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From doing to managing: maker culture and project management practices in business administration education

Do fazer ao gerir: cultura maker e práticas de gestão de projetos no ensino de administração

De la acción a la gestión: cultura maker y prácticas de gestión de proyectos en la formación en administración de empresas

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Abstract

In the context of contemporary culture, higher education assumes a strategic role for economic and social development, being recognized not only as a mechanism for social ascension, but also as a space for promoting human emancipation. Considering this emancipatory perspective, this study proposes to reflect on the integration of maker culture and organizational project management concepts in higher education. The research adopted a qualitative approach, using participant observation as a data collection technique, with the subjects being a professor and his students from the Administration course at a Higher Education Institution located in the state of Santa Catarina. The data were analyzed in light

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of microgenetic analysis, based on the historical-cultural approach. The results show that the inclusion of practices based on maker culture enhances the development of essential skills for the 21st century, such as problem solving, digital literacy, critical thinking and collaboration between peers, contributing to more active, meaningful learning aligned with the demands of contemporary times.

Keywords: Higher education. Teaching practices. Marker culture. Project management concepts.

Resumo

No contexto da cultura contemporânea, a educação superior assume um papel estratégico para o desenvolvimento econômico e social, sendo reconhecida não apenas como mecanismo de ascensão social, mas também como espaço para a promoção da emancipação humana. Considerando essa perspectiva emancipadora, este estudo propõe refletir sobre a integração da cultura maker e dos conceitos de gestão de projetos organizacionais no ensino superior. A pesquisa adotou abordagem qualitativa, com uso da observação participante como técnica de coleta de dados, tendo como sujeitos um professor e seus acadêmicos do curso de Administração de uma Instituição de Ensino Superior situada no estado de Santa Catarina. Os dados foram analisados à luz da análise microgenética, fundamentada na abordagem histórico-cultural. Os resultados evidenciam que a inserção de práticas baseadas na cultura maker potencializa o desenvolvimento de competências essenciais para o século XXI, tais como resolução de problemas, literacia digital, pensamento crítico e colaboração entre pares, contribuindo para uma aprendizagem mais ativa, significativa e alinhada às demandas da contemporaneidade.

Palavras-chave: *Educação superior. Práticas pedagógicas. Cultura maker. Conceitos de gestão de projetos organizacionais.*

Resumen

En el contexto de la cultura contemporánea, la educación superior asume un papel estratégico para el desarrollo económico y social, siendo reconocida no sólo como un mecanismo de ascenso social, sino también como un espacio para promover la emancipación humana. Considerando esta perspectiva emancipadora, este estudio propone reflexionar sobre la integración de los conceptos de cultura maker y gestión de proyectos organizacionales en la educación superior. La investigación adoptó un enfoque cualitativo, utilizando la observación participante como técnica de recolección de datos, teniendo como sujetos a un profesor y sus estudiantes del curso de Administración de una Institución de Enseñanza Superior ubicada en el estado de Santa Catarina. Los datos fueron analizados a la luz del análisis microgenético, basado en el enfoque histórico-cultural. Los resultados muestran que la inclusión de prácticas basadas en la cultura maker potencia el desarrollo de habilidades esenciales para el siglo XXI, como la resolución de problemas, la alfabetización digital, el pensamiento crítico y la colaboración entre pares, contribuyendo a un aprendizaje más activo, significativo y alineado con las demandas de los tiempos contemporáneos.

Palabras clave*: Educación superior. Prácticas pedagógicas. Cultura maker. Conceptos de gestión de proyectos organizacionales.*

1. Introduction

The development of more effective educational practices in higher education remains a central concern within the academic community. Efforts to integrate knowledge, playfulness, curiosity, and values seek to promote collaborative learning environments that stimulate imagination and creativity (Ching; Carvalho, 2019).

Many higher education institutions continue to follow a traditional, expository model in which instructors tend to reproduce pedagogical experiences they themselves underwent (Shear et al., 2011). Contemporary pedagogical frameworks, however, should prioritize learning design suitable for 21st-century students, incorporating diverse tools, methods, and techniques oriented toward problem-solving and multiple forms of knowledge construction (Beetham; Sharpe, 2019).

A variety of innovative approaches have emerged in recent years with the aim of transforming knowledge acquisition and teaching practices in higher education. Among these, maker culture stands out as a strategy that enhances teamwork and hands-on learning, thereby improving the development of knowledge, skills, abilities, and behaviors (Blikstein, 2018; Pucci; Mulder, 2015; Sanches et al., 2025).

Maker culture encourages individuals to act as producers rather than mere consumers, transforming social and educational interactions (Dougherty, 2012; Magalhães Silva; Santos, 2024). It is characterized by accessibility, collaboration, creativity, and a hands-on, experimental approach.

In educational settings, maker culture involves the conception of physical and/or digital objects, in which individuals or groups plan, test, implement, and evaluate different solutions to a given problem (Papavlasopoulou et al., 2017).

Within this framework, students from diverse fields can collaboratively develop collective projects, assuming different roles in project management processes and addressing emerging challenges (Samagaia; Neto, 2015). Maker culture, together with established project management methodologies, can therefore provide a foundation for planning, objective-setting, technique selection, and action implementation, mobilizing knowledge to explore possibilities, scenarios, and challenges defined by the instructor (Garofalo, 2024; Silva Jr., 2019).

According to the Project Management Institute (PMI), project management is “the application of knowledge, skills, tools, and techniques to project activities to meet project requirements” (PMI, 2021, p. 4). It is structured around five process groups: Initiating, Planning, Executing, Monitoring and Controlling, and Closing (PMI, 2021; Ruschel, 2023).

In the field of administration, project management teaching benefits from experiential approaches that complement conceptual content (Bočková et al., 2015). The integration of practical activities, discussion, illustration, and application of ideas has been shown to enhance knowledge retention and the effectiveness of learning processes (Borges; Alencar, 2014; Albar, 2023; Glasser, 2001).

Although various initiatives seek to bridge theory and practice in project management education through maker culture, significant challenges remain in promoting institutional change and providing students with authentic hands-on experiences (Lima; Patah, 2016; Marsh et al., 2018; Thomas; Mengel, 2008).

Several studies indicate that student engagement in maker activities constitutes one of the most effective ways to apply project management concepts in practice (Smith et al., 2015; Somanath et al., 2016). As a rule, learners enjoy learning and developing their activities within the context of maker culture (Chu *et al.*, 2017a; Posch; Fitzpatrick, 2012; Shak, 2023 ; Sheffield *et al.*, 2017), particularly when they experience maker-style projects in a structured yet flexible way, having the independence to prioritize how they wish to manage and implement the project (Bar-El; Zuckerman, 2016; Bekker *et al.*, 2015; Kerzner, 2023; Schwartz *et al.*, 2013).

In light of this, this research is a collaborative effort, whose pedagogical practices were undertaken in a sixth-semester class of the Administration course at a higher education institution located in the state of Santa Catarina. These practices have revealed the richness of everyday teaching and learning experiences, lived through maker culture in the context of project management.

2. Theoretical Framework

This section presents a literature review on concepts related to maker culture, its application in the educational context, and its interface with project management.

2.1 Maker Culture

The do-it-yourself (DIY) movement began with the idea that individuals could perform basic repairs and solve everyday problems using their own hands. Popularized from the second half of the 20th century, the term became more familiar with the rise of digital technologies, considered a predecessor to maker culture (Carvalho; Bley, 2018; Harris*et al.*, 2025).

The maker culture developed in the United States of America, through the first specialized publication created by Dale Dougherty in 2005 on this culture, called Make Magazine (Sang; Simpson, 2019). According to Wilczynski (2015), maker culture is composed of people who design and conceive new analog or digital artifacts and share these assimilated experiences.

The word "maker," literally translated into Portuguese, means to make, to create, or to execute, considered the essence of maker culture, carried out with the participation of different and varied individuals, grouped in physical or online spaces, bringing together the knowledge and experience of all those involved in this process of building specific items (Cohen; Lotan, 2017).

According to Dougherty (2016), maker culture is considered a form of active learning based on the concept of experiential learning, that is, a person or group of people who are actively involved, from the initial design to the delivery of the artifact, in the process of learning by doing.

The idea that people can create, repair, and alter different artifacts through maker culture contributes to promoting collaborative work carried out by groups of people, who are capable of performing surprising actions (Katchborian, 2016). The maker culture proposal, according to Almeida (2019) and Brandenburger (2023), suggests actions that can be carried out and implemented in different ways, through fabrication laboratories, the so-called FabLabs, or even in an elementary way in a regular classroom.

Specifically, the maker culture in Brazil was established through the LabdeGaragem website, considered one of the cornerstones of the movement, a precursor to the sharing of project information, with one of its responsibilities being the pursuit of developing nine values (Table 1) based on its objectives (Katchborian, 2016).

Table 1 - Nine values - LabdeGaragem

Value	Description
1. To do	As an expression of creation and an expression of who we are, and through which we can feel complete as human beings.
2. To share	There is no point in creating something if it is meant to be shared.
3. Give	To provide satisfaction and altruism through the donation of what has been created, symbolically, as if it were a donation of oneself.
4. Learn	Interest in learning how to do things, improving techniques, materials, and processes.
5. Having the right tools	Use what is easy and inexpensive.
6. To play or to experiment	Make room for surprises, excitement, pride, and new discoveries.
7. To participate	The importance of embracing maker culture, participating in events, parties, and spaces that provide important connections.
8. Support	In every way possible: political, financial, emotional, intellectual.
9. To change	Change is important. It's possible to propose changing even the maker culture itself.

Source: adapted from Katchborian (2016).

At a fundamental level, maker culture fosters a vision of reusing and/or repairing objects, as opposed to discarding them or acquiring new ones. With the advancement of technology and industrialization, people have lost touch with the tools and the process of building their own things, and especially with knowing what they consume; that is, it advocates a change in the consumer's conception of what it means to own something (Brockveld *et al.*, 2018; Jonas; Nessel, 2023).

Raabe *et al.* (2018) demonstrate that education, as a pedagogical proposal, is experiencing the appreciation of practices focused on initiatives that use a project approach, whose objective is the search for solutions to problems, in a collective and collaborative way, influenced by maker culture.

2.2 Maker Culture in Education

The concept of maker culture has been present in our daily lives for some time, and the possibilities for applying this culture to learning are abundant (Blikstein, 2018). Vuopala *et al.* (2020) mention that maker culture was based on the theoretical framework of Seymour Papert's constructionism, in which learning happens through the process of doing, of getting hands-on, where the student builds based on their own interest, and is therefore motivated to learn (Mota; Mota, 2016); John Dewey's experiential education, in which "education that comes from experience favors learning because the learner acts upon the object of knowledge, extracting from it information that will enable the acquisition of new knowledge" (Dewey, 2008, p. 165); Similarly, Paulo Reglus Neves Freire's critical pedagogy, which stoically positions the student at the center of the learning process, focuses primarily on associating everyday issues and relevant problems in order to organize concrete educational practice (Libâneo, 2018).

The do-it-yourself philosophy, or habitual maker behavior, is based on the ability to stimulate interest, creativity, and innovation, which is why maker culture is of singular importance to education (Cerutti, 2022). Maker culture, also established in Jean Piaget's constructivism (1937), is recognized as an opportunity to improve the teaching and learning process, since the construction of knowledge is carried out more adequately when the student is consciously involved in the conception of an object, that is, through the practice of learning by doing, the student is responsible for the composition of their own knowledge, making use of their know-how, thus learning from their certainties and uncertainties (Azenha, 2006; Blikstein, 2018; Martinez; Stager, 2019).

Halverson and Sheridan (2014) and Chu *et al.* (2017b) state that maker culture ensures several benefits for academic learning, contributing to “developing the experience of controlling one’s own actions by generating effects with them in the outside world – a sense of personal agency” (Magalhães, 2018, p. 7), to improve the individual’s perception of their abilities in the exercise of a given activity (Bandura, 2004) and in the “set of feelings and thoughts of the individual about their own value, competence and adequacy, which is reflected in a positive or negative attitude towards themselves” (Rosenberg, 2016, p. 3).

Taking these concepts into account for higher education institutions, a collaborative work environment is created for the student, fostering the construction and sharing of ideas, aligning theory with practice. This environment fosters a creative spirit and an attitude of being proactive in achieving what we want, in other words, getting our hands dirty (Cerutti, 2022). Neves (2018) states the need for HEIs to follow certain steps (Table 2) to implement maker culture in the teaching and learning process.

Table 2 - Steps for implementing maker culture in higher education institutions

Step	Descrição
Step 1	Create a project that motivates students to believe they can do anything;
Step 2	Design a maker space (which can start with very simple electronics tools and educational kits and gradually acquire machines);
Step 3	Create social platforms (online and/or offline) for collaboration between students, teachers, and the community;

Step	Descrição
Step 4	Create a community space for showcasing hands-on projects, encouraging more students and teachers to participate;
Step 5	Develop educational contexts that connect hands-on practice to formal concepts and theories to support discovery and exploration, to introduce new tools and, at the same time, new perspectives on the learning process;
Step 6	Develop in all participants of this process, in a holistic way, the capacity, creativity, and confidence to become agents of change in their lives and in their communities.

Source: adapted from Neves (2018, n.p.).

Maker activities can be used in different areas of knowledge, with the purpose of improving the learning process (Marsh *et al.*, 2018). For Cabeza *et al.* (2014) maker culture can be implemented both inside and outside the classroom (in this case, for example, the makerspace), offering students practical and conceptual tools, thus promoting opportunities to undertake actions that differ from conventional academia.

In this light, the concept of maker culture contributes beneficially to academic teaching and learning, where educators can create and improve possible and viable ways to provide students with a creative mindset, in the search for new ways to solve problems (Halverson; Sheridan, 2014).

2.3 Project Management

Among the different areas of knowledge that encompass administration, project management can be considered one of the most elementary, as it deals with planning, executing, monitoring, and closing the most diverse projects in the most varied areas (PMI, 2021; Kerzner, 2023).

Kerzner (2017, p. 2) defines a project as "any series of activities that has a specific objective to be achieved within certain specifications that involve a start and end date, funding limits and necessary resources". According to Lacerda *et al.* (2018) project development must always be linked to organizational strategies, objectives and management.

Regarding the project management process, it can be understood as a field of practices conceived by disparate groups of individuals that evolves through tools and techniques developed to support the act of managing, as well as through mutual influence among those involved (Cooke-Davies *et al.*, 2009; Juupaluoma, 2023).

Project management, according to PMI (2021), comprises a set of phases, such as: identifying the conditions necessary to achieve the project objective, promoting actions to improve the communication process with and between stakeholders, promoting a more reciprocal relationship between stakeholders, among others. Furthermore, project management also encompasses potential limiting factors such as scope, quality, resources, costs, budget, schedule, risks, etc. (Vargas, 2017).

Creating and managing a project, according to Toyohara *et al.* (2010, p. 3), “it is the same as developing a plan to carry out a particular idea”, however, when this theme is jointly associated with the teaching and learning process, it becomes something unique and complex.

From this perspective, it is worth highlighting the concept of plurality and the coexistence of things that are quite distinct from one another, created by Edgar Morin, which helps to guide the execution of some activity in a given proposed project. The concept of multidisciplinarity "constitutes an association of disciplines, due to a project or an object that they have in common"; and the concept of transdisciplinarity "often involves cognitive frameworks that can cross disciplines" (Morin, 2003, p. 115). Cherobini and Martinazzo (2005) mention that the concepts established by Edgar Morin are a way of reflecting a set of ideas, giving them a complementary unity, that is, an integrating element of knowledge based on the students' preliminary knowledge.

In light of this, project management demands different and better ways to provide students with knowledge acquired through practice. This can be achieved through the contribution and use of specific active methodologies,

which require dynamic classes with activities based on gamification, robotics, maker culture, and other approaches to engage students (Bacich; Moran, 2017).

According to Schank (1995) and Valente (2024), the act of understanding and learning something through theoretical-practical experimentation provides what is necessary to judge and make imperative decisions in the face of dissimilar situations. The use of different methodologies in the creation and management of projects aimed at education and learning in the classrooms of a higher education institution can generate differentiated solutions to the traditionalization of educational practices, developing and expanding a series of essential skills for students.

3. Methodology

This research adopted a qualitative approach, of a descriptive and exploratory nature (Gil, 2019; Triviños, 1987), conducted in a Business Administration course at a Higher Education Institution (HEI) located in the state of Santa Catarina. The choice of a qualitative approach is justified by the need to understand in depth the interactive teaching and learning processes mediated by maker culture, in the context of organizational project management. Prior to conducting the research, the ethical procedures required by the Research Ethics Committee with Human Beings of the Federal Rural University of Rio de Janeiro (UFRRJ) were followed, as per Opinion No. 272/2012. The research participants were duly informed about the objectives of the study and signed the Informed Consent Form, as stipulated by CNS Resolution No. 466/2012.

The selection of the class for the Bachelor's degree in Administration was based on institutional convenience and availability, considering the researcher's accessibility and the relevance of the Project Management discipline to the object of study. The class consisted of twenty-five students, organized into working groups formed by the professor himself for the development of practical activities. From these groups, a specific group of six students was selected for detailed observation, based on criteria such as active participation, diversity of profiles, and representativeness of the interactions observed in the classroom. This choice allowed for an in-depth observation of the dynamics of collaboration, teacher mediation, and emerging learning processes during the activities.

The technique used for data collection was participant observation, with systematic recording through a field diary and authorized photographic documentation (Angrosino, 2009; Lüdke; André, 2022; Minayo, 2022). The observations focused on the practical activity called the Spaghetti Bridge Project, structured based on the principles of maker culture and the stages of project management, as shown in Table 3 below:

Table 3 - Structure of the observed teaching activity: Project – Spaghetti Bridge

Step	Activity Description	Educational Objective	Registration Form
Planning	Group discussion and definition of objectives, deadlines, and responsibilities.	Develop strategic and collaborative thinking.	Field diary and photos.
Creation and Prototyping	Imagination and a combination of ideas for building the bridge using alternative materials.	To stimulate creativity and problem-solving skills in groups.	Field diary.
Execution	Physical construction of the bridge and strength tests	Apply maker culture concepts and project management principles.	Field diary and photos.
Presentation and Evaluation	Final presentation to the "sponsor," including deliverables and lessons learned.	Reflect on processes, results, and skills developed.	Field diary and visual records..

Source: prepared by the authors (2025) based on PMI (2021) and Vygotsky (2010).

The data collected were analyzed using microgenetic analysis, based on the Historical-Cultural Approach. This form of analysis focuses on the interactive episodes observed in the educational context, allowing us to understand how teaching and learning processes develop from social interactions and teacher mediation (Oliveira, 2010; Vygotsky, 2007).

For the analysis, we used microgenetic analysis, a particularly interesting and extremely important form of analysis in schools because it allows us to observe how the teaching and learning process occurs, as well as to detect which communicative skills facilitate or hinder learning during interaction processes. According to Góes (2000), microgenetic analysis is used in investigations into the constitution of subjects, mainly in educational contexts, since it consists of a form of data construction focused on details and the selection of interactive episodes. For this study, the episodes were selected based on the following criteria: (i) thematic relevance to the concepts of maker culture and project management; (ii) intensity of interactions between participants; and (iii) evidence of pedagogical mediation. This type of analysis is based on the Historical-Cultural Approach and aims to understand individuals and their intersubjective relationships in specific historical and cultural contexts, resulting in a detailed understanding of events.

The observations were systematically organized into written records, later categorized into themes such as: collaboration, mediation, creativity, planning, and execution. The analysis sought to identify how elements of maker culture influenced pedagogical practices and the engagement of academics in the active learning process.

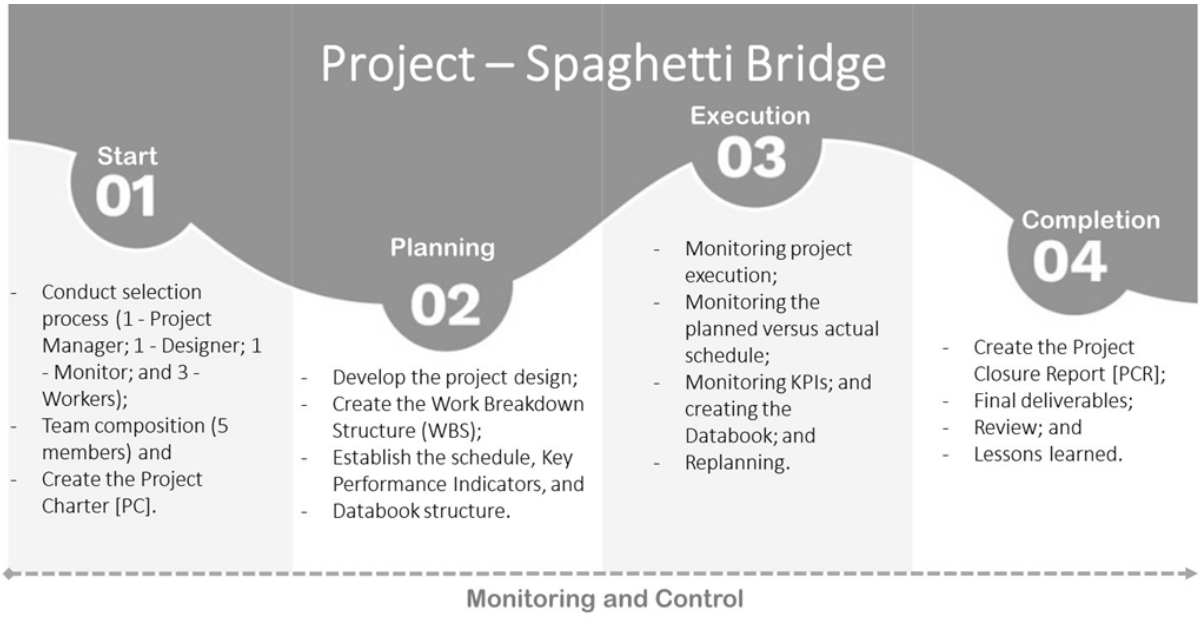
4. Analysis and Discussion of Results

The activities that integrated maker culture into the different phases of project management provided academics with significant learning experiences. Experience, according to Vygotsky (2010), means lived experience, that is, everything that is composed in the collective and in the formation of the personality of the subjects.

With the aim of providing hands-on experience in the proposed activities, the students were given the opportunity to listen, speak, experiment, and consequently, experience the concepts involved in the discipline of project management. From this perspective, Vygotsky (2014, p. 13) states that "the more the subject hears and experiences, the more he learns and assimilates, the more elements of reality he has at his disposal in his experience, the more important and productive his imaginative activity will be."

Therefore, we consider the broadening of experiences an essential condition for learning. It was from this perspective that the activities were organized, as shown in Figure 1.

Figure 1 - Project- Spaghetti Bridge



Source: prepared by the authors (2025) and adapted from PMI (2021).

The professor, acting as a facilitator of learning, guided the students towards specific dimensions involving the concept, triggering the abilities they were capable of developing. We understand that this condition was fundamental to the intellectual development of the students. During the mediation, we observed that the teacher provided opportunities for reflection among the students, showing them new possibilities for elaboration within the context of the community.

During the time allotted for collective reflection on the activity, the teacher invited the students to discuss their experiences, encouraging them to engage in an imaginative creative process. “From a developmental point of view, the creation of an imaginary situation can be considered as a means to develop abstract thought [...]” (Vygotsky, 2007, p. 124). According to Werbach and Hunter (2015) and McGonigal (2016), the mechanisms of stimulation, sensation, and behavior can be designed through creation and subsequent use, thus triggering specific responses in the student.

The teacher's dynamic fostered empowerment within the group, that is, the attainment of personal/collective power, which is part of a liberating education (Freire, 2019). According to the author, liberating education problematizes and empowers the individual, making them reflect, criticize, idealize, and question.

For the creation of the Spaghetti Bridge Project (Figure 2), it became necessary for the class to imagine, because “[...] when we imagine, we revisit the impressions of our lived experiences, transforming them; we do not limit ourselves to their reproduction, but we combine, create, and rework new images and actions” (Vygotsky, 2014, pp. 3-4).

Figure 2 - Creation and planning stage of the Spaghetti Bridge Project

Source: researchers' collection (2025).

As the creation process progressed, the group began to identify the need to define goals and the means to achieve them, using the basic principles of project management, from the operational level up to the highest position in the group, that is, the project manager.

Thus, it is important to highlight that the ideas for creating the Spaghetti Bridge Project did not arise spontaneously, but rather from previous experiences, interests, needs, and the environment in which each individual

finds themselves. In this context, the creation of the Spaghetti Bridge Project by the groups involved a creative process through which, based on prior knowledge and elaborations by the class, ideas were constructed and deconstructed.

Collective and collaborative activity required negotiation, acceptance, understanding, patience, and choices. However, the collaboration between the academics was a natural and spontaneous process. The heterogeneity present in the groups, with their different levels of knowledge, fostered the exchange of experiences and learning. According to McGonigal (2016), the existence of challenges fosters the use of inventiveness and the student's ability to achieve the stipulated objective, which makes the activity rewarding when a solution is found. In this context, it's worth highlighting that the whole class contributed ideas, making the activity a great success.

Figure 3 shows the execution process established in the planning and activity schedule stages of the Spaghetti Bridge Project.

Figure 3- Project Execution Stage – Spaghetti Bridge

Source: researchers' collection (2025).

The results achieved through the proposed activity reinforce the concepts of collectivity, collaboration, and experience presented by Vygotsky (2010). These concepts are essential to boost and promote learning for all academics. Dougherty (2016) mentions that maker culture involves active learning, where people engage actively and dynamically, either individually or in groups, from the beginning of the project, its execution to the final delivery, learning by doing. Almeida (2019, p. 150) highlights "[...] maker culture as an enhancer of playfulness, creativity and the sharing of ideas in the academic context", in addition to being considered a positive influence on teaching and learning processes and on the construction of knowledge.

Throughout the development of the Spaghetti Bridge Project, the students remained attentive and enthusiastic, seeking to understand the rules. The class's involvement led us to reflect on the importance of learning about project management through maker culture, as according to Vuopala *et al.* (2020) learning comes from the process of doing, of getting hands-on, where the student creates based on their own interest.

Analyzing the experience, we understand that activities based on the use of gamification, robotics, maker culture, among other approaches to engage students, should be applied in various environments, including universities (Cerutti, 2022), contributing to the gradual reduction of barriers commonly experienced in higher education institutions that rely solely on theoretical reproduction (Prensky, 2012), in order to provide students with different and better ways to acquire knowledge about project management in practice (Bacich; Moran, 2017).

Figure 4 shows the presentation of the Project Closure Report (PCR), final deliverables, lessons learned, and quality testing of the project delivered to the project sponsor.

Figure 4- Project Execution Stage – Spaghetti Bridge

Source: researchers' collection (2025).

In this sense, when comparing the experience presented here with other consolidated initiatives, such as those described by Almeida (2019), Jaatinen and Lindfors (2019) and Vuopala *et al.* (2020), it is observed that the insertion of maker culture in higher education constitutes significant advances in learning, reinforcing that active learning requires time for maturation, continuous teacher training and the development of new forms of assessment that value the creative process, and not just the final results. From this, it becomes evident that, even in the face of structural or pedagogical limitations, maker experiences in higher education are viable and promising, provided they are inserted in a reflective, critical context and supported by innovative educational policies.

Given the context we are experiencing, we highlight the words of Toyohara et al. (2010), who mention that with the teacher's guidance, learning based on developing a plan to carry out an idea, that is, developing a project, can contribute to expanding the skills to be developed or improved throughout life, which are increasingly important and necessary in contemporary times. According to Katchborian (2016), maker culture contributes to promoting this entire teaching and learning process, making it something unique for students.

Thus, the idea of linking maker culture to the teaching and learning process of organizational project management can be a way to foster new forms of engagement, while also providing an analysis of how content can be presented in the context of collaborative learning. From the moment we are able to spark students' interest and motivate them to research the topic they are studying, we can envision students who are more autonomous and engaged in their own learning.

5. Final Considerations

This article facilitated reflections on the use of maker culture in the teaching and learning process in higher education administration courses, based on pedagogical practices in organizational project management. These reflections helped us understand that maker culture brings academics to the center of the teaching-learning process; promotes motivation, engagement, and autonomy; It fosters an environment that encourages multiple ways of making sense, namely reflection, observation, critical thinking, creativity, responsibility, questioning reality, analysis, decision-making, and solving "enigmas" or problems for the joint construction of knowledge, allowing students to make choices.

Within the context of maker culture, other skills have been developed, such as teamwork, cooperation, responsibility, respect, empathy, resource and time management, acceptance of mistakes as part of the learning process, perseverance, creativity, and imagination, enabling the experience of living different social roles and expanding ways of acting in the world.

It is worth highlighting that, despite the observed benefits, the implementation of activities based on maker culture and organizational project management in higher education also presented significant challenges. One of the main points relates to the need for academics to adapt to a more active and less prescriptive methodology, requiring autonomy, proactivity, and a willingness to deal with uncertainty and the absence of ready-made answers.

This study demonstrates how important maker culture is in the teaching and learning process and how it can enable meaningful experiences that help organize the pedagogical process, thus making learning more attractive.

In this sense, it is worth highlighting that these methods contribute significantly to profound changes in education, which allows us to say that they cannot be seen as an easy solution to all educational problems, but rather as a methodology to be combined with other learning methods. With the guidance of a professor, learning organizational project management based on maker culture can equip students with increasingly important and necessary skills for the 21st century, such as problem-solving, digital literacy, critical thinking, and peer collaboration.

This research acknowledges as a limitation the exclusive use of observation as a data collection technique, without triangulation with interviews or document analysis. However, this limitation was partially offset by the density of the microgenetic analysis, which provided a detailed understanding of the interactive processes experienced in the

classroom. According to Flick (2008), the depth and richness of qualitative data can guarantee internal validity, even with a narrower range of techniques.

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