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# Active methodologies supported by interaction and communication technologies in higher education

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**Abstract**
In the last decades, technologies have been adopted by Higher Education Institutions, all over the world, as tools to approach new pedagogical practices for their programs. This paper aims to present an experience on the use of tools for communication, interaction and collaboration in a project-based learning on distance education. The project is developed virtually, with students organized in groups in order to develop a solution to a real problem. Therefore, with the use of technology, it is intended to provide those involved with forms of communication and interaction. Technologies in a context like this are considered strong allies of the teaching process developed under the perspective of collaborative work and the development of student autonomy. The collected data show results that indicate the used tools have promoted collaboration between the students, who have learned by developing solutions to problems.

Keywords: Higher education; distance education; collaborative learning.

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## 1. Introduction

The use of Digital Information and Communication Technologies in social interactions has promoted new possibilities for communication, interaction, teaching and learning. Contemporaneity brings a new discursive association, articulated by multimedia, that is, by hybrid utterances, written and oral texts that mix with static images (photos), movements (videos), and sounds (music), such as TV advertising, YouTube videos, WhatsApp messages and the use of Google Drive to share and create new content.

In the last decades, Higher Education Institutions have adopted technologies, all over the world, as tools to approach new pedagogical practices for their programs (Wiske, Sick & Wirsig, 2001; Gerjets & Hesse, 2004 ; Donnelly, 2010; Dabbagh & Dass, 2013). Such technologies must be incorporated into education in order to support pedagogical models cantered on students and their learning processes (Garbin & de Oliveira, 2019). In the Brazilian context of higher education, there are institutions which use blended learning models to emphasize a pedagogical model based on active learning methodologies in order to develop collaborative projects. One of these institutions is the Virtual University of São Paulo State (Univesp), a public university located in the city of São Paulo (Brazil).

The university was established in 2012, and has as one of its goals to develop a new pedagogical model, contextualized in its social missions, such as to promote:

1. knowledge as a commonweal.

2. universal and open access to formal education and for the citizenship.

3. use of innovative pedagogical methodologies; and

4. the intensive use of information and communication technologies applied to education.

In this way, the university is designed to develop competences, to build professional skills, and to promote the dissemination of knowledge through Distance Education (DE). His first entrance exam took place in July 2014 with an offer of 3,300 vacancies for undergraduate courses in teachers' programs in the following areas: Mathematics, Chemistry, Physics and Biology, also for Computer and Production Engineering. Currently, there are approximately 50,000 students enrolled in 382 face-to-face meetings centres, distributed in 325 municipalities in the State of São Paulo. It is estimated that the institution is present in more than 50% of the that Brazilian state territory. Today, the following programs are offered: Pedagogy, Bachelor's Degrees in Mathematics and Letters (both for pre-service teaching), such as Computer Engineering and bachelor's Degrees in Information Technology and in Data Sciences.

All programs in the school are offered in the Distance Education (DE) modality, using a Virtual Learning Environment (VLE) as a fundamental technological tool to support the teaching and learning process. The contents of the curricular subjects are organized by means of didactic sequences, containing links to readings of full texts on the virtual libraries made available to students, papers, videos, video lessons, open educational resources, evaluative and follow-up activities, among other

teaching materials prepared by teachers in collaboration with the university team. In addition, the university also has a television channel, also available on the Youtube platform.

The curricular map of undergraduate programs offered by Univesp has a semi-annual organization, and the courses that compose it are offered bimonthly. Each semester is organized around the development of an integrative project in which, from the definition of a central curricular theme, the students articulate the contents of the program curriculum. Such a project uses the conceptual basis of Problem-Based (PBL) and Project-Based Learning (Araujo and Sastre, 2009; Araujo and Garbin, 2016) . This PBL project is named as Integrator Project (IP).

In addition to articulating the contents studied in practices aimed at school contexts, Integrator Project activities also foster the development of relevant skills for the labour market and for life in society, such as digital fluency, autonomy, organization, planning, time management, communication, reflection, virtual presence, self-assessment, self-motivation, flexibility, and teamwork (Behar & da Silva, 2012 )in addition to those aimed at 21st century professionals, such as problem solving, critical thinking, creativity, and conflict resolution.

The IPs are foreseen in the undergraduate teachers' programs of Univesp to contemplate the practices as a curricular component (PCC), according to the Brazilians Resolution for teachers training. Supported by the principles of Problem-Based Learning and Projects, students are exposed to activities that relate curriculum content to pedagogical foundations, for mastering not only specific content, but also the pedagogical practices necessary for the teaching process (Shulman, 1986; Shulman, 1987 ). In this context, students are expected to identify a real problem to be studied in groups of 6 to 7 students, based on a problem scenario given by the university, contextualized in the educational area. Collaboratively, students need to identify a community to participate in the project and propose solutions to the problem under study, which are viable and together with the participating public.

Teachers' competences are not restricted only to the content knowledge (like maths or sciences), but also by the relationship between this knowledge and its teaching, as well as in the ways of being a teacher and exercising teaching (Shulman, 1986). It is necessary for the pre-service teaching students to be exposed to reflections on the contents they will teach, to know the school reality and its context, to be in contact with research in his area of knowledge, and to be actively introduced to the difficulties identified in learning basic contents. Furthermore, this student needs to be able to analyse content and find new approaches to school programs, as well as discuss the potential of technological tools for learning, developing teaching activities in these different environments (Shulman, 1987).

The students carry out this work in school environments, having the opportunity to investigate the learning processes and consider aspects of young people's cognitive, affective and social development, as well as the learning difficulties of some contents. In each undergraduate course, students develop a total of six projects (480 hours) until the end of the course. Thus, it is expected that there will be an exchange of experiences and debate on common or divergent points of view. Integrator Projects have aim:

- To propose solutions to problems in teaching, considering a specific educational context.

• To apply pedagogical practices learned during their training.

• To carry out a didactic transposition of the specific contents of each course to the proposed teaching situations.

### *1.1. Purpose of study*

In order to allow free communication and collaboration between students, and also between students and tutors, some asynchronous and synchronous communication tools have been integrated into the platform. Within the set of tools used, we can highlight Google Drive and Google Meet.

The idea behind the tools is to complement those of collaboration, through which students can effectively produce works, documents and projects. Communication tools (synchronous and asynchronous) fulfil the important role of allowing students, even if geographically distant, to always have the possibility of face-to-face interaction, through which they can exchange specific information about activities and projects. This paper aims to analyse how the practice as a curricular component was implemented in the Integrator Projects using technology. Also, it is explicitly qualitative, since it does not cling to large amounts of data for quantitative analysis.

## 2. Methods

### *2.1. Data Collection*

The research made use of a case study in the collection of the study's data. The case study covered the Integrator Project of a university system.

The development of the IP basically comprises three phases, all with guidance from the institution's professors, tutors, mediators and supervisors:

1. Approach to the theme, elaboration and analysis of a problem. From a broad theme, planned by professors in order to integrate the subjects into some practical practice, students come into contact with members of their community, in order to elaborate and analyse existing problems, always human cantered. Students carry out fieldwork, declarations, questionnaires, etc., in order to hear the public and identify problems that need to be solved in a cheap and quick way.

2. Development of actions that lead to the resolution of the problem, through the creation of prototypes. In this phase, students discuss and reflect on the data collected and propose viable and effective solutions to the problems identified. They must be hands-on, articulating the theories studied in some practical activity that generates a prototype, a materialization of the solution to the problem found in the school context.

3. Socialization of the necessary knowledge, obtaining feedback before the prototype implementation, and the production of a written report. At this time, students are encouraged to share

their projects with other students, their tutors, mediators and supervisors. After this moment, they must also go back to the field and check if the prototype actually helped to solve the problem. In addition, as a requirement for academic approval in the discipline, the groups must also produce a written scientific report, in which they demonstrate how they applied the theories studied in the problem-solving practice.

Authors selected four IP developed during the second semester of the program, it can be seen in the following table.

**Table 1**.

*Integrator Projects from pre-service teachers selected for analysis*

| Undergraduate program | Integrator Project |
|---|---|
| Pedagogy | Playroom: play space and its relevance in the learning process |
| Pedagogy | The child and the notion of time and space at the time of leaving the day-care centre |
| Mathematics | Evaluation of number learning in elementary school: solving and elaborating new problems |
| Mathematics | Mathematical games and the procedural evaluation process |

### ***2.2.*** *Participants*

Participants in this study consisted of university students taking the undergraduate teachers' programs at the Virtual University of São Paulo State (Univesp), a public university located in the city of São Paulo (Brazil).

### ***2.3.*** *Analysis*

Thus, in the next item, the projects will be analysed based on the following logic: it is based on a narrative of the work, which aims to delimit how the pedagogical practice becomes a relevant learning context for students at Univesp, including its technology use. This logic aims to bring to light how the Integrator Project at Univesp is supported by the Interaction and Communication Technologies in Brazilian Higher Education.

## 3. Results

The Univesp pre-service teachers have in their curriculum a lot of subjects focused on technologies, use of active methodologies, problem solving, educational design, and methodologies for distance education. That is, current and contextualized themes, which provide differentiated training to new professionals in the contemporary world. For this reason, all these aspects are also worked on in the Integrator Project: the theme of this semester was related to the intentional use of technologies in a During the analysis of the selected projects, it can be observed, in general, that everyone started from

the guiding theme for a specific problem that was raised with the project participants in the researched institutions. The groups of students managed to follow the proposed theme, researching

practical teaching situation (Oliveira, 2019). The students are led to reflect on a certain problem that contextualizes him in his future profession, within the school environment, the focus of this paper.

**Table 2**.

*Integrator Projects from pre-service teachers selected for analysis*

| Undergraduate program | Subjects | Situation |
|---|---|---|
| Pedagogy | Calculus I and II, Educational and Learning Assessment and Learning Theories | Evaluation of number learning in elementary school: solving and elaborating new problems |
| Mathematics | Theories of Learning, Fundamentals of Early Childhood Education I and II, Educational Psychology and Educational and Learning Assessment | Games and Play in the Construction of Relationships between Space and Time |

different tools and applying pedagogical intent to them in relation to the content worked on, thus reinforcing the importance of the teacher's role. Research appeared that worked with autism and

technology, simulators, office tools, digital whiteboard, educational resources, and games, all with a focus on teaching. Furthermore, some common findings:

• The use of technology can make the learning of certain content more attractive, especially for those who have more difficulty to be learned by students.

• The need for an update on the part of teachers on the use of technologies in the classroom, since its use aims at a pedagogical intention.

• Teachers still use a lot of traditional methods in their teaching process.

• Some groups noticed difficulties in the use of technologies by teachers and schools, due to two essential aspects: the lack of resources and the difficulty of the teacher in thinking about pedagogical practices using new resources, different from those they are used to.

• Students are users of technologies, but need to understand how to use them to build formal knowledge.

• Students developed actions related to pedagogical practice with teachers, managers and pedagogical coordinators.

• In the selected sample, only one group did not propose practical pedagogical work in the classroom - the others proposed a concrete pedagogical action in the classroom.

Thus, it is noted that the students were able to emerge and reflect on the teaching action and on the role of the school.

## 4. Discussion

As Shulman (1987), points out, the teacher needs to have knowledge of teaching practice and not just the content - and that is precisely the focus of Univesp's Integrator Projects: providing pre-service teaching students situations that expose them to reflections on what is to be a teacher.

In this sense, it is important that these actions that lead students to reflect on teaching practice are implemented in pre-service teaching undergraduate courses. Neto, & da Silva, (2014 ) affirm that a curriculum needs to be composed of three axes: 1) horizontal structure, composed by the disciplines of each year; 2) vertical structure, contemplated in the articulation between the different years; 3) transversal and integrative, which can be understood as the Integrator Projects treated in this paper, that is, a proposal for intervention and modification of a context, which considers interdisciplinary aspects. These three axes, organized in an articulated manner, promote and constitute the conscience of professional identity in teachers in training.

According to Shulman (1986) and Shulman (1987), the teacher needs to know aspects of the methodological field related to the teaching process, which he calls pedagogical content knowledge, that is, the didactic transposition of a certain knowledge. This is provided by the Integrator Project of Univesp's pre-service teaching undergraduate courses.

The present paper aimed to analyse integrative projects developed in the pre-service teaching undergraduate courses, in order to verify how the use of technology took place. During this Integrator Project, the guiding theme of these projects was “to build a proposal that uses technology to teach a certain subject”; for this, four works were selected at random in the virtual learning environment. The reports produced during the development of the projects were analysed qualitatively, through documentary analysis.

## 5. Conclusions

The data analysis corroborated with the authors mentioned throughout this article, indicating the importance of promoting situations in which Univesps' students could reflect and experience about the future teaching practice. The Integrator Project activities allowed students to engage in actions experienced in the school environment, promoting educational practices contextualized in the areas in which they will work. In addition, they also enabled a deeper knowledge about the problems existing in Brazilian schools, such as the lack of resources to update teachers in training courses, as well as the availability of resources for more interactive classes.

It was also possible to verify the relevance of the technologies for students as they manage to include it as an intentional pedagogical tool. Therefore, the practice is relevant to the formation of the teacher's identity, permeating the entire formation, since the beginning of his undergraduate course, making it as the articulator between concepts, problem solving, observations and reflections, in favour of the construction of the teaching identity.

## 6. Recommendations

As we can see, it is necessary to improve the academic possibilities and opportunities to use technology with educational intentionality, in order to promote contextualized reflexions and practices to the students. In terms of educational practices, this is a necessary action to improve the teachers’ formation.

So, for the future research, we see that learn technology and how to provide collaboration is a cornerstone – although not the only one – to a better education. In this sense, we recommend going

deeper on this aspect: how to provide a meaningful and collaborative teaching with technologies in higher education. After that, assess the learning of this teaching will be a natural step.

**References**

Araujo U. F. and Garbin, M. C. (2016). Active learning methodologies and problem-based and project-based learning in distance education," in Motivation, attitudes and skills: resources for learning. São Paulo, SP, Brazil: Cengage Learning Brazil,2016, pp. 76-87.

Araujo U. F. and Sastre, G., (2009). Problem-Based Learning in Higher Education. São Paulo, SP, Brazil: Summus. http://rieoei.org/recensiones/Recensiones51_02.pdf

Behar, P. A., & da Silva, K. K. A. (2012). Competency mapping: a focus on the distance education student.Renote, 10(3). Doi: https://doi.org/10.22456/1679-1916.36395

Dabbagh, N., & Dass, S. (2013). Case problems for problem-based pedagogical approaches: A comparative analysis. Computers & Education, 64, 161-174. https://www.sciencedirect.com/science/article/pii/S0360131512002291

Donnelly, R. (2010). Harmonizing technology with interaction in blended problem-based learning. Computers & education, 54(2), 350-359. http://dx.doi.org/10.1016/j.compedu.2009.08.012 .

Garbin, MC, & de Oliveira, É. T. (2019). Teaching practices in Distance Education: a look at the areas of knowledge. Educational Dialogue Magazine, 19 (60), 36-55. https://periodicos.pucpr.br/index.php/dialogoeducacional/article/view/24106

Gerjets, P. H., & Hesse, F. W. (2004). When are powerful learning environments effective? The role of learner activities and of students' conceptions of educational technology. International Journal of Educational Research, 41(6), 445-465. https://www.sciencedirect.com/science/article/pii/S0883035505000595

Neto, S. D. S., & da Silva, V. P. (2014). Practice as a Curriculum Component: questions and reflections. Educational Dialogue Magazine, 14(43), 889-909. https://www.redalyc.org/pdf/1891/189132834013.pdf

Oliveira, E. T. D. (2019). EaD and virtual learning environments: guiding dimensions for media selection (Doctoral dissertation, Universidade de São Paulo). https://www.teses.usp.br/teses/disponiveis/48/48134/tde-04112019-163653/en.php

Shulman, L. (1987). "Knowledge and teaching: foundations of the new reform," Harvard Educational Review, vol. 57, no. 1, pp. 1-22, 1987, https://meridian.allenpress.com/her/article/57/1/1/31319/Knowledge-and-Teaching-Foundations-of-the-New

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. Educational researcher, 15(2), 4-14. doi: https://doi.org/10.3102/0013189X015002004.

Wiske, M. S., Sick, M., & Wirsig, S. (2001). New technologies to support teaching for understanding. International Journal of Educational Research, 35(5), 483-501. doi: 10.1016/S0883-0355(02)00005-8.