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Be Active: design and creation of an innovative digital platform for active methodologies

Be Active: design e criação de uma plataforma digital inovadora de metodologias ativas

Be Active: diseño y creación de una plataforma digital innovadora de las metodologías activas

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Abstract
The article is an experience report of design and creation of a digital platform for the application of active learning methodologies. There are digital platforms that offer support for the use of active methodologies, however, they usually choose a single methodology and to diversify the strategies, one must use different platforms. In this context arises the Project "Be Active", whose goal is to implement a digital platform in which it is possible to apply and map the learning and performance of students through different active methodologies. The project started in 2019 and is developed through a methodology inspired by the R&D cycle. The production team is multidisciplinary and meets weekly. Initially, a briefing and a delivery map, execution flowchart, and indicators were structured. Currently, Be Active already allows, for any educational model (distance, hybrid, or face-to-face), the support for the use of active methodologies: Problem-Based Learning, Project-Based Learning, Peer Instruction, Team-Based Learning, as well as gamification strategies. In addition, it allows the application of Learning Styles Diagnostics. It allows the user to register and use the methodologies synchronously or asynchronously, as well as reports on student performance that can be downloaded and analyzed qualitatively and quantitatively. The perspective is to improve its functionalities, layout, and usability. It is hoped that it will be possible, through the wide dissemination of the use of the platform, to contribute to a contextualized and innovative educational reality, adapted to a logic of complex and continuous learning.
Keywords: Active methodologies; Digital platform; Innovation.

Resumo
O artigo trata-se de um relato de experiência de design e criação de uma plataforma digital para a aplicação de metodologias ativas de aprendizagem. Existem plataformas digitais que oferecem suporte para a utilização das metodologias ativas, no entanto, geralmente elegem uma única metodologia e para diversificar as estratégias, deve-se recorrer a diferentes plataformas. Nesse contexto surge o Projeto “Be Active”, cujo objetivo é implementar uma plataforma digital em que seja possível aplicar e mapear a aprendizagem e desempenho dos estudantes por meio de diferentes metodologias ativas. O projeto teve início no ano de 2019 e é desenvolvido mediante uma metodologia inspirada no ciclo de P&D. A equipe de produção é multidisciplinar e reúne-se semanalmente. Inicialmente estruturou-se um briefing e um mapa de entregas, fluxograma de execução e indicadores. Atualmente Be Active já permite, para qualquer modelo educacional (à distância, híbrido ou presencial), o suporte para o uso de metodologias ativas: Aprendizagem Baseada em Problemas, Aprendizagem Baseada em Projetos, Instrução de Pares, Aprendizagem Baseada em Equipe, assim como estratégias de gamificação. Além disso, permite a aplicação de Diagnóstico de Estilos de Aprendizagem. Permite que o usuário se registre e utilize as metodologias de forma síncrona ou assíncrona, além de

relatórios sobre o desempenho do aluno que podem ser baixados e analisados qualitativa e quantitativamente. A perspectiva é a de melhorar suas funcionalidades, layout e usabilidade. Espera-se que seja possível, através da ampla divulgação do uso da plataforma, contribuir para uma realidade educacional contextualizada e inovadora, adaptada a uma lógica de aprendizagem complexa e contínua.
Palavras-chave: Metodologias ativas; Plataforma digital, Inovação.

Resumen
El artículo es un informe de experiencia de diseño y creación de una plataforma digital para la aplicación de metodologías de aprendizaje activo. Existen plataformas digitales que ofrecen soporte para el uso de metodologías activas, sin embargo, suelen optar por una única metodología y para diversificar las estrategias hay que recurrir a diferentes plataformas. En este contexto surge el Proyecto "Be Active", cuyo objetivo es implementar una plataforma digital en la que sea posible aplicar y mapear el aprendizaje y rendimiento de los alumnos a través de diferentes metodologías activas. El proyecto comenzó en 2019 y se desarrolla con una metodología inspirada en el ciclo de I+D. El equipo de producción es multidisciplinar y se reúne semanalmente. Inicialmente se estructuró una sesión informativa y un mapa de entrega, un diagrama de flujo de ejecución e indicadores. Actualmente Be Active ya permite, para cualquier modelo educativo (a distancia, híbrido o presencial), el apoyo al uso de metodologías activas: Aprendizaje basado en problemas, aprendizaje basado en proyectos, instrucción entre pares, aprendizaje basado en equipos, así como estrategias de gamificación. Además, permite la aplicación del Diagnóstico de Estilos de Aprendizaje. Permite al usuario registrarse y utilizar las metodologías de forma sincrónica o asincrónica, así como informes sobre el rendimiento de los estudiantes que pueden descargarse y analizarse cualitativa y cuantitativamente. La perspectiva es mejorar sus funcionalidades, diseño y usabilidad. Se espera que sea posible, a través de la amplia difusión del uso de la plataforma, contribuir a una realidad educativa contextualizada e innovadora, adaptada a una lógica de aprendizaje compleja y continua.
Palabras clave: Metodologías activas; Plataforma digital; Innovación.

1. Introduction

We are currently in 2022 and we are experiencing, worldwide, societies that are trying to reorganize themselves in the midst of a post-pandemic process of covid-19, a disease caused by a new type of coronavirus called SARS-CoV-2, which causes severe respiratory infections (Brasil, 2021). Because of this virus, life in society has changed radically since 2020, going through isolations of different orders (Brasil, 2020), which directly affected the dynamics of school and work, which began to direct their activities, mostly in online, home office and remote formats (Brasil, 2020), intensifying the use of Digital Information and Communication Technologies (TDIC - Tecnologias Digitais de Informação e Comunicação) for the performance of the most different tasks (Schneider et al., 2020). According to Magalhães (2021), the alternatives created involved from high technology, such as the transmission of live classes and availability of recordings on digital platforms, to the production of video classes and educational programs, broadcasted on radio and television stations.

The meaning of the intensification of these alternatives are disruptive processes, which were already being observed before the covid-19 pandemic, in different dimensions. Obviously, the changing in the social scenario and consequently the future of work will still change the formal education scenario, at all levels and modalities. According to the report "The Future of Jobs" (2020), the covid-19 pandemic has shown that a new hybrid way of working is possible on a larger scale, as well as pointing out that 65% of children who are in basic education today will work in jobs that do not yet exist.

Dondi et al (2021), in research by the McKinsey Global Institute, state that in a digital and dynamic labor market, the key skill sets to be developed in this century, regardless of job and profession, involve adding value beyond what can be done by automated systems and intelligent machines, operating in a digital environment, and continually adapting to new ways of working and new occupations. In the educational context, Martins et al. (2021) emphasize the importance of continuing education for teachers due to the expansion of the use of digital information and communication technologies within the school environment, highlighting the relevance of digital literacy.

According to Schmitt and Domingues (2016), there are different typologies of learning styles, since styles are characteristic and dominant modes of the way individuals receive and process information (Felder & Spurlin, 2005). Specific

models such as Kolb's, Gregorc, Felder-Silverman, VARK, and Dunn & Dunn are the most widely used. All are based on Howard Gardner's theory of multiple intelligences and provide a sufficiently stable characterization that assists the planning of more effective pedagogical strategies in relation to the needs of students.

According to Lacerda and Santos (2018), the university should also be guided towards active learning methodologies. Bacich and Moran (2018), define active methodologies as the interrelation between education, culture, society, politics and school, being developed by activities focused on student autonomy. Given this whole context, education as a whole, and more specifically Higher Education, must also intensify pedagogical practices that leverage competencies and skills that are expected for the very near future. This is why learning diagnostics and hybrid or technology-mediated education, in addition to active learning methodologies, have their meeting point.

In Brazil, the active learning methodologies, according to the authors, began to be conceived with the movement called New School (Escola Nova), whose direct influence is given by the North American author John Dewey, who advocated teaching and learning methods focused on practice and learning by experience, the so-called learning by doing (Dewey, 1971).

In more than a century, many active learning methodologies have been conceived from this educational current called pragmatism, all over the world. One example is Problem Based Learning, a methodology created in the 1970s in universities in Europe and Canada, in which students work in small groups to analyze the problem and determine what the facts of the problem are, the ideas for solving it, the questions that arise, and what information is needed to solve it. Once the learning issues are identified, students conduct self-study before returning to the group to share their findings and apply them to solving the problem (Mamede & Penaforte, 2001). Another example is the active Peer Instruction methodology, conceived in 1991 by Eric Mazur, professor of physics at Harvard University, whose main objective is to ensure that students are effectively involved and encouraged to participate in the learning process (Crouch et al., 2007).

Masetto (2012) proposes that through active learning methodologies, the class should be thought horizontally, collaboratively, in which the objectives of teachers and students are common and can use digital technologies as support. It is noted that there are digital platforms that offer support for the use of active methodologies, however, they usually choose a single active methodology, such as the Projetc Pals Platform, and others.

Seeking the diversification of learning diagnosis strategies and active learning methodologies, different platforms must be used. It is in this context that the "Be Active" Project arises, whose objective is to implement a digital platform where it is possible to apply and map the learning and performance of students through different active methodologies, without the need to resort to other tools.

Be Active is a collaborative web-based platform designed to work with the diagnosis of learning styles and various active methodologies. The idea is to offer in a single platform the support to use methodologies such as Peer Instruction, Team-Based Learning, Problem-Based Learning, Project-Based Learning and Gamification strategies, in online, face-to-face or hybrid classrooms. The different active methodologies included in the Be Active platform have similar characteristic attributes, since they focus on the intellectual development of the student through problematic questions and activities that favor peer interaction, such as: discussion of specific topics, teamwork, tests, quizzes, problem solving, case studies, brainstorming, investigation and research activities.

2. Methodology

This is a descriptive study, of the experience report type , developed from the development and implementation of a digital platform for the use of active methodologies in higher education (Severino, 2017) The project began in 2019 and is developed through a methodology inspired by the R&D cycle. This article describes the experience of design and creation of this digital platform for the application of active learning methodologies.

In general terms, the R&D cycle starts by defining a briefing, followed by a delivery/phase map. For this, a single registration form with flowchart must be created. Inspired by this process, the methodology for creating the Be Active Platform is developed by a multidisciplinary team, formed by experts in Education, Management, and Technology. Its development, since 2019, is linked to a technology incubator in a university in the interior of the State of São Paulo/Brazil.

Since then, the multidisciplinary team meets weekly. Initially a briefing was structured, through a brainstorming about what the platform could contemplate. In this brainstorming it was considered interesting to add value to the platform, bringing the different learning styles diagnostics, through the inventories validated by Kolb (1999) and others, and a complexity dynamic (from lowest to highest), for the implementation of active learning methodologies.

Therefore, the initial stage generated a delivery map, execution flowchart and indicators, organized in an online and editable project file (Figure 1).

Figure 1 - Project file.

OBJETO/RECOMENDAÇÕES PEDAGÓGICAS:

Contratação de serviço técnico para desenvolvimento de uma Plataforma de Desenvolvimento de Práticas de Metodologias Ativas, para qualquer modelo de educação (distância, híbrida ou tradicional), com o objetivo de apoiar a utilização das metodologias ativas: Problem Based Learning, Project Based Learning, Peer Instruction, Team Based Learning, bem como estratégias de gamificação. Este serviço deverá ser realizado por pesquisadores que dominam as metodologias ativas citadas.

O objeto deverá atender aos seguintes critérios pedagógicos:

1) Diagnóstico de estilos de aprendizagens: com base em organograma do autor Kolb, deverá ser programado um questionário para a detecção de estilos de aprendizagem, de maneira que o relatório seja reportado ao usuário;
2) Estratégia de Flipped Classrom (Sala de aula invertida): proposta de jogo didático para que o professor entenda como organizar os estudantes para estudo baseado na estratégia, antes de desenvolver qualquer uma das metodologias ativas. Deverá ser programado uma atividade do tipo simulação e quiz;
3) Aplicativos para apoiar as metodologias ativas sistematizadas: Problem Based Learning, Project Based Learning, Peer Instruction, Team Based Learning. Essa proposta conterá orientações sobre como elaborar o passo a passo das metodologias e os questionários de verificação da aprendizagem. Deverão ser programados no mínimo 6 tipos de testes de verificação.

Source: Authors.

Through the organization of the delivery map, the following steps were consolidated by December 2021:

1) Layout and Usability: year 2019;
2) Learning Styles Diagnosis: year 2020;
3) Active Learning Methodologies: 2020 and 2021;
4) Testing of the Platform: year 2021;
5) Gamification: start at the end of 2021.

Currently Be Active already allows, for any education model (distance, hybrid or face-to-face), the support for the use of active methodologies: Problem Based Learning, Project Based Learning, Peer Instruction, Team Based Learning, as well as gamification strategies. In addition, it allows the application of Diagnosis of Learning Styles. It allows the user to register and use the methodologies synchronously or asynchronously, and reports are reported on student performance that can be downloaded and analyzed qualitatively and quantitatively. The results of this implementation will be presented below.

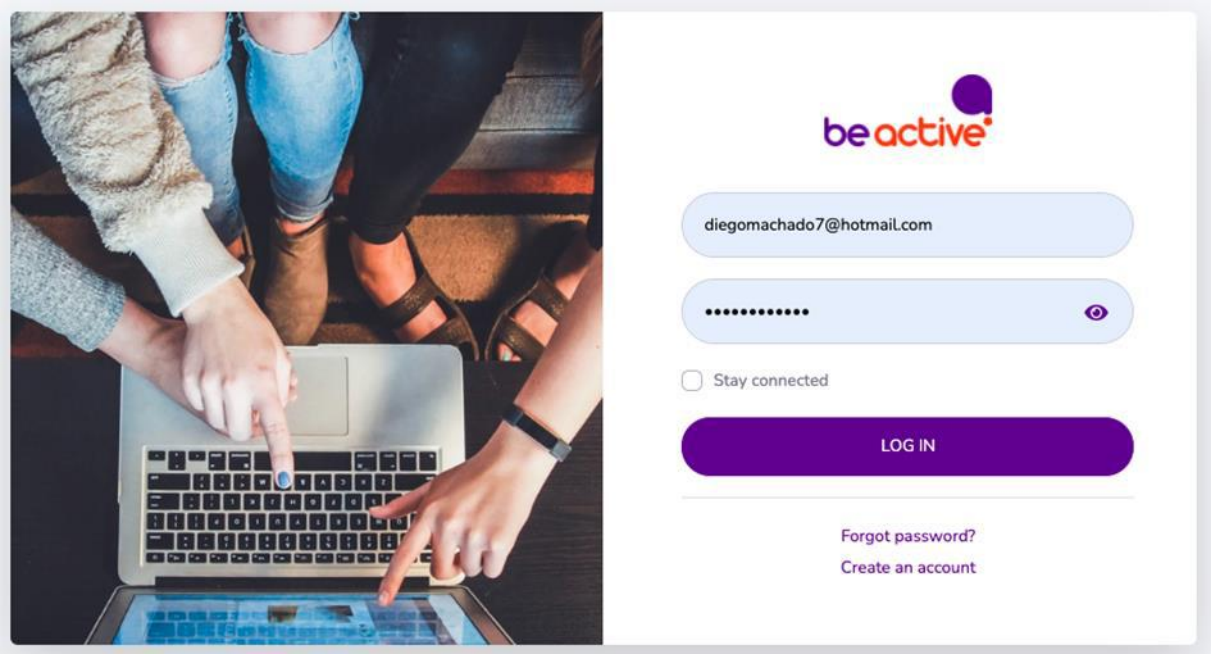
3. Results and Discussions

The platform offers the creation of events with start and end dates to apply the diagnostics or methodologies to several

participants at the same time, obtaining individual or team performances. The application can occur quickly, with just name and e-mail. Or through a logged area to follow up on participants for longer periods.

In terms of navigation, Be Active can be accessed via computers, laptops and smartphones, through the use of a browser. Currently the system is available in the domain www.beactive.com.br. The private area can be accessed with an account created on the Login link (Figure 2).

Figure 2 - Login area.



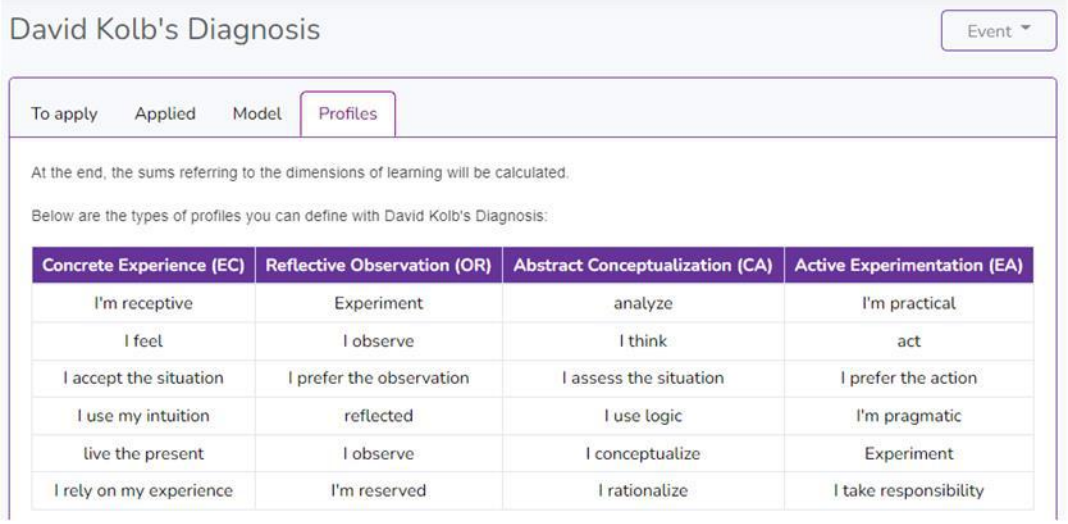
Source: Authors.

After almost two years of development, it is possible to identify learning styles with the Honey-Alonso Diagnostic, V.A.R.K, David Kolb, Multiple Intelligence (still under development) and Emotional Intelligence (still under development) (Schmitt & Domingues, 2016). And, besides that, to stimulate participants through a more direct teaching process with the help of Active Methodologies like Peer Instruction, Team Based Learning, Problem Based Learning, Project Based Learning (still under development) and Gamification (still under development).

3.1 Diagnostics

The diagnostics have a scientifically validated questionnaire model, so that the teacher understands the content that the participant will have access to at the moment of interaction. It is also possible to visualize the possible profiles to be detected. At the end of the application, it is possible to understand how a participant or his team can learn better and faster (Figure 3).

Figure 3 - Example of the possible results of a diagnostic application.



Concrete Experience (EC)	Reflective Observation (OR)	Abstract Conceptualization (CA)	Active Experimentation (EA)
I'm receptive	Experiment	analyze	I'm practical
I feel	I observe	I think	act
I accept the situation	I prefer the observation	I assess the situation	I prefer the action
I use my intuition	reflected	I use logic	I'm pragmatic
live the present	I observe	I conceptualize	Experiment
I rely on my experience	I'm reserved	I rationalize	I take responsibility

Source: Authors.

3.2 Active Methodologies

Active Learning Methodologies are a disruption of the traditional way of teaching to an interactive way of teaching, in which scholars feel more involved and stimulated to learn (Morán, 2015) . In order to add more value to this disruption, Be Active unites all methodologies in a single platform, transforming complex theories into collaborative practices to actually generate knowledge, not just information.

3.2.1 Peer Instruction

Peer Instruction was conceived in 1991 by Eric Mazur, physics professor at Harvard University, aiming to propose an educational methodology more in line with the concept of education advocated by him. According to Mazur (2013), education is a two-step process: The first step refers to the transfer of historically constructed information; The second step, the student needs to do something with this information, that is, create mental models, make sense of what he has learned, be able to see how the information and the embodied knowledge apply to the world around him.

In general terms, Peer Instruction is a technique that promotes interaction between students. As the name of the methodology makes clear, students are encouraged to explain concepts to each other. The teacher's role is to present questions that promote understanding of fundamental concepts of a subject's content. By answering the questions, students have the opportunity to test and share their knowledge with their peers.

After applying a quiz, the system generates an event, and it is necessary to enter a PIN and wait for all participants to be connected. Once everyone is connected, the teacher starts the event enabling the collection of the participants' answers. If the percentage of correct answers is between 0% and 30%, the platform tells the teacher to explain the content again and retake the test. If the percentage of correct answers is between 30% and 70%, the platform tells the teacher to separate the participants into pairs or discussion groups and repeat the question until the result is higher than 70% of correct answers (Figure 4).

Figure 4 - Performance Table Peer Instruction.

Source: Authors.

The system offers the option to form teams manually or automatically (leveling the teams between the worst and best performers). After the teams are formed, a chat room is made available where the teacher monitors all the conversations, encouraging participation or providing guidance in case of doubts. If the percentage of correct answers is between 70% and 100%, the platform will inform that the participants had a great use of the content. And it guides the teacher to make a brief conclusion before moving on to the next question. This process is repeated until all questions have been answered. At the end, the teacher will have everyone's results and will also be able to see the sequence of right and wrong answers for each of the participants. The platform also allows the use of a questionnaire created in Team Based Learning in Peer Instruction.

3.2.2 Team Based Learning

Team-Based Learning was created in 1970 by Larry K. Michaelsen, a professor at the University of Oklahoma, aiming to propose an educational methodology that would promote dynamic, meaningful and collaborative learning for classes of more than 100 students (Michaelsen et. al., 2002).

Four aspects are essential to achieve these goals: (1) permanent, strategically formed teams and their appropriate conduct; (2) student accountability for the quality of individual and team work; (3) frequent, immediate, and timely feedback; (4) team assignments that promote both individual learning and team development.

This methodology has two versions, one with only the Readiness Assurance Tests, and one with Preparation, Readiness Assurance Tests, and Concept Application. In Preparation, it is possible for the teacher to assemble study material by inserting bibliographical references and documents such as PDF, DOC and XLS. In the Prep Assurance Test, the teacher chooses a questionnaire to apply to the participants.

A quiz created for Peer Instruction without true/false questions can be used in Team Based Learning. The platform allows the teacher to set how many minutes the participants have to answer the quiz individually and in teams. Once everyone is logged in, the teacher starts the event, and the participants can answer the questions and wait until everyone else is finished. At the end of the individual answer period, the teacher will form teams for discussion and define one participant per team to answer for everyone. During the answering time, a chat will be available for the participants to chat and choose the correct answer. After all teams have answered, the teacher can finalize the questionnaires and define the maximum score, individual weight (%) and team weight (%).

The teacher will have access to all individual and team results and averages. The participant will only have access to

his or her individual and team results and averages. They can also export the results in PDF format. In the Application of Concepts, the teacher creates an activity to check whether the students have really absorbed the knowledge. Next, the participants will take part in a forum to discuss the subject of the activity proposed by the teacher. After the discussion, the participants will send a resolution to the teacher, and will evaluate their peers' participation in the resolution.

3.2.3 Problem Based Learning

Problem-Based Learning begins by presenting to the students a problem situation, without any prior instruction or information related to its solution. Then students work in small groups to analyze the problem and determine what the facts of the problem are, the ideas for solving it, the issues presented, and what information is needed to solve it. Once the learning issues are identified, students conduct self-study before returning to the group to share their findings and apply them to solving the problem (Mamede & Penaforte, 2001). The final stage involves a reflective activity in the sense that students evaluate themselves as well as their peers with respect to knowledge construction and skill acquisition (Ribeiro, 2008).

This methodology is applied in six stages in Be Active. Before starting, the teacher can establish a schedule. The first step is the registration or addition of an already registered problem that may contain bibliographic references, links and attached files, the problem will be the basis for the application of the methodology. The second is the formation of teams, which can be generated manually or randomly, defined by the system, then the teacher or the participants must define the roles of the members of each team, which can contain a leader, a writer, a spokesperson, and several members. These roles can be changed at any time in the following steps. The third stage is the frame of reference where participants will publish their ideas, facts, learning questions, and action plan for their respective teams in the form of post-its. In this step the participants should strive to understand the problem and seek a solution that will be discussed in the forum. The fourth stage contains the forum where the participants will debate the content published on the board and answer their questions or complement the solution to the problem through topics created by the participants or by the teacher, in order to seek the resolution of the problem that will be sent in the next stage. In the fifth step, a member of each team must send a file containing the solution to the problem according to what was published in the framework and discussed in the forum, thus concluding the methodology. Finally, the sixth step is the self-evaluation of the participants in relation to their contributions to their respective teams during the methodology.

3.2.4 Project Based Learning

Project-Based Learning refers to a teaching and learning methodology that emphasizes the involvement of students in work that is meaningful to them, in the sense of proposing tasks that are based on situations and problems of the reality of these students, so that they can develop and solve such activities with greater cooperation, involvement and performance (Bender, 2015).

Currently, Project-Based Learning is being widespread in all areas, due to the changes that have occurred in the educational context, especially with regard to the profile of students of the 21st century, who need to build knowledge, develop collaborative skills, work in teams, and then act not only in the labor market, but also to be responsible and active as global citizens (Bie, 2008; Bender, 2015). This methodology will be executed in six stages and when applying an event, the teacher must necessarily plan a schedule for each one of them.

The steps of the methodology will be Team Formation: this follows the same pattern as Project Based Learning, but there are no roles for the teams. Choice of Theme: the participants must define a theme for the project, the ideas will be published as post-its and then voted on in a poll. Formulation of Questions and Hypotheses: these will also be published in the form of post-its but there is no poll, the teacher selects the questions and hypotheses for the project. Project Development: This stage is currently under development, and will be done using Kanban charts. Finalization/Socialization: (not yet developed). Final

Evaluation: (not yet developed)

Because this methodology is under development, any of the above steps may be partially or completely changed after the publication of this article.

3.2.5 Gamification (under development)

The idea of applying elements usually associated with games in "non-gaming" contexts to motivate and increase individual engagement quickly gained strength in spaces in which interactions between people occur. Thus, the concept of gamification is basically characterized by systems of explicit rules and competition between individuals in order to achieve goals or results in terms of stimulating the learning of a content, whether in business or education (Deterding et al., 2011).

In the Gamification methodology it is possible to create a library of quizzes, flash cards, and memes, organized by folders and subfolders. Quizzes have a title, description, image, and are composed of questions. The questions have a title, image, true/false type, multiple choice type (only one correct alternative), select multiple type (more than one correct alternative, you can select multiple answers) and fill-in-the-blank type with exact words or excerpts, time to answer, option to send audio from a device or record in real time.

The game configuration gives the teacher the possibility to choose if he wants music, display the alternatives in random mode for the participant, jump automatically to another question, set the number of attempts to answer, show the answers during the activity. On the initial screen of the game, the teacher view contains the PIN code, QR Code, website link for the participant to participate (beactive.com.br/play), number of people connected, list of connected participants, option to block new participants, start button, option to change the music, music volume option, and the teacher option to choose whether or not the tool will read the question. In the participant view, it contains a field to enter the nickname or name, avatar, music on/off, option to read the questions. After the configuration the teacher starts the game, and follows in real time the performance of the participants in the form of a ranking.

The participants answer within the time that the teacher has set for each question. For each question answered, the participant receives feedback on his or her position in the ranking. At the end, both the teacher and the participants have access to a partial or complete report of the applied event. Because this methodology is under development, any of the above steps may be partially or completely changed after the publication of this article.

4. Conclusion

The objective of this article was to describe the experience of design and creation of a digital platform called Be Active, which consists of the opportunity for the teacher to know and apply learning style diagnostics and to apply active learning methodologies.

The platform, still under construction, has usability, accessibility, and offers the opportunity to be used in Portuguese. In 2022 it is expected to improve its functionalities, layout and usability. The design and development of the Be Active contribute to a contextualized, innovative educational reality, adapted to a complex and continuous learning logic, in which it becomes possible to develop different active methodologies and monitor students' performance, in order to map their actions in each of the experiences lived. The experience report opens the possibility for qualitative and quantitative studies to be developed to assess the Platform's effectiveness.

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