PROJECT MANAGEMENT IN THE CONTEXT OF PROJECT-BASED LEARNING USING THE MODEL LIFE CYCLE CANVAS®

GESTÃO DE PROJETOS NO CONTEXTO DA APRENDIZAGEM BASEADA EM PROJETOS USANDO O MODELO LIFE CYCLE CANVAS®

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ABSTRACT

This study aimed to verify the usability of the Life Cycle Canvas® (LCC) model of project management in the context of project-based learning. For that, a case study of qualitative, exploratory and descriptive nature was used. From the theoretical point of view, the foundation for the study are the active methodologies, the project-based learning, the flipped classroom and the methodology for the management projects Life Cycle Canvas. The main results were: increased availability of time for the group-mediated activities of the teacher, simultaneous use of several digital resources, closer teacher-student and student-student relationship and flexibility of learning pace. These aspects corroborate with the theory presented. Finally, the LCC acts as a facilitator in the learning process, focusing on project-based learning, improving the performance of both the teacher and the student.

Keywords: Project management. Project based learning. Flipped classroom. Life Cycle Canvas.

RESUMO

Este estudo teve como objetivo verificar a aplicabilidade do modelo Life Cycle Canvas® (LCC) de gestão de projetos no contexto da aprendizagem baseada em projetos. Para tanto, fez-se uso de um estudo de caso de natureza qualitativa, exploratório e descritivo, em uma disciplina em nível de pós-graduação de um programa de mestrado de uma instituição pública de ensino superior. Do ponto de vista teórico, o alicerce para o estudo são as metodologias ativas, a aprendizagem baseada em projetos, sala de aula invertida e o modelo de gestão visual de projetos LCC. Os principais resultados foram: aumento da disponibilidade de tempo para a realização das atividades em grupo mediadas pelo docente, uso simultâneo de diversos recursos digitais, estreitamento da relação professor-aluno e aluno-aluno e flexibilização do ritmo de aprendizagem. Estes aspectos corroboram com a teoria apresentada. Por fim, o LCC atuou como um facilitador no processo de aprendizagem, dando foco à ABPj, melhorando o desempenho tanto do docente quanto do discente.

Palavras-chave: Gestão de Projetos. Aprendizagem baseada em projetos. Sala de aula invertida. *Life Cycle Canvas*.

1 INTRODUCTION

The development of teaching models that are efficient, providing good performance and high engagement from students, and are still compatible with the budget of educational institutions is a problem faced worldwide. Education scholars have recommended Project Based Learning (PBL or PjBL) as a teaching approach to overcome this challenge (Barrell, 2006; Bender, 2015; David, 2008; Ghosh, 2000; Laboy-Rush, 2011).

PjBL is a teaching-learning model that assists in the development of competencies and skills necessary for the 21st century. The student grasps concepts and content while developing specific skills when confronting problems, considered relevant and significant in the real world. Students are driven by motivating questions derived from true situations and, through collaborative work, seek knowledge to list possible resolutions to the proposed dilemma. Concrete projects are carried out throughout this process, developing creativity, respecting the students' learning style and meeting a basic prerogative of PjBL, which is the preparation of a product at the end. (Bender, 2015).

The fundamental challenge of this new pedagogical creation is to confront the role of the tutor, in order to know how to supervise the apprentices and also how to engage them in professional life to achieve the general learning objectives. Cargnin-Stieler, Lima, Alves and Teixeira (2014) and Bender (2015), recognize the difficulty that students and teachers have in planning and executing PjBL projects. Bender (2015) also shows that the project controls need to be done through student notes and does not detail how this control takes place. In this context, it is identified that a management model can help the student to plan and better visualize the progress of his project, which would be a potential benefit for learning, considering that the control of the processes that involve the project becomes one less problem in building student knowledge.

In order to make this assistance feasible, visual tools support planning and simplify project management, providing a better integration between business management and project management. These tools facilitate communication and understanding of the parties involved in project management, in addition to a more dynamic and participative interaction between the team, during project monitoring meetings, for example (Veras, 2016).

In view of the need to manage the project in a systematic way, so as not to give up the simplicity of the visual models of project management, the Life Cycle Canvas (LCC) was

created (Veras, 2016), allowing the management of the cycle complete project life cycle (Initiation, Planning, Monitoring & Control, Closure).

Given the above, the use of visual project management models can allow management in a simplified way of the complete project life cycle, which in this context is presented as a fundamental part of the adoption of the PjBL methodology. However, the use of visual project management models in the development of disciplines that use the PjBL method was not found, which highlights this gap in the literature. Hence, the research aimed to verify the applicability of LCC in project management in the classroom associated with the flipped classroom.

2 THEORETICAL REFERENCES

2.1 LIFE CYCLE CANVAS

Despite the increase in complexity, there was a growth of a way of thinking that seeks to "uncomplicate" the management. In this scenario, there was an increase in the use of tools and visual models. Starting with the Lean approach and based on the use of tools and techniques, they allow a better and easier visualization of the information. Consequently, it provides an integrated view through pictures or screens, and can be used to have a holistic notion of the organization. This trend can be noticed not only in management as a whole, but mainly in Project Management (Medeiros, Sousa Neto, Nobre & Nogueira, 2017; Veras, 2018).

In addition to stimulating innovation, the use of tools or models that have a more visual characteristic helps people who do not usually deal with management. The first contact with something that is visually pleasing is positive, being evidenced in studies that point to the friendlier and freer character that these tools can bring (Arantes & Normanha Filho, 2015).

The logic of visual project management models meets the Japanese 5W2H model, which uses basic questions to direct the manager's thinking to particularities that are apparently simple, but, in some projects, may require much more effort and attention. The extensive and varied use of these visual models has already been seen in other areas such as process mapping, monitoring production flows, and performance evaluation to manage resources (Steenkamp, Hagedorn-Hansen & Oosthuizen, 2017; Veras, 2018).

Medeiros and Silva (2017) indicate that, among the visual models analyzed, LCC was the most aligned to the techniques and methods that adopt a project management model suggested by the more traditional guides and models of good practices. However, on a single screen, LCC promotes an integrated view of processes, following a flow of activities that contemplates the entire project life cycle.

LCC proposes to facilitate the control of the activities inherent to the management of a project in its life cycle. This gives the project team opportunity to focus on groups of activities that are crucial, such as time, risk and cost, without losing resources in superfluous details (Veras, 2018). This is the central idea of using LCC model in the PjBL methodology.

LCC model provides the complete route through the project phases, that is, initiation, planning, execution, monitoring & control, and closure (Veras, 2018). In this way, it aligns with the standard used internationally, the PMBOK guide, thus adding methodological rigor to the construction of the project. Furthermore, it deconcentrates information and gives the project team the domain of its management, thus bringing greater engagement of those involved (Medeiros, et al., 2017; Medeiros & Veras, 2016; Veras, 2018).

LCC differs from other visual models by its management throughout the project's life cycle, which is divided into five groups by PMI. The first phase, the initiation phase (Figure 1), integrates the first set of management processes of the PMBOK, which begins with the structuring of a determined identified need, and, therefore, the definition of a new project or a new phase of an existing project (Medeiros, Araújo & Oliveira, 2018; PMI, 2017).

Figure 1 Iniciation with LCC

Source: Veras (2018).

The proper processes and documents of a management plan that must be used to execute it are part of the Planning (Figure 2), detailing what must be accomplished (Medeiros et al., 2017; PMI, 2017).

Figure 2 Planning with LCC

Source: Veras (2018).

The execution phase (Figure 3) puts into practice what was planned in order to allocate the data so that they can be administrated. This step is important to integrate people and other resources needed to execute the project management plan (Medeiros et al, 2018; PMI, 2017; Veras, 2018).

Figure 3 Stages of execution and monitoring and controlling with LCC
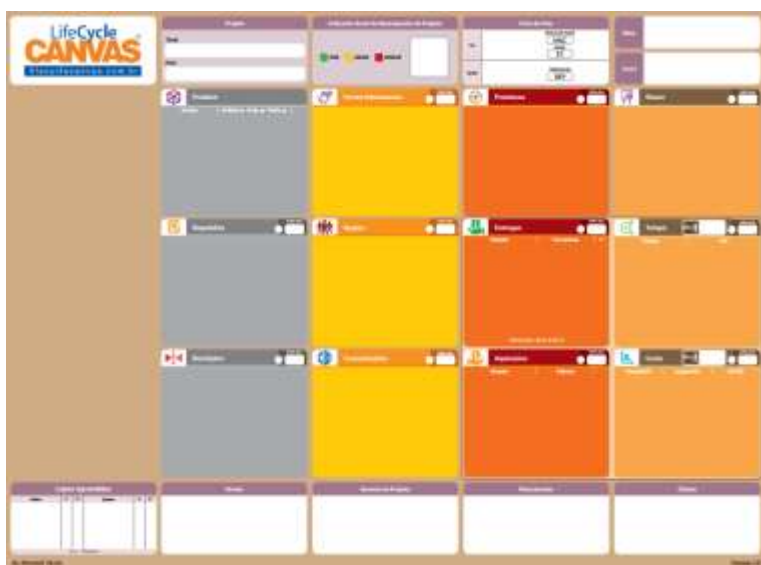
Source: Veras (2018).

Closing (Figure 4), the last group of management processes, formalizes the acceptance of the final product, or of a service of the project, or of a project phase (Veras, 2018).

Figure 4 Closing with LCC

Source: Veras (2018).

In short, LCC model addresses the issues inherent to the good practices recommended by PMBOK, and, at the same time, gives dynamics and simplicity to the project management processes, causing the project screen to be modified throughout the life cycle.

Given the above, LCC model is an innovative, robust and flexible model, characterized by its applicability to projects of any type, any scope or activity. In this context, LCC model can be used as a facilitator in the management of activities to be developed in the teaching-learning process through active learning methodologies, such as Problem Based Learning (PBL); Peer learning (Peer Instruction); Flipped Classroom (FCR); and, of course, Project Based Learning (PBL or PjBL). Following are the teaching methodologies used in the present study, PjBL and FCR.

2.2 PROJECT BASED LEARNING

Active learning methodologies allow students to experience real-life problems and situations in advance. In the active method, knowledge is built collaboratively and students occupy the center of educational actions, having knowledge, experiences and opinions as a starting point for building knowledge (Diesel, Baldez & Martins, 2017).

The use of active methodologies is suggested as a good resource to reduce the presenteeism of university students (characterized by physical presence and lack of participation in academic activities), especially in conjunction with the use of technological tools (Paulo, Costa & Andrade, 2018). The implementation of active methodologies is also associated with the retention (permanence) of students in higher education, being more intense when there is a student perception regarding the quality of this new pedagogical method. Public universities could further explore the use of active learning methodologies to the point where students perceive and value innovation in teaching processes, making it the main attraction of the student's permanence and changing the position of gratuity to a complementary plan (Guimarães, Severo, Nobrega, & Leone, 2019).

The use of projects, the inversion of the classroom and learning through problems are examples of active learning methodologies, as they base their learning processes on the student's action. The pedagogical use of projects and the construction of knowledge was idealized by John Dewey in 1897 and developed by William Kilpatrick (Barbosa & Moura, 2013).

Holm (2011) pragmatically defines PjBL as a student-centered training that, within a defined period, students select, plan, research and produce a product in response to a problem in the real-case scenario.

Several publications and school experiences refer to the potential of learning projects as valuable support for the educational process, especially with regard to the promotion of meaningful learning, taking into account the application in real situations related to context and life, in broader sense, which must be related to the central object of the project under development (Barbalho, Reis, Bitencourt, Leão & Silva, 2017; González-Carrasco et al, 2016; Habók & Nagy, 2016; Pereira, Barreto & Pazeti, 2017).

2.3 FLIPPED CLASSROOM

The Flipped Classroom Method (FCR) connects various educational concepts, including active, meaningful and collaborative learning. It basically refers to transferring what is traditionally done in the classroom to home and vice versa. Generally, reading or instructions are converted into a video or other digital format, in line with current students who are highly connected with new technologies and digital resources. Students learn basic information at home, record notes and questions; and, later, they are helped in the classroom

to understand the concepts they feel blocked and to apply the acquired knowledge. Classroom time is totally restructured, being used to carry out activities, practical assignments and targeted help, which must be mandatory and involve interactive learning, except lectures. The significant gain in time devoted to guided and independent practice or laboratory activity with the use of inverted classroom, exceeds 100% increase, when compared to the practice time of the traditional teaching model (Bergmann & Sams, 2017; Bishop & Verleger, 2013; Zuber, 2015).

Other resources such as printed texts and audios (podcasts) can be produced to instrumentalize the student for the discussion and the solution of problems, there is no need for a large production of material, but rather that this material is developed with the main intention of engaging students, without causing an information overload (Sharma, Lau, Doherty & Harbutt, 2015). The integration with students through a virtual environment, such as Moodle or EdModo, or the use of blogs to provide material to students, associated with a space where students can place their notes are also options for interaction with students (Bollela, 2017).

The application of the method is based on its four basic pillars: 1-Flexible (F), the process must be flexible and favor the use of different teaching-learning modes; 2- Learning (L), learning should be centered on the students and their relationship with peers; 3-Intentional teaching actions (I), the teacher must be intentional in the activities carried out and proposed to the students; 4-Professional Educator (P), the teacher must evaluate and give feedback to students, as well as reflect and evaluate their own practice (Flipped Learning Network [FLN], 2014).

The inversion of the classroom has several advantages. It allows exploring digital resources; bringing the language of today's students closer, who can be connected to different digital devices and multitasking simultaneously; flexibilize the pace of learning according to the needs of each student; assist students who face difficulties; helping students with different skills to excel, considering special needs; intensify student-teacher and student-student interaction; personalization of learning; facilitates classroom management, as students are involved in activities and are less likely to disperse. Additionally, it makes the class more transparent, as the material is available to all those interested on the internet (Bergmann & Sams, 2017).

The literature points to improvement in the learning of higher education students in different areas, both at undergraduate and graduate levels. Pavanelo and Lima (2017), when using the method for the development of a calculus subject, from the Engineering courses of the Technological Institute of Aeronautics, identified as positive points the use of classroom time for interactive group activities and the better performance of students in evaluations, corroborating with evidence identified by Bishop and Verleger (2013). Strong current evidence, given by a study using meta-analysis about the education of health professions, suggests that the FCR approach yields a significant improvement in student learning compared to traditional teaching methods (Hew & Lo, 2018).

Associating LCC with PjBL and FCR, the starting point is to fill in the Education screen (Figure 5), which includes, among other information, the anchor and the driving question.
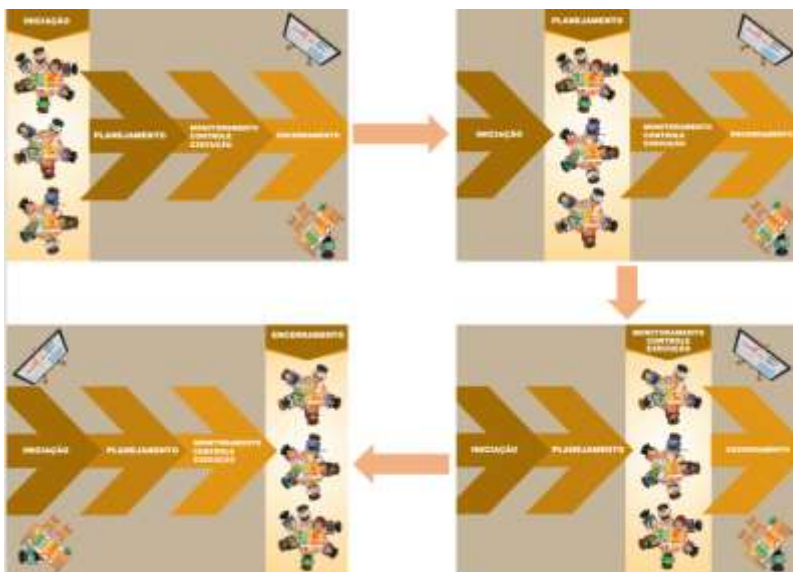
Figure 5 Utilization of FCR with LCC

Source: Elaborated by the authors, 2018.

From there the project management cycle is carried out (Figure 6), going through the stages of initiation, planning, monitoring, control and execution, closure.

Figure 6 Utilization of FCR in the life cycle of projects

Source: Elaborated by the authors, 2018.

The process is completed by evaluating the stages of carrying out the project and filling out the learned screen's lessons (Figure 7) for each project, where the results of the projects are evaluated.

Figure 7 Utilization de FCR com LCC

Source: Elaborated by the authors, 2018.

This didactic-methodological design, although applied as a hybrid model (associating traditional teaching and an inverted classroom), can provide an adequate interaction between

teachers and students, as well as between students themselves, providing meaningful learning using the technological resources of the internet (Francisco & Oliveira, 2016).

Since, the concepts to which the study pervades were established, and in the perspective of better understanding the processes of the proposed work, we proceed to the next section that deals with the procedures and methodological characterizations of this research that associates the use of LCC model with active teaching- learning.

3 METHODOLOGICAL PROCEDURES

In order to achieve the objective proposed by the study - to verify the applicability of a visual management model of the life cycle of projects, the Life Cycle Canvas® model, in the context of the management of learning activities based on active learning methodologies - we chose to do action research, of qualitative nature, with exploratory and descriptive character, through case study.

The study was conducted in a discipline at the graduate level of a master's program at a public institution of higher education. The choice of the case was for convenience, due to the partnership established between professors of the Administration and Education courses in favor of the application of LCC model in the discipline "Project Based Learning". However, the relevance is significant due to the innovative character of this experience, which sought to present a practical solution so that the students themselves can take an active role in the management of their projects in the academic environment. In addition, the research represents the pilot study for a master's dissertation and a doctoral thesis, both from the Postgraduate Program in Administration at the same institution.

The research was carried out from April to July 2017. The researchers participated since the planning of the discipline, followed the practical activities in the classroom and acted as facilitators in the process of filling in the LCC® support screen, attended the final presentation of the students' groups, and followed the evaluation carried out by the teachers regarding the students' development and the adequacy of the model to the discipline.

The data collection process was carried out through participant observation, document analysis and questionnaire application. Initially, the researchers collected data through observation and interaction with the object of study. During this stage, the researchers focused on identifying how the four groups conducted the completion of LCC screen, in order to

understand the behavior of students in the process of project management in the area of education, as well as to record the successes and struggles they faced.

In addition, triangulation, pointed out by Flick (2009) as a quality factor in qualitative research, was also observed in the study. Both method triangulations, and researchers and data triangulation were performed. Two qualitative and one quantitative methods were used that seek circularity and validation, in addition to generating different sources of data. Besides, two of the researchers were involved in participant observation which gives different perspectives from the analytical point of view.

The documentary analysis used the artifacts produced by the students (main LCC screens filled in) and by the teachers (evaluation rubric screen). In order to fulfill the objective proposed in the study, the documentary analysis also examined how the groups assimilated the proposed idea of establishing a process for managing education projects and how the use of LCC® model contributed to making the innovation process an effective action. This stage basically verified consistency and cohesion based on a more detailed analysis of the documents completed by each of the groups related to the proposed innovation products.

The questionnaire applied with the teachers was composed of 8 questions, 2 closed (Likert scale with 5 points) and 6 open, subdivided into four sections that sought to contemplate the teachers' perception regarding: 1- LCC itself; 2- The association from project management to PjBL characteristics; 3- The association of project management and LCC to the PjBL methodology; finally, the most important item; 4- The association of LCC with project management in PjBL. The questionnaire was sent by e-mail and the sending was communicated to respondents by text messaging application.

As for the results, the data from the closed questions of the questionnaire were described verbatim and the answers given to the open questions were partially transcribed. In order not to identify the individual responses of the interviewees, they were randomly coded as Professor 1 (P1) and Professor 2 (P2).

As it is an action research, the analysis of data in the light of the literature combined with the analysis of documents (the artifacts generated from the use of LCC) and the observations recorded during the process, constituted important instruments to obtain the results and the conclusions of that study.

4 RESULTS AND DISCUSSIONS

4.1 THE FCR-PjBL USE PROCESS MANAGED BY LCC

The first stage corresponded to the planning of the discipline, which comprised the deepening of knowledge about the theoretical framework (FCR, PjBL, LCC), definition of teaching learning strategies and resources, schedule planning, selection of the basic bibliography, discussion about the method and evaluation rubric. It was held in April 2017, with 2 face-to-face meetings between teachers, with the presence of researchers.

The second stage was the completion of the discipline, which took place during the months of May and June, with a total workload of 30 hours, having face-to-face meetings every two weeks on the weekends (Friday and Saturday). The methodology used was the Flipped Classroom-FCR (Figures 5, 6 and 7), associated with PjBL practices managed by LCC. On the first day of class, the teaching methodology, strategies, schedule, and basic bibliography for study were presented to students. In the development of FCR, the home activity corresponded to the reading of didactic material about PjBL and LCC, made available through the virtual environment usually used in the educational institution.

The classroom practice used PjBL as a strategy, through which each group of students developed a project in the area of education and delivered a product. As part of PjBL, an "anchor" video was used to support a real-world scenario, emphasizing the importance of the general subject proposed to the class (Education today). Then, the groups of students met and defined the "driving question", that is, the specific theme that would be the main focus of each group's PjBL experience, namely: 1- How to insert digital games in the teaching of Business Administration Financial resources?; 2- Improvement of the knowledge of Information and Communication Technologies (ICT) for a group of senior citizens using as motivational focus the life experiences of the students themselves; 3- Flipped Classroom: how to do it ?; 4-School and Community, building a culture of peace. Mini classes (lasting 15 to 20 minutes) were also held on project management using LCC, following the completion of the life cycle (Initiation, Planning, Execution, Monitoring & Control, Closure) of the projects that were developed by the students.

The development of practical activities in the classroom was monitored by teachers and researchers, and feedback was provided to students. The doubts were clarified in person and, when out of class, by text messaging application. The learning pace of each group was respected, with greater attention and monitoring for a specific group that demonstrated this

need, following the recommendation of PjBL. According to the discipline schedule, all groups carried out their projects and, at the end of the course, presented the results of the experiment, and delivered the products: book, e-book, digital game with usage guide, and advertising material for educational campaign.

It was identified that the 4 basic pillars of the flipped classroom methodology, referenced by FLN (2014) and Wang (2017), were respected in the present study: flexible environment, student-centered learning culture, intentional content, and prepared educators. The main advantage of the inverted classroom observed in this experience was the increase in the availability of time to carry out interactive group activities with the mediation of the teacher, which allowed other advantages such as the simultaneous use of several digital resources; getting closer to students and narrowing the teacher-student and student-student relationship; greater availability of time for students who faced personal or learning difficulties; and the flexibility of the learning pace, respecting the final deadline for the completion of the project; benefits that corroborate with the notes of the current literature (Bergmann & Sams, 2017; Pavanelo & Lima, 2017).

The students went through the entire cycle of a project: initiation, planning, execution, monitoring and control, and, finally, closing. For this purpose, the students completed the 4 main LCC screens, the learned lessons screen and the LLC-Education screen (Figures 1, 2, 3, 4, 5 and 7). It was observed that there was a strong involvement of the class with the content, contributing to the students' significant learning and a good performance in the evaluations carried out, these items being verbalized by the students themselves at the end of the discipline. These results confirm the findings of Bishop and Verleger (2013), Moran and Milsom (2015), Foster and Stagl (2018) and Hew and Lo (2018).

The basic characteristics of PjBL, listed by Bender (2015), were evidenced by the researchers in the present study: selection of an anchor; definition of driving questions by students; performing cooperative team work; research and innovation in project tasks; reflection; valuing the voice and choosing the student throughout the project; feedback and review from teachers and colleagues; and public presentation of results. The students' report pointed to the use of active methodology as a primary factor of learning and performance in the discipline. A similar perception was pointed out by Escrivão Filho and Ribeiro (2008) when they used another type of active methodology, Problem Based Learning (PBL), in teaching administration. The authors identified that compared to traditional instructional

approaches, the use of the active methodology proved to be advantageous even when partially adopted. Moreover, they highlighted the narrowing of the student-student and teacher-student relationship as an important affective factor.

By monitoring the project management and filling in LCC artifacts, the researchers listed the project management concepts that generated more requests for clarification: requirements, restrictions, assumptions, risks, product and deliveries. However, it was possible to identify that the concepts were being apprehended and used by the groups during the completion of screens and the management of their respective projects applied to real situations of their professional practices. This finding agrees with the scientific evidence about the need to associate classroom content / activities with students' professional experience, aiming the mobilization and systematic development of skills, which was pointed out as one of the most frequent considerations in a study on skills development, in the context of postgraduate programs in management training (Ruas & Comini, 2007).

Additionally, the students identified LCC as a facilitator in the management of the developed projects. The researchers' observations endorse that LCC presented itself as a visual instrument of simple application due to the use of screens and, at the same time, very robust for relying methodologically on guides in the area of internationally recognized project management. It facilitated the relationship of the interested parties, giving an integrated, clear and global vision of the project. It proved to be scalable, serving the different sizes of projects developed in the classroom, and flexible, being used by people with different levels of prior knowledge about the project management area. Its great differential, when compared to other management tools, was its exclusive dynamic style, which allows to manage the entire life cycle of the projects, as proposed by Veras (2016) and Medeiros and Veras (2016).

The third stage was the evaluation of students, carried out using a specific screen containing rubrics, developed specifically to contemplate the application of LCC to PjBL. The following items were evaluated: analysis of the project's feasibility and development, quality and deadlines for deliveries / final product, quality and deadlines for completing LCC artifacts / screens, registration of lessons learned; in addition to assessing the involvement of groups with the applied educational practices (FCR and PjBL), developing the project aligned with the proposed subject and presenting it to the class. The evaluation occurred continuously, with its value attributed at the end of the discipline after a teachers meeting. Only one group did not reach the minimum score necessary for approval in terms of filling in artifacts (LCC

screens). Considering the need for more specific monitoring for this group, as recommended by the PjBL methodology (Bender, 2015), the students had their questions clarified and were instructed to fill in the screens again and hand it in for a new evaluation. In the end, all students were approved.

The fourth and last stage, which occurred after the completion of the activities with the students, in July 2017, was the evaluation of the discipline, carried out by the teachers. They recognized LCC's contribution to project management in the education area, identifying it as a simple, robust, flexible, scalable and dynamic visual management model, as proposed by the literature (Veras, 2016). The Flipped Classroom methodology, using Project Based Learning managed by Life Cycle Canvas®, was evaluated as a positive experience and, therefore, it was incorporated into the discipline and will be replicated with the next classes, demonstrating the teachers' adherence. Positive result with continuity of pedagogical practice was also reported by Escrivão Filho and Ribeiro (2008) about the use of active methodology in the Administration course, showing teacher satisfaction, the stimulus to the professional improvement of the teacher through the intellectual challenges that emerged during the process teaching-learning and the implementation of a new way of teaching-learning after conducting the research.

Upon observation it was found that the basic concepts about FCR, PjBL, and LCC were learned during the active learning process, since the execution and management of interactive activities were successfully performed by all groups in the class, with the delivery of the final product carried out according to the requirements, deadlines and costs pre-established by the students themselves.

4.2 PERCEPTION OF TEACHERS ABOUT USING LCC WITH FCR-PjBL

In a general context, the two teachers who answered the questionnaire identified that LCC positively influences the basic characteristics of PjBL. However, one of the teachers does not consider that LCC has had any influence on the definitions of the anchor and driving issue, while the other teacher considered that there was some relevance. This relationship ends up being reversed when asked about the influence on the student's voice and choice, when the teacher who disregarded the influence of LCC in the initial parts analyzed how high LCC's ability to improve this characteristic was and how the other teacher claimed to have some capacity.

The fact that one of the respondent teachers is not from the Administration area, brings a more accurate perspective on the usage of LCC in contexts in which users are not familiar. This teacher evidenced that although management provides greater control to the project, some concepts inherent to the project management area can initially be mistakenly assimilated, requiring some time and the guidance of the teacher / facilitator to be really learned. This becomes clear when one of the teachers assigns a high grade to the influence on the establishment of the strategy, while the other is unable to give an opinion.

The teachers also stated, through the questionnaire, that the association of the theoretical foundation of the project management (PM) area with the PjBL methodology allowed the optimization of the application of knowledge, skills, tools and techniques to the project activities in education in order to meet their requirements. They justified that the association "makes the process simple and intuitive" (P1) and that "the requirement of objectivity necessary for the development of a project, with clear forecasts, consistent steps, means that the north of the actions necessary for good performance is not lost of the process "(P2). In addition, they point out that "the rationale provides fundamental and visible guiding elements for execution, which facilitates the review and monitoring of actions, without deviations, in addition to allowing the final result / product not to be lost sight of." (P2)

The use of LCC model was considered by both teachers to facilitate the application of the Project Based Learning methodology, as it "simplifies, engages, guides" project management and "in a simple way, it [LCC] signals that projects have life cycles" (P1). P2 describes that LCC screens are "a clear, objective device that provides the precise and necessary information for the monitoring" of the project. P2 also describes that "the visual proposal of LCC is extremely useful for monitoring the project, since it makes it possible to visualize all the stages of the project at a single time (P2). It also states that the use of LCC clarifies the critical points of the project that must be revised, since it provides the identification of "coherence / inconsistencies, breaks and systematicity of the steps".

The engagement of the team and the use of LCC were highlighted as fundamental to the success of the developed projects. The transparency of the information was perceived as a fundamental point, as it allows a detailed understanding of the project as a whole; as well as, the identification of inconsistencies that could have a negative impact on the results. In this sense, Professor P2 explains "the involvement of the group was crucial, the understanding of

the relationship between the parts that make up the project, the highlight being the visibility provided by LCC".

For teachers, LCC made important contributions to the management of projects carried out by the PjBL methodology, namely: 1-Speed in the preparation of the project; 2-Perception of the intrinsic relationship between the problem, objectives, deliveries and the final product; 3-Definition and distribution of responsibilities; 4-Simplification of project management; 5-Track and sequence for the realization of a successful project; 6-Focus on results.

Regarding difficulties in using LCC to support the management of projects implemented through the PjBL methodology, one of the teachers stated that he did not identify any difficulties. The other professor listed two points: 1-The students' lack of knowledge in relation to some terms used in the area of project management (for example, delivery and requirements); and 2-The need to adapt the screens (substitution of the term sponsor).

In view of the above, the teachers showed a positive perception regarding the result of using LCC in the management of PjBL projects, highlighting the need to develop knowledge concerning the concepts of the project management area in order to carry out the practice.

5 FINAL CONSIDERATIONS

The basic concepts about FCR, PjBL and LCC were applied by teachers during the course, providing the students with an understanding of these concepts through theoretical mini-classes and practical activities for the elaboration of projects that went through all the phases of the project life's cycle.

Life Cycle Canvas provided the project management framework for teaching practices from the perspective of Project Based Learning. LCC acted as an aid in this educational environment, providing students with the initiation and detailed planning of a project; the execution of a real project in its totality, the most accurate monitoring; making control decisions more safely, given the clarity of the information, the engagement of the team and the communication facilitated by the use of specific screens for each phase of the project; as well as proper closure and recording of lessons learned. LCC contributed to the students' learning and the development of their skills, focusing on the realization of projects to solve real problems.

The Flipped Classroom methodology, using Project Based Learning managed by Life Cycle Canvas®, was evaluated as a positive experience. The teachers sustained that LCC positively influenced the basic characteristics of the PjBL and pointed out that the association of the theoretical foundation of the project management area with the PjBL methodology allowed the optimization of the application of knowledge, skills, tools and techniques to the project activities in education in order to meet their requirements.

The students recognized LCC as a facilitator in the management of the developed projects. The involvement of the class with the content contributed to the students' significant learning, evidenced by the good performance in the activities and evaluations carried out. LCC demonstrated important contributions and simple application in the management of the projects carried out.

As this is an action research carried out with only one graduate class in a public education institution, this limitation is attributed to the study. In this context, as a way of confirming the results found, we recognize the need to replicate the research with different groups of people and in different teaching-learning environments, which represents the future perspectives of new studies to be carried out by this group of researchers.

Given the above, the assistance that LCC gives to the management of the PjBL project, allows students to have more time to apply effort for activities related to cognition and learning, contributing to the optimization of the learning process. Thus, we may conclude that LCC subsidizes the management of projects in education, comprehensively and without losing the necessary simplicity in this context; therefore, it is applicable in the context of PjBL.

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