

Building a Virtual Learning Environment to Foster Blended Learning Experiences in an Institute of Application in Brazil

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Abstract

Blended learning, the combination of face-to-face teaching with a virtual learning environment (VLE), is the theme of this study that aims at describing and analyzing the implementation of a VLE in the Institute of Application Fernando Rodrigues da Silveira, an academic unit of the State University of Rio de Janeiro. This study's main contribution is to reflect on the complexity of the institute that comprises schooling for basic education students and teacher education, from elementary school to postgraduate education. The wide scope of the institute encompasses face-to-face and non-presential activities, in different proportions, depending on the educational segment. Thus, starting from the assumption that blended learning teaching processes foment more student-centered educational models and facilitate interactions between individuals, a collaborative way was chosen as the VLE development method, contributing to pedagogical practices that favor meaningful learning. The VLE design was developed to meet the different needs and demands of the different educational segments. Currently there are 295 registered users. However, there are no registered basic education students so far. This can be justified by the fact that the VLE is relatively new to the community, and the participation of basic education students in the VLE depends on their teachers' enrolment and use of the VLE itself.

Keywords: blended learning; basic education; teacher education; design of virtual learning environment; cooperation school/university

Introduction

The aim of this study is to describe and reflect on building and implementation of a virtual learning environment (VLE, henceforth) in different education segments, from basic education to postgraduate courses in the Institute of Application Fernando Rodrigues da Silveira, an academic unit of the University of the State of Rio de Janeiro in Brazil. The VLE was designed to complement the activities of face-to-face teaching and build blended learning teaching processes. Despite technological advancements and legislation, that regulate Distance Education (DE, henceforth) in Brazil, there is still prejudice and misinformation about its potentialities.

DE has been substantially growing. According to figures provided by the Ministry of Education and Culture (MEC), there were 49,911 students enrolled in distance higher education courses in 2003. However, in 2013, the number of enrolments rose to 1,153,572. The 2015 census conducted by the Associação Brasileira de Educação a Distância - Brazilian Association of Distance Education (ABED, 2015) accounted for 5,048,912 students, with 1,108,021 in fully distance education and hybrid courses and 3,940,891 in corporate or non-corporate free courses. The census shows that, in higher education, most of students are enrolled in teacher education courses. As presented in the census, 406 distance graduation courses are offered in Brazil; among those, 258 courses are related to teacher education. In terms of post-graduation, there are 1,079 specialization courses, 197 MBA and only 7 Master's courses. In basic education, there are 20 courses in middle school and 19 in high school. This DE framework is outlined mostly by technological advancements, increasing access to Internet and its digital resources as well as the legislation that governs DE in Brazil.

Law number 9,394 (1996), also known as *The Law of Guidelines and Bases of National Education* (LGBNE, henceforth), was the first one to tackle DE in Brazil. In its 32nd article, it establishes that elementary and middle schools activities must be carried out face-to-face, and DE is to be used to complement the process of teaching and learning in emergencies only. In its 80th article, it determines the role of public powers in the development of DE programs in all levels of education and continuing education. According to LGBNE, it is also up to the federal government to regulate DE courses concerning the examination, issuance of certificates and accreditation of institutions (Law n. 9.394, 1996). Borba, Malheiros and Amaral (2014) highlight that the LGBNE was aimed at presenting quantitative and qualitative goals for DE instead of treating it as an experimental project. In 2005, Decree number 5,622 was published to regulate the 80th article of LGBNE. In its first article, it characterizes DE as an educational model in which the didactic-pedagogic mediation in teaching and learning processes occurs with the use of media, information and communication technologies, with students and teachers developing educational activities in different places or times. Besides determining means and tools for mediation, it also brings up aspects of asynchronicity and territory dilution in the DE teaching and learning processes. This decree also organizes methodology, management and evaluation, as well as determines that face-to-face moments are mandatory for exams, trainings and laboratory activities. However, the complementary nature of DE remains. The decree maintains that DE is for emergencies, cases of health problems and places where there are no educational institutions.

Considering the importance of DE and the current legislation, MEC published the Quality Benchmarks for the Higher Distance Education (Benchmarks, henceforth) in 2007, which has no power of law. Instead, it is a guide to subsidize legal acts of the government to specific processes of regulation, supervision and evaluation (Ministry of Education and Culture, 2007). The Benchmarks emphasize that there are many ways of implementing DE courses and programs, which can have different design, methodologies and resources to meet students' needs and the context conditions. The document also acknowledges that DE has its own characteristics and language that requires consistent administration, design, evaluation, technical, technological, infrastructural and pedagogical resources. In this sense, DE also requires a political and pedagogical project that clarifies the concepts of education and curriculum in the processes of teaching and learning, communication systems, educational and evaluation materials. In addition, it should favor the formation of a multidisciplinary team, determine the infrastructure of support and, finally, keep academic and administrative management to define its financial sustainability. Therefore, the elaboration and implementation of DE activities, online and blended learning experiences, runs through different spheres. In supporting infrastructure, in Brazilian public educational contexts, we face lack of funds and resources, which interferes negatively in the offering of DE programs. For instance, the lack of connectivity or low speed connections are common in public schools and universities. In the sphere of the formation of a multidisciplinary team, human resources are scarce because of low hiring what leads to accumulation of tasks and functions.

In the Institute of Application (IA, henceforth), the landscape is not favorable because it faces problems in infrastructure and lack of material and human resources. Despite that, we proposed to build and provide a VLE to different levels of education in order to foster meaningful practices in both distance and blended learning in the institute.

The Institute of Application Fernando Rodrigues da Silveira

The IA is an academic unit of the State University of Rio de Janeiro, which encompasses the axis of teaching, research and extension. It is a training field for graduation students from other institutes

in the university. It builds rich spaces for dialogue and experiences sharing among different areas of knowledge, which makes it suitable for multidisciplinary work and collective knowledge production. The IA is composed by a school where children and youngsters go to elementary, middle and high school; it offers mandatory subjects in graduation courses and hosts a postgraduate Masters' course. Nowadays, it has 1,030 students in basic education, 463 students in higher education and 120 postgraduate students, 189 teachers and 70 employees in the technical and administrative staff. The IA has also an exchange program with Tokyo University Foreign Students (TUFS). When students graduate from high school, they can apply to study in the Japanese university.

The benefits of the IA structure reside in fostering the cooperation between university and school, especially in teacher education to improve the quality of teaching in basic education. This occurs mainly because both university and school students share the same training space and all teachers in IA work in both levels: university and school. The IA structural organization requires that teachers must be formally qualified to work in basic education levels and in university, as well.

The diversity of activities of the IA demands different teaching processes to search means to provide access to accumulated and produced knowledge in varied areas as well as the production of new knowledge, to foster the dialogue between specific contents and teaching methods (Shulman, 1986).

Knowledge does not occur in a vacuum. Nor is it produced in isolation in classrooms and laboratories. Instead, it relates to participants' contexts and the world's realities. To make knowledge more accessible and contextualized, technology plays a fundamental role. Different technological resources (computers with Internet access, multimedia projectors, tablets, cell phones, etc.) can have different functions that range from material storage to generation of interactional spaces by means of information and communication tools, which are essential in knowledge produced in researches and didactical materials. Moreover, technologies in the educational daily life can favor new ways of communication and facilitate understanding of knowledge as a process, not a final product (Magnavita, 2003). In this way, the proposal of a VLE to different educational levels can contribute to more meaningful pedagogical practices in accordance to the IA amplitude.

The potentiality of blended learning in the Institute of Application

Technology is present in all spheres of our daily lives and affects different sectors and areas. In education, for instance, digital technologies increased possibilities in different types of teaching. Romiszowski (2005) considers the integration of new electronic technologies to the practical realities of human communication is a kind of synergy, which affects DE, especially online learning. Nowadays, with the broad access to Internet and digital resources, not only can students search for materials, such as books and articles, but also need to establish relationships with others who belong to different cultures in order to interact and discuss topics of mutual interest.

The educational scope of IA congregates face-to-face and non-presential or online activities in different proportions according to the educational segment. Elementary, middle and high school students stay at school full time, which sums more than the 800 hours/year determined by the LGBNE. The activities are face-to-face mostly, while the non-presential ones have to do with homework, readings and researches. The IA has no official DE activities for basic education. On the other hand, in graduation courses, we gradually introduced the VLE aiming at building a digital repository for theoretical texts, didactical materials and students' productions. We also intend that it becomes a space for interaction between teachers and students to deepen discussions previously conducted in classrooms. Thus, our pedagogical practices move towards blended learning experiences. Graham, Allen and Ure (2005) highlight three advantages of seeking merged processes

of teaching and learning in higher education: more adequate pedagogical practices, access and expanded flexibility and increased cost-effectiveness. Concerning pedagogical aspects, the authors point out that merged teaching processes promote a more student-centered educational mode and facilitate interaction between individuals.

We can understand blended learning in different ways. The most common one associates face-to-face activities in classrooms with distance activities (online or not). It can be a way of teaching that combines face-to-face activities to distance ones, technologically mediated by computers and other technological resources (Graham, 2006). However, So and Bonk (2010) state that it is not enough to put the activities together to have successful blended learning experiences. The design is an important component and it is paramount that it integrates the activities in a coherent way in order to offer efficient contents and give support to students. Therefore, building a VLE to all educational segments in a public institute, such as IA, that faces shortage of human, financial and technological resources, constitutes a great challenge. Besides, it is necessary to deal with the characteristics and objectives of the segments. A VLE for students in basic education (children and teenagers) is different from one for undergraduate and graduate students. The processes of creating and delivering the VLE go through several stages and bring together different sectors of the university. Next, we describe the architecture and the design process of the VLE.

The Virtual Learning Environment (VLE) of the Institute of Application

We elaborated the VLE in cooperation with Information and Communication Technologies Laboratory, an academic unit responsible for development and management of technological platforms in the university. This partnership was based on the division of labor according to the functional nature of each unit. The laboratory provides technological support and the IA is in charge of the design and administration of the VLE. This is already a difference in the VLE development since teachers design the tasks and develop the VLE in their professional practices in line with their subjects and students' needs.

Brazilian basic education is organized into pre-school, elementary school, middle school and high school (Fig. 1). The VLE was created to foster teaching-learning processes in six levels of formation. Its structure contemplates elementary school, middle school and high school as well as graduation, post-graduation and extension courses. Besides, a research group has requested registration in the VLE to help their activities.

Each level or course has a different design to meet specific needs. Elementary school is the first level, from 1st to 5th grades and students' age range from 6 to 11 years old. The group encompasses 60 students, organized into 3 classes of 20 students. Teachers mediate the activities in the VLE in all subjects, except Visual Arts, Music and Physical Education. However, in the VLE, all the students integrate the same grade (1st) of elementary school (Fig. 2). The horizontal integration of these groups enables collaborative performing tasks, contributing to the critical development and enhances socialization.

Middle school students' age ranges from 10 to 16 years old and they are organized into the 6th to 9th grades, which encompasses about 120 students in 4 groups of 30 students. This segment has a multidisciplinary formation with about 10 subjects mediated by different teachers. Thus, the VLE was organized in order to promote interdisciplinary actions, considering each group as a course (Fig. 3).

In high school, the courses are organized into knowledge areas aiming at scientific preparation and the ability to use different technologies to perform (MEC, 2000). Each grade has around 100 students, distributed in 4 groups of 25 students (Fig. 4).

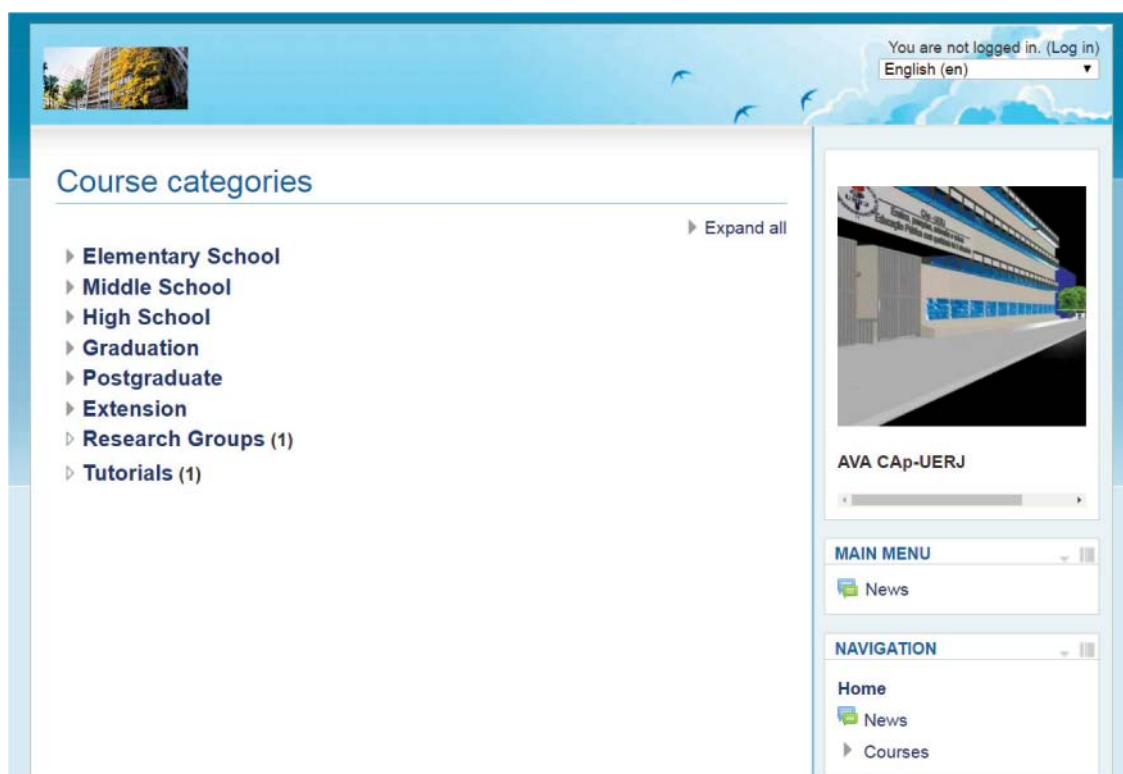


Figure 1: The levels of formation and courses in the VLE

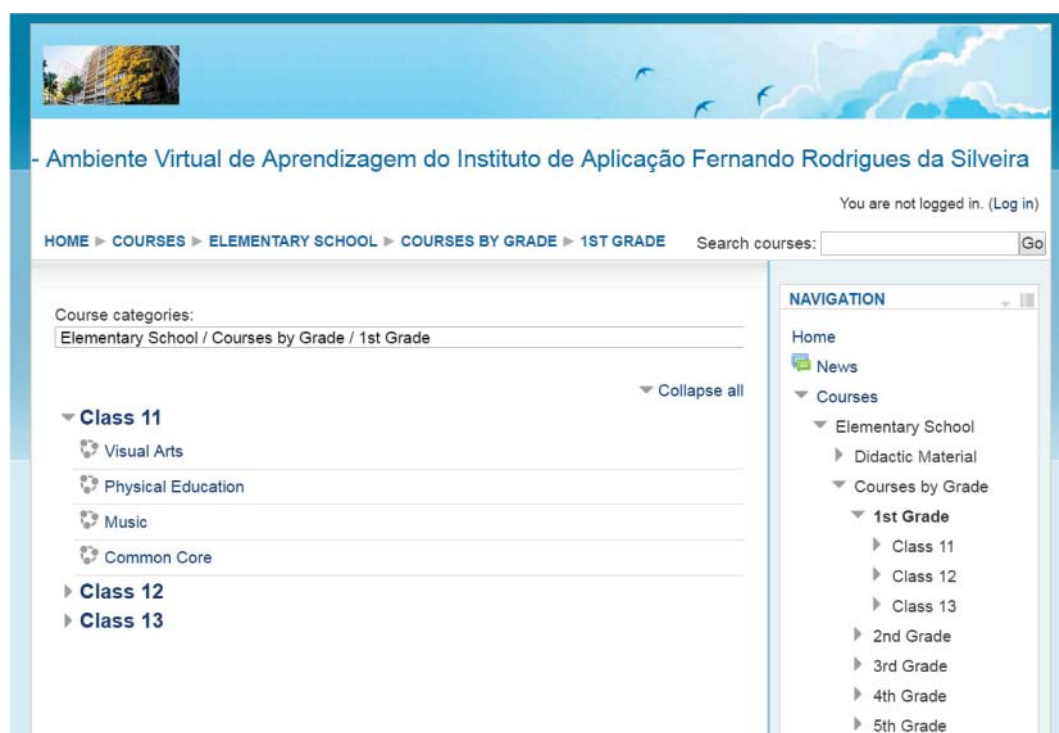


Figure 2: 1st grade organization in the VLE

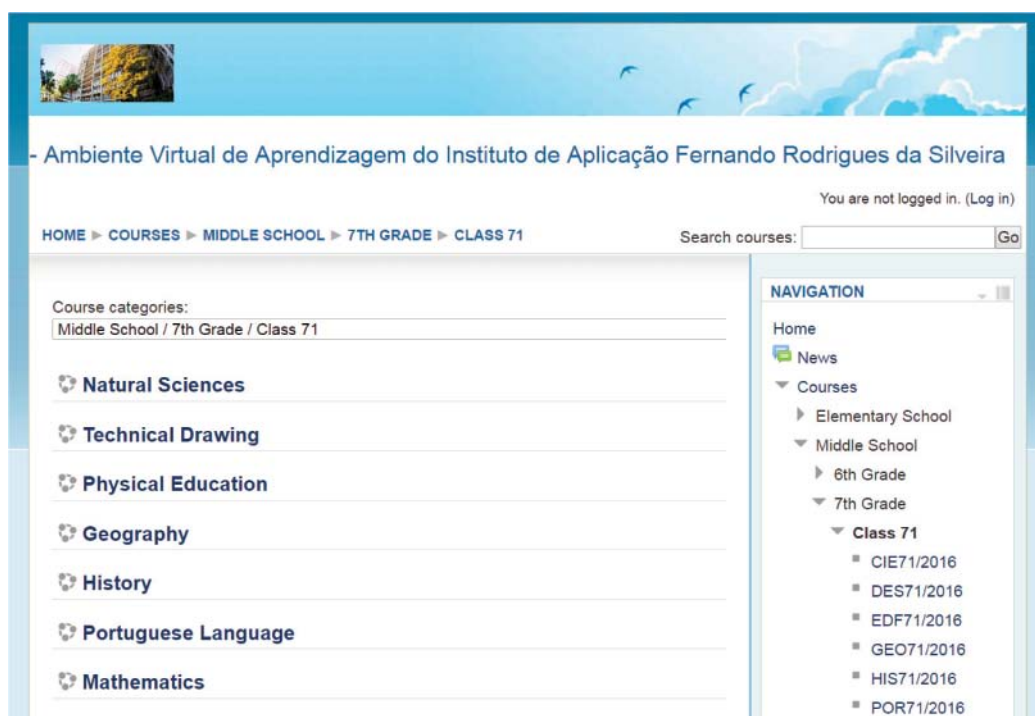


Figure 3: Middle School Organization in the VLE

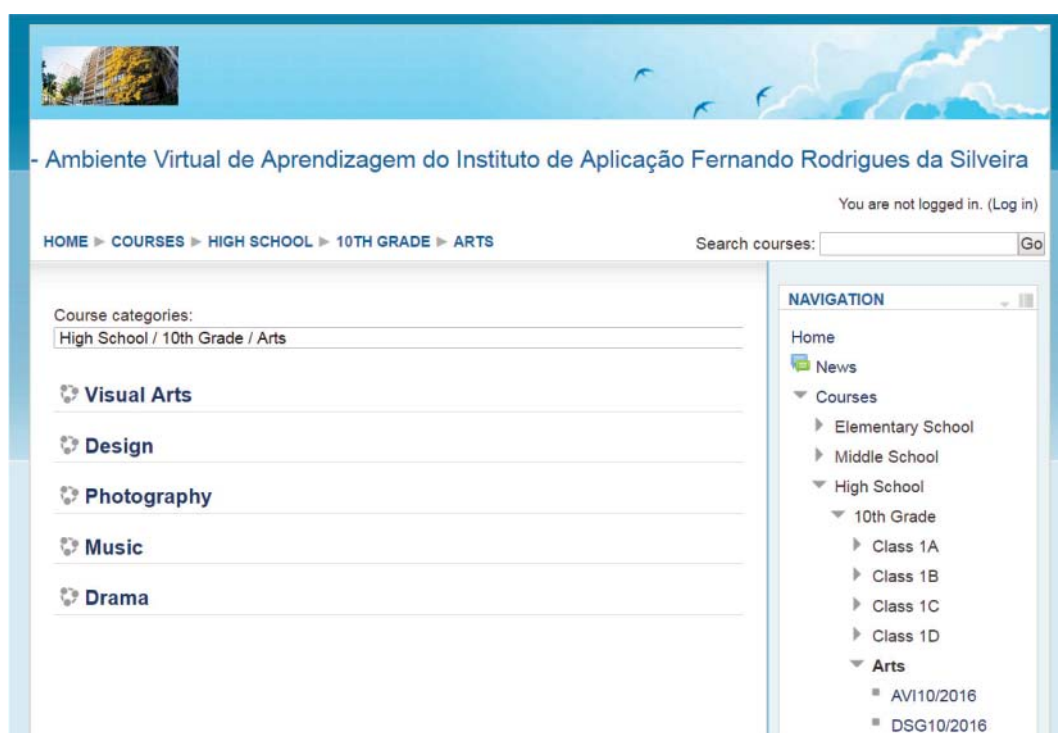


Figure 4: High School Organization in the VLE

At the university, teacher education occurs in undergraduate courses, whose activities relate to subjects of specific content of knowledge area and pedagogical subjects. The former varies according to the knowledge area (math, science, languages, etc.); the latter refers to teaching itself, and includes teacher training and practical and methodological subjects.

The VLE design established correspondence between the teacher education courses and the virtual classroom (Fig. 5). This gives opportunity for future teachers to experience the production of didactical materials and in DE practices.



Figure 5: Teacher Education Course Organization in the VLE

The extension courses are the ones that meet the needs and expectation of the external community. Consequently, they do not have a previous configuration so that the courses can meet the needs of each proposal (Fig. 6).

The post-graduation consists of two categories: post-graduation itself and research groups, with very different purposes. The research groups have internal activities such as forums and research activities and function as digital repositories for the group production. That is why they should be visible in the menu and grant access to contents (Fig. 7).

Collaborative construction of design as development methodology

Collaboration and similar experiences sharing contributes to developing awareness about one's own actions in a VLE (Jesus, Figueiredo & Ribeiro, 2016). By choosing a collaborative development method over a technical and specialized one, we seek to contribute to teachers' actions that are more autonomous. This leads to the option of batch registration, for instance. Due to operational aspects, batch registration makes the process of enrolment and support faster since teachers compile the demands and send them to the VLE administrator. This avoids a large number of similar requests and congestion of access channels, which compromises service quality.



Figure 6: Extension Course Organization in the VLE

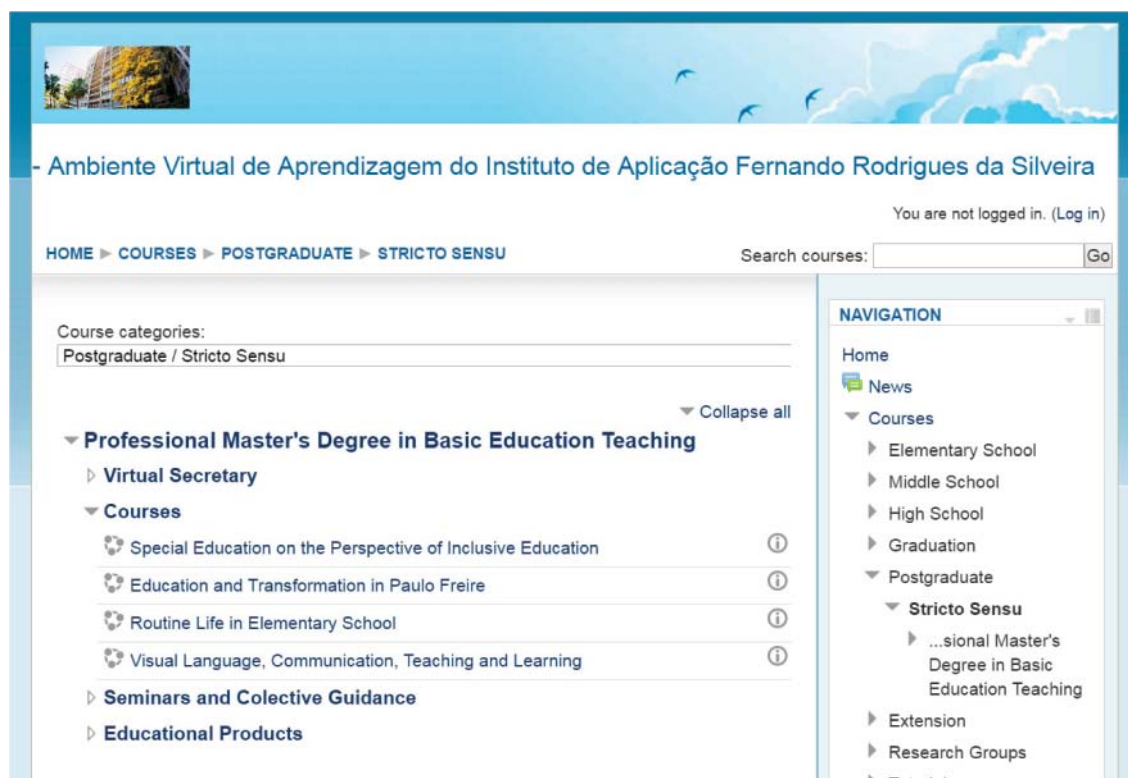


Figure 7: Post-graduation Organization in the VLE

We planned the collaboration process in different pillars. Firstly inside the courses, as it is typical of DE models. Teachers participate by their own initiative or by answering a previous consultation by means of interviews and questionnaires. The second pillar is set after the registration and enrolment in the VLE, when teachers began to work with peers and students to implement activities in the VLE. The third pillar is constituted by research dissemination events and sharing of research experiences and results both in and outside the university.

It is important to highlight that teachers' contribution to the process is validated by the diverse actions in formation contexts in the IA. Most of teachers work in more than one level of formation because the political and pedagogical project of the IA establishes that every teacher should work in basic education settings as well as in graduation, extension and post-graduation courses. The VLE is institutional; however, participating in the VLE is optional, that is, teachers can choose if they are going to use the VLE resources or not. Despite that, it is possible to notice the quantitative and qualitative evolution of the participations.

Current Stage of the Virtual Learning Environment (VLE) in the institute

The VLE has, nowadays, 295 registered users with attributed role of "teacher" or "student". There are 306 attributed roles so far. This difference is justified by the fact that a user can be enrolled in different courses with different roles. Concerning the three axis of teaching, research and extension, the extension one had largest number of registrations. The majority of users and attributed roles is in the extension course *Constituting the Collaborative Education in Baixada Fluminense*, with 183 registered users (about 58% of total number of users). 10 users assume the role of teacher and 173 of student.

In post-graduation, there are 97 registered users (about 31% of total registered users), participating in four courses: *Special Education in the Perspective of Inclusive Education* (2 teachers and 18 students); *Education and Transformation in Paulo Freire* (1 teacher and 20 students); *Daily Life in Elementary School* (2 teachers and 28 students) and *Visual Language, Communication, Teaching and Learning* (3 teachers and 23 students).

Language and Education: Teaching and Science is the only research group in the VLE so far, with 17 registered users (about 5% of the total users): 2 teachers (the group leaders) and 15 researchers and post-graduation students whose attributed role is student.

In this initial stage, teachers use different resources in the VLE platform: insertion of content by means of verbal and non-verbal texts (images, videos etc.), collaborative activities (thematic forums, database building), cooperative management of the subjects and feedback, which provides information to foster our interventions. Students' most common demands relate to technical support: problems about passwords, difficulties to access and find contents and activities within the courses. This happens mostly due to lack of previous technical knowledge and little familiarity with the environment. Some teachers point out that many students do not consider the VLE a legitimate tool and space to interact and deepen discussions and concepts studied in the classroom. Most of them view it as a repository of materials and texts. For instance, there are postgraduate students who send messages via e-mail or WhatsApp instead of participating in the forums and other activities in the VLE. On the other hand, teachers are concerned with technical training to use the VLE and its tools. They indicate the necessity of larger workload to develop projects and products. They also state that the use of the VLE should be encouraged. They consider that we should share knowledge about the use of the environment *vis-à-vis* the ongoing researches in the institute.

Concerning basic education, there are no registered students in the VLE so far. This can be justified by the fact that the digital environment is relatively new to the community of the institute.

Teachers have gradually shown interest in integrating it with their pedagogical practices in presential classroom. To do so, we intend to seek strategies to disseminate and insert the VLE in pedagogical activities. Training courses and workshops have been developed and offered to meet teachers' demands and needs. Since the participation of basic education students in the VLE depend on their teachers' registration and effective use of the environment and use it as a pedagogical tool, we expect that the number of basic education students registered in the VLE will increase as more teachers decide to use it, as well. According to figure 8, there are 295 users today. 97 are in post-graduation segment (89 students and 8 teachers). Our goal is to include all basic education students in the VLE until November 2017.

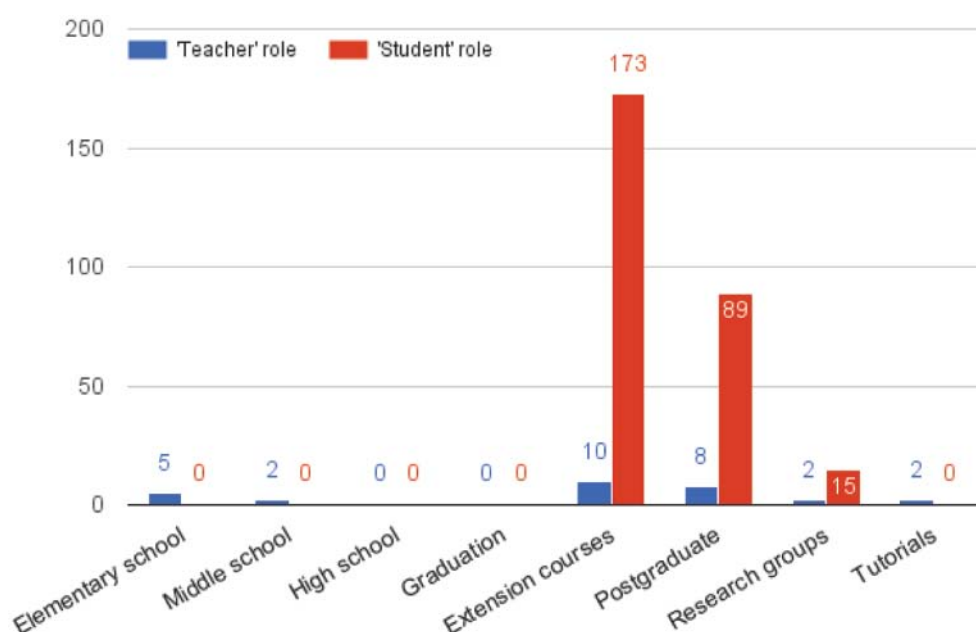


Figure 8: Registered Users in the VLE

Building cooperation between school and university is challenging. Teachers and students have different knowledge, experiences and opinions concerning blended learning experiences. In order to find solutions and strategies that can contribute to learning and teaching processes at school, to teacher education and to research in education, school / university cooperation is established by the articulation of the objectives of both: the first to produce a competent basic education process and the second to form good teachers for basic education. Based on this, shared actions are elaborated and developed. Some of them take place in common space-times, such as the school's classrooms. Others occur in specific places, such as laboratories of teaching research and research group meetings. The design of the VLE reflects not only the curriculum organization of the educational segments, but also the actions taken by the participants in its scope.

Next stages to implement the Virtual Learning Environment (VLE)

In 2017, blended learning experiences consolidation will take place in three dimensions: full coverage of the virtual rooms in all segments, building a broad multidisciplinary collaborative network, expansion of epistemological and methodological perspectives and search for partnership with external sectors to foster research and extension actions.

The networking of studies and production in the IA will encompass a set of integrated actions, such as surveys with the VLE users; interviews with teachers working in the virtual classrooms, forums and seminars to share methodologies and pedagogical practices, workshops to develop technical skills. We expect that this set of actions will contribute to meet the target public needs.

We intend to expand dialogue with external communities according to the professional demands of the ones who work in basic education by means of extension courses. In the field of research, the inter-institutional cooperation is already in progress. The National Institute of Science and Technology: teaching and communication—creativity, innovation and technology in teacher education includes 40 Higher Education institutes all over Brazil and the IA is one of them.

In addition, the VLE is meant to be a space and a tool for interaction and collaborative learning and teaching. Thus, the data obtained from the different participants (basic education, graduation and post-graduation teachers and students) will contribute to investigate and analyze their ways of participation and engagement in the different levels of formation. We intend to conduct studies on mediation, access patterns in the different age groups and schooling levels. Since teachers and students will probably present their points of view and report their experiences in using the VLE, we expect that they mention aspects of usability to meet students' and teachers' needs and aptitudes. Therefore, the data obtained will also contribute to design improvements.

Besides that, it will be possible to understand how learning takes place from the insertion of the VLE and its impact on teaching quality.

In this way, the VLE will be opportunity to foster teacher and student participation and to create spaces for discussions and exchange of experiences and knowledge.

Conclusions

We presented and described the proposal of blended learning experiences in a VLE in IA to establish the bases of comparison for the next studies. Different aspects of basic education and teaching methodologies are potential objects of inquiry in different educational segments. We intend that our reflections on teaching and learning digital contexts will gain prominence when we identify and understand new forms of interaction and communication, creating knowledge-building opportunities in everyday school life.

Reflect upon building and implementing a VLE in different segments of education brings about the consideration of different spheres of teaching and design.

Up to the current stage, we have reached some provisional findings about the different levels of formation in basic education, graduation and post-graduation courses. In general, we notice that most teachers are not well prepared to include the VLE in their pedagogical practices. They tend to underutilize the technical resources (for instance, use it as a digital repository of texts) instead of promoting more meaningful teaching practices that meet students' needs in a digital era that requires new social practices.

Especially to basic education students, the individual differences demand plural pedagogical practices. In this sense, the VLE makes possible the use of different languages and multimodal texts, which can contribute to better learning. Besides that, the VLE minimizes the frontiers between schools and other learning spaces, since it can be accessed from different places.

We strongly agree that we should promote the use of VLE despite the infrastructural and technological problems in public institutions in urban and rural areas. Brazilian continental dimensions call for the dissemination of blended learning experiences to promote intertwined practices of local and social accumulated knowledge and, thus, helping to foster means to more meaningful learning (Ausubel, 2003).

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