due to constant demands for training, unlearning, and relearning (Walker & Lloyd-Walker, 2019).

Figure 3 – Key Knowledge, Skills, Attributes and Experiences for Project Professionals by 2030




Source: Walker e Llyod-Walker (2019)

The need to develop training for the project workforce to use new technologies effectively will also pose potential challenges and advantages for educators (Walker & Lloyd-Walker, 2019). On the positive side, there are obvious opportunities for additional sources of income from continuing lifelong learning (Walker & Lloyd-Walker, 2019). The disadvantage lies in the inevitable updating of research and investments for the creation of materials and research by the educational sector (Walker & Lloyd-Walker, 2019). It already happened today. However, the challenge

will be updating and quickly creating research and materials since the updates will be fast and constant.

Training is a source for developing skills and knowledge (McCreery, 2003). However, it is not the only training means (Söderlund et al., 2008). Building competence at the project level is closely associated with the project team's ability to respond to complexity (Söderlund et al., 2008).

This ability emerges as the project team works to solve day-to-day tasks (Söderlund et al., 2008). Consequently, learning mechanisms must be seen in the light of how groups of individuals manage to instigate processes of searching and analyzing solutions in complex situations (Söderlund et al., 2008). Therefore, learning processes are ways of dealing with complexity and simultaneously implementing mechanisms that trigger learning at the project level (Söderlund et al., 2008).

Table 6 – Project Manager's competencies and project phases

| Phase | Competencies |
|---|---|
| Initiation | Effective Questioning/Feedback Generation |
| | Persuasion/Marketing/Sales |
| | Listening Skill |
| | Guiding the Vision/Articulating Business Issues |
| | Consensus Building |
| Planning | Project management skills and knowledge |
| | Consensus Building |
| | Technical skills / Theoretical knowledge |
| Execution | Ability to live together/Team member |
| | Goal Orientation |
| | Be true/Honest |
| Closure | Writing Skills |
| | Share – Information and Trust |
| | Pride in workmanship/quality |
| | Be true/Honest |

Source: Skulmoski and Hartman (2010)

One of the ways to deal with learning is to identify fundamental competencies for each moment or phase of the project. Skulmoski and Hartman (2010) present research that shows the essential competencies in each step of the life cycle of projects proposed by the Project Management Institute (PMI) – Table 6.

In each phase, different competencies are emphasized, because, in each moment, different tasks need to be completed. For example, questioning and listening skills are essential at the beginning of a project, as understanding the business problem and preliminary requirements will be required (Skulmoski & Hartman, 2010).

The importance of these skills decreases slightly in the planning and implementation phases and decreases again in the closing phase, as other skills exist throughout the phase. All skills are essential throughout the project. However, some will be in greater demand in specific phases (Skulmoski & Hartman, 2010).

Therefore, as the tasks change in each phase, so do the skills required. The research by Skulmoski and Hartman (2010) is significant because, until that moment, the project manager's necessary competencies were treated as static rather than dynamic. Accepting that project manager competencies are dynamic has considerable implications for professional and academic environments (Skulmoski & Hartman, 2010).

### 3.2.5 Knowledge

As the introduction mentions, knowledge is knowing how to do or develop something. One of the main sources of project knowledge is lessons learned (Yap & Skitmore, 2020). In this way, when projects develop good knowledge management, it can shorten the learning curve (Yap & Skitmore, 2020).

Knowledge can be developed in a disciplinary or interdisciplinary way (Säisä et al., 2019). Disciplinary knowledge is developed by presenting and teaching concepts, techniques, and tools throughout a specific discipline. However, for the student to achieve success in various stages of the project management profession, interdisciplinary knowledge is of paramount importance, such as, for example,

knowledge of traditional and agile project management and the alignment between theory and practice (Säisä et al., 2019).

Knowledge can also be characterized as explicit or tacit. Explicit knowledge is characterized as formal and codified, often written down or clearly articulated in processes; in project management, it is often associated with the content of bodies of knowledge (Crawford et al., 2006; Hoorn & Whitty, 2019). Tacit knowledge, on the other hand, is associated with the context of the subjectivity of everyone, challenging to codify or explain and, often, not necessarily within the consciousness of the person who possesses it (Hoorn & Whitty, 2019).

Therefore, organizations should be concerned not only with explicit knowledge but also with tacit knowledge. Communication and sharing of learning situations are the first steps for the organization to be able to share explicit and tacit knowledge (Yap & Skitmore, 2020). Therefore, it should not focus only on knowledge management but on the capture, storage, and recovery processes (Yap & Skitmore, 2020).

According to the knowledge-based view, knowledge is a critical resource for sustainable organizational development and success (Zhang & Min, 2019). That said, there must be no concealment of knowledge, as not sharing affects the results and learning of the teams (Zhang & Min, 2019). One of the ways to avoid concealment occurs by increasing the team's stability since it develops trust among team members (Zhang & Min, 2019).

Therefore, knowledge and the creation of knowledge must be understood as something that does not belong only to the company, but as an asset, as the current understanding emphasizes. Knowledge can be represented in people's actions (Hydle & Breunig, 2013). From the practitioner's point of view, the findings suggest that managers should understand different knowledge practices and new knowledge according to what the organization needs to improve at other times (Hydle & Breunig, 2013).

## 4 FINAL CONSIDERATIONS

The project management area has grown in recent years, both in academic and professional environments. This growth demands investment in preparing professionals to work in the different functions of the project area. Thus, studies and methods have been developed for learning, teaching, education, and ways of creating knowledge and improving skills.

It is observed that there are gaps in the studies that deal with these themes of project management. Topics such as management of learning processes, the relationship between learning in educational institutions and organizational environments, the impact of informal learning, experiential learning, comparison of serious games and simulations with other learning methods, serious games in projects, hard skills and soft skills, are still little researched in scientific journals on project management.

In this way, the present work aimed to understand how teaching and learning in project management happens and its challenges. Through a Systematic Literature Review (SLR), we tried to understand the ten leading international project management journals published on the subjects. RSL is different from conventional methods, representing a replicable and transparent process. Therefore, it is not enough to review the literature to carry out an RSL. For creating an RSL, it is of fundamental importance to use a protocol. Therefore, the protocol created by Pollock and Berge (2018) was used in this research.

Articles were selected from the Scopus database and sorted according to the search string that limited the search to only the ten chosen journals. The research corpus consisted of 120 articles published between 1983 and 2022. Publications on the themes remained low until 2008 and grew in later years.

Based on the results obtained, it is proposed to carry out a research agenda on learning, education, teaching, knowledge, and skills in project management. This agenda can be composed of topics such as: (a) learning developed by teaching institutions; (b)

comparison between learning within organizations and in educational institutions; (c) experiential learning; (d) impact of lessons learned on learning; (e) serious games and simulations in projects; (f) alignment of skills required by organizations and developed by educational institutions; (g) educational processes in project management; (h) hybrid teaching; (i) hard and soft skills; and (j) knowledge and creativity.

It is hoped that this work will collaborate in the investigation and discussion on the themes of teaching, education and learning in project management and that it will facilitate the understanding of the main research published in the main international magazines of projects, the categorization of the themes, being a simplifying tool for the researchers who intend to study the themes.

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| **2.** Development of hypotheses or research questions (empirical studies) | √ | √ | √ |
| **3.** Development of theoretical propositions (theoretical work) | √ | √ | √ |
| **4.** Theoretical foundation / Literature review | √ | √ | √ |
| **5.** Definition of methodological procedures | √ | √ | √ |
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