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Research Article

Active Methodologies Applied in Higher Technological Education

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Abstract

This report presents an interdisciplinary experience carried out at the Faculty of Technology, belonging to the Paula Souza State Center for Technological Education, involving the subjects of Programming Logic and Fundamentals of Communication and Expression. The main objective of the project was to develop students' essential skills, competencies, and attitudes, enabling them to contribute positively to the improvement of quality in the industrial and commercial sectors. Active methodologies, such as Problem-Based Learning (PBL) and Creative Learning, were employed to stimulate creativity in problem-solving. These activities were conducted in accordance with the principles of the Hitozukuri philosophy, which emphasizes human development and technical excellence. The project activities led to the development of the technical and conceptual skills required in both subjects, fulfilling the specific project goal of fostering improved relationships and mutual respect among students. As a result, and to showcase the project's interactive nature, several logic games were created and made available through workshops, using concrete materials. These were presented during an end-of-semester event, which was open to the community. This initiative not only enhanced the educational experience but also demonstrated the value of integrating different areas of study to promote holistic learning and development, ultimately preparing students for real-world challenges.

Keywords

Active Methodologies, Hitozukuri Philosophy, Interdisciplinarity, Creative Learning, Problem Based Learning

1. Introduction

This article describes a project developed with first-semester students from the Industrial Maintenance and Industrial Automation programs at the Faculty of Technology, located in São Paulo, Brazil, carried out in 2018. The project involved activities using Active Methodologies, specifically Problem Based Learning (PBL), which uses problems as a starting point for learning, and Creative Learning to develop systematic reasoning and collaborative work. The proposal to work with this methodology was motivated and functioned as a pilot project aimed at implementing a quality philosophy in the Higher Technological Courses at Paula Souza Center. For this, it was necessary to conduct some activities and workshops within the development of the subjects of Programming Logic and Fundamentals of Communication and Expression.

The quality philosophy in the Higher Technological Courses at Centro Paula Souza was initially presented to the faculty team at Faculty of Technology, with the primary objective of promoting measures to make this philosophy a part of the teaching culture in Faculty of Technology courses, fostering a participative, analytical, and critical awareness [1].

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The project aimed to develop students' skills, competencies, and attitudes necessary to enhance human potential, capable of contributing positively to strengthening quality in active industrial and commercial sectors, using the standards of the Hitozukuri Philosophy consciously, which will be addressed in the Theoretical Framework, as well as creativity in problem-solving. The specific objectives included: experiencing free experimentation in Technological Higher Education; being exposed to a more creative approach, aiming to develop the quality skills and competencies necessary for higher technological education; providing theoretical and material support for participants to replicate the experience with other students and teachers in Higher Education, as well as promoting the formation of conscious and engaged professionals.

Below is what was developed in the project.

2. Theoretical Framework

The interdisciplinary work required a theoretical foundation from the two subjects involved in the project, which we describe below.

2.1. Active Methodologies

The concept of Active Methodology is not new. In Dewey's work [2], experimentation was already present, as well as in theoretical approaches focused on teaching-learning processes from an autonomy perspective [3]. Vygotsky [4] addressed social interaction as an active methodology for learning. Thus, it is observed that all these studies have already addressed active principles.

Nowadays, the active method has been stimulated and encouraged in the teaching-learning process. According to Moran [5], methodologies need to align with the intended objectives. In this way, active methodologies are paths to advance more in deep knowledge, socio-emotional competencies, and new practices. In this sense, engaging students in diverse and stimulating activities contributes to a learning environment that fosters creativity and problem-solving.

Project based learning involves “allowing students to confront real-world issues and problems they consider significant, determining how to approach them, and then acting cooperatively in search of solutions.” The concept is associated with constructivist theories, which argue that knowledge is not absolute, as it is built by the student through their prior knowledge and interaction with peers and the environment, thus presenting itself as a 21st-century teaching and learning strategy, treating the student as the center of learning [6].

The PBL (Problem Based Learning) acronym was initially adopted in the late 1960s at McMaster University in the Canada and later at Maastricht University in the Netherlands [7]. It is an active teaching methodology in which students acquire knowledge and skills while solving problems related to the area in which they will work. The main idea is for students to develop critical thinking and problem-solving skills.

To develop the cognitive process and stimulate creativity in learning new concepts, Creative Learning was used, which seeks, in addition to developing meaning, the involvement and creativity of participants. Mitchel Resnick, director of the Lifelong Kindergarten, argues that the creative learning spiral is the engine for creative thinking [8].

The research team at the Massachusetts Institute of Technology (MITMediaLab), led by Mitchel Resnick, has been refining and using studies related to creative learning. The pillars of the creative learning spiral are focused on the four Ps of creative learning: projects, partnerships, passion, and playful thinking, inspired by the constructionism approach initially developed by Seymour Papert [9].

Considering that in today's world, both in everyday life and the job market, unexpected problems constantly arise, requiring creative and different resolutions, it is in this sense that creative learning allows students to use knowledge creatively, developing innovative solutions to the problems they are exposed to, and exercising their autonomy as protagonists in their learning process.

The Hitozukuri philosophy's principle is to invest in people, giving them the conditions to improve their work and, consequently, productivity. With this principle in mind, the Paula Souza Center team participated in meetings with leaders of some Japanese companies to understand how this philosophy is practically implemented. A simple translation of the term monozukuri wa hitozukuri is "making people before making things." Before thinking about people, there was the Monozukuri philosophy, which translates as "making things." The experience showed that only thinking about the product and its quality led to errors and losses, and it was from these studies that the Hitozukuri philosophy emerged.

Thus, realizing the dream of all industries to have motivated employees, the hired people would know how to deal with mistakes more creatively, allowing for improved productivity. The concept monozukuri wa hitozukuri directly correlates with the respect that should exist among people. It is about exercising respect for the training of people to perform their functions and providing them with the necessary tools for the job. The philosophy used in Japanese companies also respects and supports people when they have difficulties. The main idea is that by investing in people, you are investing in the company.

2.2. Concept of Semiotics

For the development of the project in the course "Fundamentals of Communication and Expression," we used the Semiotics theory developed by A. J. Greimas and the Group of Semiotic-Linguistic Investigations of the School for Advanced Studies in the Social Sciences, as presented by Barros [10]. This theory conceptualizes semiotics as the science

concerned with "[...] the text, or rather, it seeks to describe and explain what the text says and how it says what it says." To explain this concept, the author first defines the term "text" as an organization or structuring aimed at communication and then considers it as an object of meaning. According to Barros, a text can be defined by two parameters: its form and its meaning. In the semiotic perspective, the meaning of a text is conceived through a content plane under the form of a generative course.

This generative course follows five stages, as outlined by the author, which we will not detail but only present, as we used them in the development of the project to understand the analyzed text related to Pablo Picasso's painting "Guernica." These stages are:

1. The generative course of meaning progresses from the simplest to the most abstract;
2. Three stages are established in the course, each of which can be described and explained by an autonomous grammar, although the meaning of the text depends on the relationship between the levels;
3. The first stage, the simplest and most abstract, is called the fundamental level or the level of fundamental structures, where meaning emerges as a minimal semantic opposition;
4. The second level, known as the narrative level or the level of narrative structures, is where the narrative is organized from the point of view of a subject;
5. The third level is the discourse level or the level of discursive structures, where the narrative is assumed by the enunciation subject.

3. Materials and Methods

The project began with joint explanations to the students about the current need for changes to keep up with the market and its technologies and the principles of the Hitozukuri philosophy. Joint activities and workshops were conducted to apply the Active Methodology involving both courses. These activities consisted of the following actions.

3.1. Activities Conducted in the Programming Logic Course

The project activities developed in the Fundamentals of Programming Logic course consisted of three main workshops:

1. Robotic-human interaction;
2. Development of flowcharts using concrete materials;
3. Flash Mob - humanization of technological education.

The main objective of these activities was to develop creative thinking, personal and meaningful expression using programming logic for problem-solving. The problem analysis is the first phase of solving a problem with a computer [11]. In this context, we developed a workshop called human-robotics, which consisted of an interaction among the students. One representative simulated a robot-computer, and the other students had to give instructions for the "robot" to complete a winding path in the classroom while blindfolded.

Initially, all students tried to give instructions simultaneously, leading to confusion and ambiguity in the path's execution. During the activity, students realized the need for cooperation among participants and the necessity of leadership to ensure the instructions were understood.

The instructor emphasized the importance of objective commands, avoiding ambiguities, which are crucial in programming logic and algorithm development, as an algorithm is a method for solving a problem through a series of precise, defined, and finite steps [11].

The students participated and engaged in the activity, electing a representative to give movement instructions. They used specific commands involving distance, angle, and speed, such as "turn 90 degrees to the right!" They seemed to enjoy and understand the conceptual principle of an algorithm.

Following this activity, the next step was formalizing logical reasoning in a graphical form by introducing the concept of flowcharts. Each group of students was tasked with developing a flowchart based on a set of exercises provided by the instructor. The flowchart had to be constructed using concrete materials, and a second group would execute it, writing the corresponding algorithm in structured Portuguese and evaluating its execution.

Initially, there was a lot of insecurity among the students, who expressed feeling incapable of performing the task. However, after completing the work, many students expressed satisfaction and increased self-confidence, one of the project's goals.

To facilitate the free experimentation of the participants, we used reference materials (poster board, colored pens, magnetic whiteboard, magnetic paper) as shown in Figure 1, reflecting on their creative application in understanding and using the symbols correctly. Each group was free to choose and compose their project with the materials of their choice.

Figure 1. *Flowchart Creation.*

Another group went further by bringing magnetic paper and a magnetic whiteboard, as shown in Figure 2, allowing the flowchart to evolve from a static version to an interactive one. This encouraged other participants to suggest and share additional solutions using the same set of symbols.

Figure 2. *Flowcharts on magnetic paper.*

Once these posters were completed, they were displayed on the walls of the classroom corridors to be shared with other students, as shown in Figure 3. Many students from other classes showed interest in the project, stopping to study their peers' posters to understand the problem-solving approaches.

Figure 3. *Collage of flowcharts at the College.*

A challenge involving evaluating their peers' activities was also implemented to reinforce learning and stimulate mutual respect. In Figure 4, we highlight the evaluation sheet. The competencies of collaboration, respect for others, leadership, and self-esteem were explored in this activity.

The outcome was positive, as many students were initially apprehensive, believing they lacked the ability to carry out the proposal. However, in the end, they felt proud of the results. This feedback was shared orally with the instructors in the classroom, which encouraged them to reinforce self-esteem and respect for others. During the activity, the completion of the requested tasks' deadlines was monitored and followed up on orally by the instructors.

The third workshop developed was called Flash Mob, which aimed to humanize technological education. This workshop was also presented at the institution's event called Faculty of Technology Expo Week, held every semester.

Curso: ( ) Automação ( ) Manutenção Período: ( ) Manhã ( ) Noite

Exercício Nº _____

Componentes do Grupo.

1. _____
2. _____
3. _____
4. _____
5. _____

Fluxograma Avaliado Nº _____

Componente	Nota (0 a 5,0)	Observação
Qualidade/Assiduidade/Organização/ Limpeza.		
Clareza na simbologia e Corretude. Teste de Mesa.		
Total		

Figure 4. *Assessment Worksheet.*

With the Flash Mob activity, interactivity among the students was developed through a theatrical performance, suggesting a change in the relationship between humans and technology. The scene was set with students acting as if they were broken, disconnected, incomplete machines. At the center of these "machines," a brain was placed, symbolizing the need for humanization. The process, developed with theatrical games, focused on humanizing education and improving quality in industrial and commercial sectors.

The activity's objective was to express how conflicts and problems encountered in daily work in the automation/maintenance area can be technically but humanely resolved. The games were based on problems experienced or witnessed by the students in the workplace, which they had to solve creatively, responsibly, with lightness and joy.

In this playful work, students developed personal freedom and spontaneity through a process of interaction and involvement among group members. The proposed choreography was created based on suggestions from the students themselves, with no need to memorize a specific set of movements in many instances. The ability to interact within established rules and with the given time was worked on

jointly by the two subjects, along with leadership skills for the job market and personal life.

The dramatic structure, focusing on "What?", "Where?", and "Who?", was used as training for future professionals to solve technical problems, considering the institution and everyone's well-being. For this, it was necessary for the participants to say "Yes" to the situation at hand. It was understood that this practice could lead students, future professionals, to say "Yes" to life, exercising moral and ethical principles promoted by the standards of the Hitozukuri Philosophy. From this experience, the students titled the project, composed of all the workshops: "We are beings under construction, we are constantly in maintenance," as shown in Figure 5.

A challenge involving evaluating their peers' activities was also implemented to reinforce learning and stimulate mutual respect. In Figure 4, we highlight the evaluation sheet. The competencies of collaboration, respect for others, leadership, and self-esteem were explored in this activity.

The result was positive, as many students were initially apprehensive, believing they were not capable of carrying out the proposal. However, in the end, they were proud of the result. This feedback was shared orally with the instructors in the classroom, motivating them to reinforce self-esteem and respect for others. During the activity, the completion of the requested tasks' deadlines was monitored and followed up on orally by the instructors.

The third workshop developed was called Flash Mob, which aimed to humanize technological education. This workshop was also presented at the institution's event called Faculty of Technology Expo Week, held every semester.

Figure 5. *Defining the project name.*

3.2. Activities Conducted in the Communication and Expression Course

The activities developed in the course "Fundamentals of Communication and Expression" aimed to encourage students to reflect on interpersonal and work relationships, providing opportunities for behavioral changes that could improve these relationships. To achieve this objective, we practiced descriptive and narrative typologies to stimulate undergraduate students at Faculty of Technology to develop writing skills and creativity in Portuguese.

Considering pre-selected images of Pablo Picasso's "Guernica," students were asked to individually produce two texts: a description and a narration based on the presented images. The submitted texts were short and very technical, lacking any reflection on the images viewed. Next, students were asked to read some of their writings aloud to the class. The students' reactions while listening to their peers' readings were similarly expressionless and lacked reflection.

Following this, a reading and discussion circle was proposed regarding the activities carried out. The images were projected again, and the students were asked if they were familiar with them and the context in which they were created. Many responded that they had heard of Pablo Picasso but were unaware of the context in which the painting was produced. The students were encouraged to revisit the images with a different perspective to understand the production context together. It was at this moment that the apathy and technical view of the images shifted. They became impressed and curious about the images, leading to reflection and expression.

Subsequently, students were asked to research the Guernica war using their own mobile phones, tablets, or laptops, as shown in Figure 6.

Figure 6. *Research activity.*

The students were asked to reflect on how their written productions could be influenced by the information they had gathered and how they would feel about producing them in groups of three. Some expressed concerns about the difficulty of working in groups, citing poor past experiences. At this point, we found it appropriate to reinforce the project's ob-

jective to the students.

Continuing with the development of the activities, they were asked to organize into groups of three and plan two new written productions in the same typologies: descriptive and narrative, as shown in Figure 7. However, this time, the writing needed to be creative, expressive, and longer, as it would be presented to a highly diverse audience.

Figure 7. *Text production activity.*

The presentation of these texts, after being corrected, would take place during the Faculty of Technology Expo Week. This is an exhibition held twice a year at the Osasco campus, where the work developed by students throughout the semester is presented to the academic community and their families.

From this point on, the classes became more dynamic, and it was an ideal opportunity to address grammatical points practically within the context of the written productions.

4. Results

The activities developed in the project led to the development of the technical and conceptual competencies necessary for the Logic Programming course and met the specific objective of the project: a noticeable improvement in relationships and respect among the students. As a result of the project, various logic games were created, including:

A memory game using flowchart symbols made with EVA, as shown in Figure 8.

The construction of the Tower of Hanoi game using wooden and acrylic sheets, as shown in Figure 9.

And a stylized chess game, as shown in Figure 10.

These materials were made available at Faculty of Technology for use by other students.

Concurrently, the textual productions developed in the Portuguese language course were printed on A3 paper and displayed on a large panel for visitors at Faculty of Technology Expo Week to read, as shown in Figure 11.

Figure 8. *Memory game.*

Figure 9. *Tower of Hanoi.*

Figure 10. *Stylized chess game.*

Figure 11. *Textual productions.*

In addition, the students created an interactive board game where each participant could answer a quiz with logical reasoning questions and advance on the board following the flowchart symbols. The board measured 2.5 m in length and 2.0 m in width, with led lights on the edges that lit up each time a user answered a question correctly.

Next to the interactive board, memory games, Towers of Hanoi, and chess games (Figures 8, 9, and 10) constructed during the project were displayed for the public to engage with.

Given the heightened sensitivity, a small space titled "What Web Moves You?" was set up, as shown in Figure 12.

A white fishing net was used, attached to a ladder, with a desk underneath where visitors could find small pieces of paper and pens. After visiting the text display, visitors were invited to write down what motivated them and place the paper in the net. The results were fascinating: "God" was the most frequently mentioned motivator, followed by "Family," with other mentions including "Friends," "Work," "Peace", "Hope," and others.

Figure 12. *Which web moves you?*

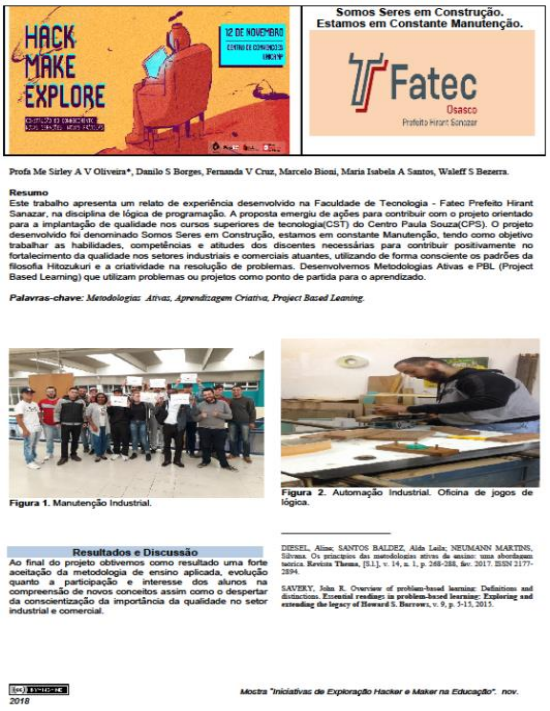

Figure 13. *Project banner.*

The banner shown in Figure 13 was accepted for presentation at the Hack Make Explore exhibition at the Convention Center of the University of Campinas, in São Paulo, Brazil. It was also displayed to the public at Faculty of Technology Expo along with the banner in Figure 14.

Figure 14. *Guernica analysis banner.*

Below is the Evaluation and Competencies Matrix (Figure 15), which allowed the instructors to measure the project's results.

Nome Aluno: [ ]

1ª Autoavaliação Inicial

Competência	Pouca evidência	Boa evidência	Forte Evidência
Autoconfiança			
Enfrentar Situação-Problema			
Respeito ao próximo			
Aprender novas habilidades			
Organização			

2ª Autoavaliação Final

Competência	Pouca evidência	Boa evidência	Forte Evidência
Autoconfiança			
Enfrentar Situação-Problema			
Respeito ao próximo			
Aprender novas habilidades			
Organização			

Obs.: _____

Avaliação do Professor

Competência	Pouca evidência	Boa evidência	Forte Evidência
Autoconfiança			
Enfrentar Situação-Problema			
Respeito ao próximo			
Aprender novas habilidades			
Organização			

Osasco, _____ / _____ / 2018

Figure 15. *Competency assessment matrix.*

The experience motivated our students to improve their written and oral communication skills and sparked curiosity among students from other courses who had yet to participate in the project.

5. Discussion

The project aimed to develop the skills, competencies, and attitudes of the students, necessary for fostering a human potential capable of positively contributing to the quality enhancement in the active industrial and commercial sectors, utilizing the standards of the Hitozukuri Philosophy [12, 13], PBL [14, 15], and creativity in problem-solving [16] consciously.

In this context, it was considered that the student was the protagonist/enunciator of their learning, and their evolution occurred consciously. The best way to evaluate their growth was through self-assessment. A competency self-assessment proposal was developed and offered to students at the beginning of the project, with re-evaluations at the end, also conducted by the responsible professors. As a result of this self-assessment, most students noticed and recognized their development in the evaluated competencies: self-confidence, learning new skills, handling problem situations, organization, and respect for others.

The competencies of handling 'problem situations' and 'self-confidence' initially showed little evidence and insecurity among most students. This evolution was observed by the responsible professors during the project's execution. By the end of the project, the same students who initially claimed they were incapable of performing the proposed activities successfully completed them and felt confident to face new challenges.

The learning of new skills became evident throughout the project, as, in addition to learning to handle concrete materials, each student had to work with wooden and acrylic sheets to create games and develop programs in C language to interact with the flowchart board. The most challenging part was presenting the flash mob, which depicted the industry's evolution and the importance of the human factor in the face of Industry 4.0 technology, in front of many people.

Organization and respect for others were requirements addressed in each class. Each team was responsible for organizing equipment, physical space, and reception during the project. Under the professors' supervision, the students learned how to create schedules and delegate tasks. Respect for others was evident during the project's implementation, with a noticeable change in the students' verbal treatment of each other, from previously more aggressive and disrespectful to more formal and courteous.

6. Conclusions

The project served as a pilot with the primary goal of being implemented across all courses at the Faculties of Technology. Initially, it involved the interdisciplinarity of two subjects: Fundamentals of Communication and Expression and Logic Programming, with the intention of incorporating other subjects in the future.

The project culminated in presentations for students from other courses at the institution and made available the activities with concrete materials developed by the students: Tower of Hanoi, Stylized Chess, and Memory Game with flowchart symbols. The texts produced by the students were displayed on the college premises to encourage reading.

In addition to achieving the expected skills and competencies, student motivation and participation exceeded expectations. Initially, only an understanding of the proposal was expected, but in the end, it resulted in the development of teamwork skills and competencies.

After the project was completed, students responded to a survey providing feedback, suggestions, and descriptions of how the knowledge and experience gained from the project contributed to reflection and behavior change in interpersonal relationships.

Abbreviations

PBL	Problem Based Learning
CST	Higher Technological Courses
MITMediaLab	Massachusetts Institute of Technology

Author Contributions

Addão Sirley Ambrosia Vitorio: Project administration, Conceptualization, Methodology, Data curation, Formal Analysis, Writing – original draft

Ferreira Tânia Regina Exposito: Conceptualization, Funding acquisition, Validation, Writing – review & editing

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Not applicable.

Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] MACEDO, A. A. Projeto de Qualidade. São Paulo: CESU, 2018.

[2] DEWEY, J. Art as Experience, in The Later Works Volume 10. 1934.

[3] FREIRE, P. Pedagogia da Autonomia. Saberes necessários à prática educativa. 51. ed. Rio de Janeiro: Paz e terra, 2015.

[4] VYGOTSKY, L. S. Mind in society: the development of higher psychological processes Cambridge, Mass.: Harvard University Press, 1978.

[5] MORAN, J. Metodologias ativas para uma aprendizagem mais profunda. In: BACICH, L. MORAN, J (Orgs). Metodologias ativas para uma educação inovadora: uma abordagem teórico-prática. Porto Alegre: Penso, 2018.

[6] BENDER, W. N. Aprendizagem baseada em projetos: educação diferenciada para o século XXI. Porto Alegre: Penso, 2014.

[7] COSTA, V. C. I. Aprendizagem baseada em problemas (PBL). Revista Távola Online, n. 5-3, 2011.

[8] RESNICK, M.; ROBINSON, K. Lifelong kindergarten: Cultivating creativity through projects, passion, peers, and play. The MIT Press: Cambridge, MA, 2017.

[9] RESNICK, M. Give P's a Chance: Projects, Peers, Passion, Play. Constructionism and Creativity conference, opening keynote. Vienna, Austria, 2014.

[10] BARROS, D. L. P. D. Teoria semiótica do texto. 5. ed. São Paulo: Ática, 2011.

[11] AGUILAR, L. J. Fundamentos de programação: algoritmos, estrutura de dados e objetos. Tradução Paulo Heraldo Costa do Valle; revisão técnica Flávio Soares Corrêa da Silva. São Paulo: Mc Graw Hill, 2008.

[12] Monozuhuri WA Hitozuhuri. Disponível em: http://leancombat.vlm.pt/monozukuri-wa-hitozukuri/. Acesso em 06 fev. 2019.

[13] Kankyozukuri, monozukuri and hitozukuri: The three pillars of Kodama Chemical Industry. Disponível em: https://www.theworldfolio.com/interviews/kankyozukuri-monozukuri-and-hitozukuri-the-three-pillars-of-kodama-chemical/5409/. Acesso em 20/07/2024.

[14] O que é Problem Based Learning (PBL)? Disponível em: http://inoveduc.com.br/o-que-e-problem-based-learning-pbl/. Acesso em: 11 fev. 2019.

[15] Aprendizagem Baseada em Problemas. Disponível em: https://inovacaopedagogica.porto.ucp.pt/metodologias-pedagogicas/aprendizagem-baseada-em-problemas-ou-projetos/ Acesso em 20/07/2024.

[16] Introduction to Creative Learning. Disponível em: https://lcl.media.mit.edu/weeks/week1/ Acesso em 20/07/2024.

Biography

Addão Sirley Ambrosia Vitorio is a professor at Faculty of Technology belonging to the Paula Souza Center, Multiplatform Software Development Department. She completed her Master in Computer Science from the institution University of São Paulo, in 2002. She has a master's degree in Computer Science from the Institute of Mathematics and Statistics of the University of São Paulo (IME-USP). She has a bachelor's degree in computer science from the Pontifical Catholic University of São Paulo, and a full degree in Mathematics. She has experience in the area of Computer Science and Mathematics as an undergraduate and graduate teacher, coordinator of higher education courses, coordinator of internships, work with educational projects, supervision of final course works, participation in competition boards, evaluator of articles, use of active methodologies and creative learning. He has participated in international collaborative projects in recent years.

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Research Field

Addão Sirley Ambrosia Vitorio: Computer science, active methodologies, systems development, creative learning, software programming.

Ferreira Tânia Regina Exposito: Linguistics, lyrics, active methodologies, communication and expression.