Humanized Learning through Blended Learning

Aprendizagem Humanizada por meio do Ensino Híbrido

Robert da Silva Soares Junior[1]*

José Lauro Martins[2]

Universidade Federal do Tocantins - Avenida NS 15, Quadra 109 Norte Sala 20, Bloco II – Palmas – TO – Brasil
*robert.junior@mail.uft.edu.br

Abstract. *The new demands for the continuity of the promotion of a quality virtual education, have led education professionals to research and planning hours. As one of the possible solutions to this fact, Hybrid Teaching or Blended-Learning seeks to unite traditional knowledge in favor of enhancing students' learning capacities with the use of technologies present in the web, using activities or actions that could be started in a classroom environment, and later to be develop with the self study of learners. To achieve success in this universe, it is necessary to know the possibilities of this environment, to promote content that is interesting and engaging for the participants, and above all, to place students as a central piece on the path to their development in the midst of the proposed contents. This article is a research derived from a systematic review to answer the following question: How to Achieve Success Through Hybrid Teaching? For this, we propose, through the analysis of 20 international articles of 5 different countries to describe the main difficulties and proposals found in external studies with a focus on the implementation of research to promote b-learning in the teaching of Natural Sciences and Mathematics in High School.*

Keywords: Blended learning. Secondary education. Distance education.

Resumo. *As novas demandas para a continuidade da promoção de um ensino virtual de qualidade, tem conduzido os profissionais de educação a pesquisa e horas de planejamento. Como uma das soluções possíveis para este fato, o Ensino Híbrido ou Blended-Learning busca unir os conhecimentos tradicionais em favor de potencializar as capacidades de aprendizagem dos estudantes com o uso das tecnologias presentes no ciberespaço. Para conquistar o êxito neste universo, é necessário conhecer as possibilidades deste ambiente, promover conteúdos que sejam interessantes e engajadores para os participantes, e acima de tudo, colocar os estudantes como peça central no caminho para seu desenvolvimento em meio aos conteúdos propostos. Este artigo trata-se de uma pesquisa derivada de uma revisão sistemática com o fim de responder a seguinte pergunta: Como Obter Êxito Por Meio do Ensino Híbrido? Para isso, propomos por meio da análise de diversos textos internacionais, descrever as principais dificuldades e propostas encontradas em estudos externos com o foco na implementação de pesquisas para promoção do b-learning no ensino de Ciências da Natureza e Matemática no Ensino Médio*

Palavras-chave: *Ensino híbrido. Educação secundária. Educação a distância.*

1. Introduction

The introduction of Distance Learning in contemporary education has challenged teachers and students to interact differently with the knowledge available in cyberspace. One of these examples is present with the increase in the demand for new strategies to promote the continuation of education in times when it is necessary to keep a distance and still establish connections of thoughts and ideas.

Thus, it is necessary to pay attention to new teaching strategies that value human communication, as social beings, interaction with peers is fundamental for the creation of an inviting environment for the construction of new knowledge. Thus, communication strategies that highlight collaborative learning become a valuable way to promote critical thinking.

Hybrid Teaching or Blended-Learning seeks to unite the two ends, the strategies that remain valid in traditional teaching and the use of the various technologies present in the virtual world in favor of enhancing the learning capacities of students. Unlike Online Education, where interaction takes place in virtual environments, b-learning seeks to integrate the use of digital tools and the traditional classroom, through individual knowledge-building tools or group interactions (ALADEJANA, 2009).

Among the possible benefits of using digital resources is network communication. It is the possibility that each participant will interact and build knowledge individually and shared with the other participants in their group, acting as a catalyst in the construction of knowledge. The teacher is the moderator in the process of building knowledge that can be shared and collaborative. This teaching model allows, above all, facilitates the construction of learners' autonomy and allows discussions that can go beyond content and improve the potential for transforming knowledge in its participants.

Another important aspect is the possibility of personalizing teaching, which is probably the most evident factor for the interest in growth today. Besides, the possibility of integration models and teaching strategies through the b-learning is an opportunity to organize a curriculum that respects the individuality and learning time of each learner.

This article presents an analytical discussion of studies and some reports of experiences with the use of b-learning considered successful by its authors published by 5 different countries. These can serve as a source of inspiration and promotion of this teaching model that is so interesting due to the current conditions and needs for the creation of educational environments in a safe and appropriate way.

2. Methodology

This research was carried out through a systematic review to analyze success through b-learning in the teaching of natural sciences and mathematics, focusing on secondary education published in English (SOARES JUNIOR; MARTINS, 2020). For this research, scientific articles referring to the years between 2008 and 2019 were searched in the ScienceDirect, ERIC, ACM (Association for Computing Machinery), SciELO and Google Scholar databases. The search terms were: ("Blended-Learning" OR "b-learning" OR "hybrid-learning" OR "mixed-learning") AND ("high school" OR "secondary school") AND ("science" OR " biology "OR" chemistry "OR" physics "). Previous reading was done in the titles of the articles to create a reference bank for the study, then a second review was used to select those who would have their abstracts read. After searching for titles, 110 articles were obtained, which would then be read and selected according to their abstracts. Among these, 20 articles considered as key were read and discussed for the making of this article (annex 1).

3. Results and Discussion

3.1 Collaborative Learning and Learning Communities

The first effective source for the use of b-learning lies in the understanding of how learning occurs in virtual environments, this action depends on the joint work of students who must work individually, to allow the development and discussion through "Collaborative Learning". This can be defined as a method where students should work in small groups to achieve goals, and as a result of this, learners will be motivated to seek new knowledge through interaction with colleagues and information analyzed among peers (CAPONE; DE CATERINA; MAZZA, 2017).

In order to create a captivating learning environment, it is necessary to understand the unique needs of each learner and then promote resources that allow learners to choose the desired form of teaching to work according to their preferences (ALADEJANA, 2009). Thus, the incentive for teamwork will be the fuel for online learning, where aspects such as individual responsibility and interaction through collective skills will be present in each step of the process (CAPONE; DE CATERINA; MAZZA, 2017).

Most of the difficulties of this process, then, are found in the problem of how to generate integration in classroom experiences and online content, which creates the need for contextualization and adaptation of teaching techniques. In a way, no type of course based on this modality will be the same as another, however, what makes this model effective is its ability to facilitate research through investigation and to promote unlimited communication between different groups such as students, tutors, among others.

To accompany and guide learning among students, it is necessary for the teacher/tutor to understand their role in the midst of the interactions carried out in virtual environments. Therefore, their duty will be that of conductor and mediator in the midst of discussions and productions conducted by students (RIBEIRO; TODESCAT; JACOBSEN, 2015). As an example, the educator should be careful to develop activities that promote engagement for research and that are meaningful in the interests of students, to promote the desire for new information. In this way, through proper interaction between participants, the Virtual Learning Environment (VLE) will be shaped into an active and interesting space, where all members have equal and significant value, in other words, we will have the rise of one "Learning Community".

Afonso (2001), defines Learning Communities as a social structure that is based on the interest of a group of individuals in search of achieving a common goal. In this model, collaborative commitment serves as a driving force for learning. These environments can be formal places like Google Classroom or Microsoft Teams, discussion forums on sites like Facebook or Reddit, or even more informal environments like groups in chat apps like Whatsapp or Telegram (OLIVEIRA et al., 2014).

It can be highlighted that the greatest barriers to the use of these spaces on formal education are found in two aspects: I - most education professionals are unfamiliar with these tools; II - the reference materials were not created with this type of use. Therefore, for the proper application of these concepts in Brazilian education, major adaptations are necessary, such as: promoting the training of education professionals through courses and training and; create new pedagogical subjects to promote autonomous thinking and study, as a source for collective discussions and deepening of concepts.

Driven by these actions, another factor is related to the way in how the moderation of Virtual Environments happens, factors such as boredom, dissatisfaction and disinterest can promote the abandonment of courses in the virtual modality. Thus, in addition to the knowledge of basic didactics, education professionals must cultivate knowledge of group management, with the purpose of maintaining motivation and influencing the communication of activities. In addition to these, the educator must adapt the activities to include the different learning styles of the participants, such as videos, audios, experiment models, writing, or interactive activities such as games or trivia (MELLO; BARROS, 2014).

Through the Interactionist and/or Constructivist teaching model, we can highlight the interactivity and communication skills of VLE, such as simplicity for interaction, fluency of ideas and possibilities of collaboration for the construction of individual knowledge, with an end to the collective knowledge of the participants. In this sense, the student has numerous tools for himself that place him as an active producer, respecting his abilities and building on his previous knowledge (RIBEIRO; TODESCAT; JACOBSEN, 2015).

3.2 Success in Virtual Environments

The success in building knowledge in Virtual Learning Communities is correlated with the strategies for connecting students in a Community and their active positioning as primarily responsible for the pursuit of this objective. According to Mello and Barros (2014), certain aspects are fundamental, such as the creation of a receptive environment, the possibility for the production of collective activities with strategies to relate the multiple intelligences and the students' learning ways.

This should start with the proper planning of the activities to be conducted, the preparation of materials aimed at building individual knowledge collectively, as well as the promotion of adequate training of teachers and tutors who must act together to address students' doubts, being still necessary the proper handling of the necessary digital tools, for example of diverse contents and the possibility of adequate answers to the possible doubts presented in the VLEs (CAMARGO CORTELAZZO, 2008).

Many of the results produced in these environments are made from models already present in previous works, as examples of the classic "*CTRL C + CRTL V + CTRL P*" (copy, paste and print), which will require maturity of the educator to solve any problems and work in the continuous development of the student's personal skills, such as familiarity with the content and interest in deepening the chosen sources. As an example, the formation of new generations with constant access to digital knowledge through simple words like "*hi, Siri...*" or "*ok, Google...*", end up creating a contemporary phenomenon where these attitudes are seen as normal in the routine of learners who are used to receiving quick (but not complete) answers at the time of their doubts. Therefore, the teacher must understand that penalizing such attitudes would end up disrespecting the personal history of his students and mitigating his interest in the content studied.

Abranches (2008), highlights the necessary understanding of the educational context and the technologies used. One should respect the culture of the learners and understand that authorship is a path to be taken in the construction of students' identity and knowledge. Thus, the most suitable alternative to copies is to understand the context and its application, so that strategies can be developed to solve this problem, by leading the student to his maturity as a producer of new knowledge. Therefore, the pedagogical proposal must be understood by the student, and then the teacher's job is to encourage individual thinking and demonstrate the reason for such product in the educational

context of each learner. One of the greatest examples of this can be seen in the research of Leo and Puzio (2016), who driven the creation of new materials by the desire and autonomous interactions between their students.

Most projects for the use of computers in Brazilian education are still restricted to their use in computer labs, which demonstrates a certain lack of interest in their use as a teaching tool (BARROS; SIMMT; MALTEMPI, 2017). Which is a big mistake, as students access virtual environments through mobile devices.

3.3 Difficulties in Hybrid Teaching

As a way of illustrating the contents seen in our research, we exemplify from this item, some reports of experiments carried out in other countries, which can serve as an inspiration source for application and training in Brazil and other countries. The main characteristic present in professionals who have achieved success in teaching with the help of b-learning is in the understanding of the relationships present in the study environment, simply, the tutor must understand the relationships between the participants and their characteristics, to then propose activities that promote that interaction.

The first difficulty, then, is the problem of how to overcome the difficulties of access present in the workplace, for example, Boitshwarelo (2009), developed a training for the use of websites for teaching Biology in Botswana. In a first interaction, 18 teachers participated in a local training to apply b-learning techniques in their schools, however, in the second part of the training, where they were to continue the online course, only 1 participant was able to access the virtual environment . Among the difficulties described, the fact of not having stable connections was reported as the main factor for the lack of answers in subsequent training, and as a result, the tutors in training were unable to implement the desired ideas among their schools.

Another major problem is found in the relationship of educators with basic skills to operate computers. Aladejana (2009) in Niger, demonstrated that most of the teachers in their research (n = 75) had basic computer skills. However, only half of the professionals were able to browse and obtain information on the internet (66.6%) and do word processing (46.7%) based on search engines. These data demonstrate how many professionals are still far from information technologies and, consequently, will

not be successful for the effective implementation of engaging research proposals between local and virtual teaching environments.

And much more than that, we still have the question of much of what is accessed by the new generations, it is done with a focus on fast interaction between mobile devices, which can be very interesting in the beginning, but become massive, as demonstrated in the research of Kalloo and Mohan (2011), where after some time of using the applications, many of the students in Caribe decreased their access to the applications.

Simple aspects such as typing or sending e-mail can even be seen as essential and easy to use, however, as described by Siko (2014), the lack of contact and delay in getting responses by e-mail is seen as discouraging by students. In one of his research questions, the author found that when they had any doubts, students preferred to question a colleague (51%) instead of asking during classes (36%). A similar relationship was obtained in the research by Chandra and Fisher (2009), where students felt uncomfortable in contacting teachers by e-mail, because of this, many students remained with doubts in the course of the course.

3.4 Successful experiences

Regarding successful experiences, DiPietro et al. (2010) interviewed teachers considered highly qualified in schools that work with virtual instruction in the United States. For the selection of these teachers, the authors sought to find professionals who had at least three years of experience teaching in virtual modules such as Moodle or discussion forums in elementary and high schools. These characteristics are summarized in Table 1:

Table 1 – Successful Strategies according to Michigan Virtual Schools Program

Interest and basic computer skills and constant updating of your skills with digital tools.	The constant contact with the new generations demands a constant need for updating so that the integration with the contents is valuable to students.
Time Flexibility and Freedom to Work with Various Teaching Approaches.	The ability of students to constantly connect to virtual environments creates the need for tutors to have the flexibility of time to interact with students. Together, it will often be necessary to use different devices to work with the learners' multiple intelligences.
Constant Online Presence and Extensive Content Knowledge	To create engagement in the execution and study of the contents to be studied, it is necessary to learn how to be a catalyst for the content and

	discussions. When this engagement becomes effective, it is common for the discussion to move away from the main objectives, so the educator must demonstrate knowledge beyond the simple specific content, to interconnect and promote interest according to the content desired by the students.
Using Diverse Strategies to Engage and Build Friendship with Students	In addition to simple pedagogical involvement, the digital study environment must become an extension of the local environment, for this, the integration of ties between teacher and students can go beyond the difficulties encountered through the group and can be able to raise learning rates individually and collectively.
Delimit the Organization and Structure of the Contents with the use of Deadlines for Activities.	The organization and time management ends up becoming a motivating source in the students' learning, in many cases because they do not have a vision of the specific time for the activities, the students can lose their motivation and contact with the group.
Encourage students' own communication and promote fast feedback.	In addition to involving students in activities, the response of activities must be done in an agile way so that students remain motivated. Simultaneously, in addition to simply answer the questions, students should be asked to discuss the contents for better understanding.

Adapted from: DiPietro et al. (2010).

Lai and Hwang (2015) reported that 38 Chinese teachers received training to use Mobile Devices in their classes. After a 1-year period, they reported frequent use of the Guided Teaching and Video Sharing strategies. The authors reported that the implementation was effective because during the study period they could count on the help of specialist professors to answer questions and give opinions. Therefore, training and information sharing should be encouraged among professionals to create small virtual communication networks, to connect these to students' practices and interests.

Between the most successful approaches, the study conducted by Seraphin et al. (2013) sought to train 48 teachers from different areas online so that they could implement content in their teaching areas with the theme of Sustainable Energies in the United States. After two online seminars, teachers received a variety of materials to encourage classroom discussions. The general opinion was positive, the participants described that the strategy helped them to make their lessons more complete. The author was able to promote communication between instructors through scheduled online seminars, where participants could share their experiences with other professionals. It can be emphasized that interestingly, the authors encouraged the participation of older

teachers by implementing small local meeting groups that served as a bridge to connect the different online groups.

3.5 Autonomy and Interaction

As sources of knowledge construction, autonomy can be highlighted as the main tool on the part of students, this can be present through the Sharing of Videos or Music, discussion by Guided Teaching or guided by Problem-Based Research. However, the source that will serve as a basis for the deepening of these concepts is based on how the participants will interact with these tools, thus, targeted research through strategies such as:

Jigsaw approach: in which students will be separated into different groups and will search for the desired content in a group of specialists, being later spread in mixed groups to share information with other specialists (KILIÇ, 2008);

Group Research: in which students must receive a task being divided between group members for research and production of a certain material that will be later presented and evaluated by the teacher and colleagues (SHARAN; SHARAN, 1990);

Tutoring in Small Research Groups: a mixed approach from the previous methods, where students will be given tasks to conduct experiments in which learning will be generated through the integration of all groups to create a product (LAZAROWITZ; HERTZ-LAZAROWITZ; RON, 2002).

In a survey conducted in schools in the Caribbean, Kalloo and Mohan (2011) used Smartphones for teaching mathematics based on an application developed especially for research. The students were divided into two groups that were given access to the applications with the duty to interact jointly with the content seen in the classroom. The big difference was in the interaction of the second group that received messages of encouragement with some regularity. According to the information obtained in the applications, students in the first group lost interest after a few days and decreased the use of the apps, while students in the second group maintained their interest for longer and continued to use the applications until the end of the study. The authors stated that one of the key factors for the continuity of interactions in virtual environments depends on the encouragement of educators and the creation of triggers for interaction over time.

McNeill, Pimentel and Strauss (2013) outlined some main points for the proper encouragement of students based on interaction through Problems and Questions:

- *Seeking to increase student engagement in group work*: to develop adequate learning in relation to the content, participants should be encouraged to seek the answers or necessary solutions to the problems presented;

- *Limit the reading time directed by the teacher*: in many cases, the complete reading of the information or long times of single action by the teachers ends up limiting the possibilities of the students' attitudes. For there to be engagement and deep development of students' cognitive skills, it is necessary to allow learners to take an active role in building their knowledge;

- *Avoid excessive adaptations of the content on the part of the teacher:* when exaggerated, adaptations of the content may be able to decrease the complexity necessary to perform or understand the proposed tasks, this decrease in mental effort limits the learning curve that would be proposed in a primary way by the authors or authorities who planned the base content.

A strategy considered efficient is the development of activities that will create a portfolio of content in virtual environments. As described by DiPietro et al. (2010), the use of activities with limited time, serve as a form of incentive for the continuity of the students' work. You can use experiments or activities that must be answered online; on certain platforms such as Moodle, Discord or Google Meet where it is possible to create chat sessions, students can interact with colleagues and instructors (CHANDRA; FISHER, 2009; CHANDRA; WATTERS, 2012). These strategies can be better used with online seminars, where after developing an experiment individually or in a group, participants should make a short presentation describing the results (SERAPHIN et al., 2013).

A major concern for teachers who wish to work with b-learning is doubt about how to measure student interaction and social contact. In certain cases, it is possible that due to the lack of social contact between students, they feel displaced to work and interact with the content. To avoid these feelings, DiPietro et al. (2010), exemplified that the tutor has an essential role as fuel for the continuity and conclusion of activities. To develop the tutor's interpersonal skills, it is necessary that through constant contact with students in virtual or local environments, they show themselves as a figure that can be easily accessed and that will be present to assist the participants. For this, the tutor's

organizational capacity is considered essential, as an example, one should seek to access online environments on a regular basis and at regular times, check common discussion areas, read and respond to students' messages, etc.

The virtual interaction between students can vary according to the class and the content. We can cite as an example the research carried out by Barros et al. (2017) who implemented the use of b-learning through multiple approaches to the teaching of mathematics in Brazil. As the authors report, the students' opinion was positive about the interaction of content with online activities. However, some of the students interacted "mechanically" or even found it difficult to talk about online content. The teachers reported that they found it difficult to discuss and quantitatively assess the interaction or even the quality of it on the part of the students. The authors concluded the study with the statement that it is necessary for professionals working in this area to receive specific training on how to evaluate interactions in virtual environments. It is recommended that the concepts of evaluation are well delimited by teachers, such as direct questions or quantitative values.

In research with configurations similar to the previous one, the development of a web-site for teaching Physics was done by Chandra and Fisher (2009), where students should answer questions about the contents seen in the classroom and view some videos and activities, in this study, the authors obtained high levels of engagement with the creation of an internal social network, with possibilities for customization such as the creation of an individual profile and comments on colleagues' pages.

4. CONCLUSION

The virtual world presents many possibilities for customization and interaction based on the use of web-sites¸ games, applications, programs, among others. To ensure the quality of education, educators must stand before this universe to strip themselves of pride to accept mistakes and the consequent learning arising from these interactions. For this, humility must be the starting point and the desire to share knowledge on the ship's sails to guide participants on this path of learning and knowledge.

As a source of interaction and learning, the authors believe that b-learning is the next frontier of school development. For this, the roles of the participants must be well understood, teachers are no longer seen as the center of knowledge and students are not simply passive figures to be "enlightened". Similarly, physical and virtual spaces meet

for the construction of knowledge and educational experiences. These can happen autonomously at home but guided by a project prepared by a figure capable of understanding and sharing his interests with the other participants, later, these individual data can be discussed, shared and synthesized together in an environment where all present will have an active role in the development of activities.

This study sought to bring data related to knowledge previously discussed outside the world, however, often inaccessible due to the language barrier and educational particularities. Thus, we were able to demonstrate that success through Hybrid Teaching is found in the Interaction and Engagement by the participants. As many researchers have already stated, the education of the future is based on collective construction through digital tools, and in the same way, the definition of these limits is the starting point for the sharing of information and the evolution of academic thought.

Among the main points developed in this study, we can indicate as the most important contributions the demonstration that "success in Hybrid Teaching" will only be achieved when the learning tools are focused on the construction of collaborative knowledge to transform the "courses" at a distance "in virtual learning spaces. For this, it is necessary to promote the training of education professionals using as a basis, the experiences considered positive described in several studies, which can be those described in this article or other studies spread across the web.

We can also understand the great need for a culture aimed at promoting Autonomy and Interaction, through the personal and intellectual growth of students. As much as educators are prepared and virtual environments become the new "Acropole" if there is no interest and understanding that the curricular bases of education must be aimed at interacting with the individual demands of the communities where the teaching environments are inserted. What will only be possible, with the gradual opening and creation of a teaching model that respects the individualities of each learner.

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