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PERCEPTIONS OF SCHOOL TEACHERS ON THE USE OF COLLABORATIVE TOOLS AT SCHOOL

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Abstract

Technology has changed many aspects of life in society, playing a key role in our quotidian, and having profound impacts on how we relate to our peers and the way we educate the youngest. Collaborative tools have broken the barriers of time and space, allowing us to collaborate without these constraints. There are numerous advantages in the use of these tools in secondary education both in the immediate and future lives of students. Thus, came the idea for this study: to understand the teachers' opinions about collaborative tools and what are role they play in the teaching-learning process, as a way to transmit knowledge and communicate, facilitating the interaction between teachers and students. The state of the art is addressed in relation to collaborative tools in schools, the advantages and possible deterrents to the use of this type of tools from the perspective of teachers. Based in previous studies, a questionnaire was elaborated to verify the opinions and perceptions of teachers. Results highlighted that teachers recognize the benefits of these tools but, at the same time, there are factors that function as limitations to their use. In fact, collaborative tools and ICT are still not well explored by teachers in the context of their work.

Keywords: Collaborative tools, Teachers, Technology, ICT, Education, Learning

1 INTRODUCTION

Technology has changed many aspects of our life in society, and plays a fundamental role in education, having changed the teaching method with the addition of new collaborative tools, enabling distance learning. "Emerging technologies provide opportunities for instructor–student as well as student–student real-time and/or time-delayed collaboration. Software companies are creating user-friendly applications that are an asset to business and educational settings alike" [1] The collaborative tools stimulate the interaction and collaboration between students and teachers facilitating the existence of learning communities, promoting and adding new dimensions to the learning process. ICT evolves at a rapid pace, to keep up with the evolution of societies. The pressure for change arises due to our perception of the benefits these tools can have [2]. There is a paradigm shift, from technical to technological. The integration of technology in education is a pillar for updating and modernizing the technological, scientific, cultural and social aspects. ICT should be seen not only as an accessory, instrument or tool, but as effectively generating qualitative transformations in school work and in the development of the students, as citizens, having a profound impact in our daily lives [3].

1.1 School, Teachers and Students

Schools are organizations that promote learning in their students, as active participants, and prepare them for a life in society. Knowledge is constructed collaboratively through joint learning, as a consequence of doing school work and projects [4]. Technology has changed how school is structured and organized, providing tools that facilitates interaction and education [1], according to the needs of students and teachers. While technology evolves at an extremely fast pace many resources are needed to keep hardware and software up to date and functional. There is a lot of pressure from the media, the general public and political parties to ensure that these technological tools are used in schools, through programs and initiatives that, despite being expensive, promise positive results [2].

Teachers have an essential role in society, transmitting knowledge, guiding and leading students, through their attitude and example, but ICT tools are also changing their interaction way with students and how classrooms are organized. [1] But the use of technologies demands for new social and educational challenges, also exposing the limitations of some schools and teachers to be update. Some of the barriers pointed out are the lack of time that exists to adapt and complete the program, to know the software and acquire the knowledge on how to use it. Also, classes have a large number of

students and there is little cooperation between teachers [5]. However, ICT tools have significant potential to improve cooperative learning as a pedagogical practice with a profound effect on the learning and socialization of students [6]. It is necessary to develop challenging and creative activities to explore the possibilities offered by technologies, to reflect on how we can make learning effective, using the new computer tools, which not only generates motivation and networks of connection but also contributes to the practices and the literacy of students and teachers.

Today students are extremely knowledgeable in ICT tools, which allow them to learn in a collaborative social environment, working in group rather than in isolation, facilitating quick access to relevant and updated content [1]. So, in general they already use ICT in or outside the school [7]. The use of social networks begins at a very young age, when children have first contact with computer tools, particularly in games or social media.

Students are now active and autonomous participants, constructing and fostering virtual communities, establishing connections with no geographical, physical or institutional barriers, sharing learning based on socialization. Thus, it is increasingly important to teach students how to work together, helping them to participate and collaborate outside of classes, promoting teamwork and preparing them to face the job market in a near future [8]; [1]).

Young people attending secondary school - usually between 12 and 18 years -, are developing the abstract thinking (beyond logical thinking), formulating hypotheses and searching for solutions as they reflect on reality [9]. This link between the development of higher psychological functions and the systems of information representation [10], gradually changes the way of learning and organizing information, along the years. The more students strive and engage in tasks, the more efficient learning will be [11]. Cooperative learning compared to competitive and individualistic learning has a very positive correlation not only with variables as success, but also increases socialization, motivation and personal development [12];[13]; [14]. However, we must take into account that not all learning can have a collaborative characteristic and some students do not appreciate or benefit from this environment [15]. Anyway, it is assumed that collaborative learning brings several benefits to the students' development such as increased capacity for dialogue, problem solving, problem formulation, cognitive and formal thinking development, reflection on results, and collaboration capacity [16].

1.2 ICT and Collaborative Tools, for Teaching and Learning

The diffusion of personal computers and software programs increasingly easier to use created a huge demand for internet and wireless communication. Users started using forms of communication such as instant messaging, blogs, vlogs, podcasts, wikis, file sharing, social networks [17]. Now, Internet works as a facilitator of collaborative learning as it allows the creation of tasks and projects where students can collaborate. What are, in fact, collaborative tools? This type of technological tools may be classified in several categories, such as, tools of face-to-face collaboration, video conferencing, audio conferencing, telephone, chat (instant messaging), file transfer applications, blogs, project management tools, email [18]. Social networks have gained relevance in recent years as collaborative tools, due to their interactive ability, that allows individuals to actively participate in the contents that are published [17].

The information involved in collaboration may be verbal, textual, spatial or graphic (maps or drawings), emotional (considered important for group tasks), photographic information and video. The main characteristics of collaborative tools are: time (we can have synchronous collaboration consisting of real-time or asynchronous collaboration consisting of collaboration at different times); predictability (collaboration can occur at a previously scheduled time or without a specific schedule); location (this can be in the same physical location or in different locations); and the degree of interaction. [18] Communication is vital in any process. Face-to-face communication is considered the preferred form of collaboration, because it facilitates social interactions between individuals, which determines behavior and decision acceptance [19]. But this is not always possible. So, often teams use online collaboration tools. The most used tool is e-mail and its efficiency depends on regular use and minimizing delays in responding to messages [19].

1.2.1 Advantages

ICT tools allow students to collaborate without space limitations. Tasks that seemed unthinkable previously such as collaboration between students, teachers and schools become possible as they eliminate factors such as the time and distance that separates them, allowing the communication and sharing of common interests. Social networks are present in all aspects of our lives. It is therefore

becoming increasingly relevant and recognized by educators the benefits of these tools in their profession, allowing online interaction, information sharing and the possibility of making learning more interesting for students, using environments familiar to them [20]. These new technologies facilitate access to information, spark curiosity, encourage students to explore school topics, and motivate them to acquire new knowledge, using user-friendly tools and resources. This has been extremely important for the social development of individuals. Motivation has an essential role in education, and motivated students learn more easily, and achieve better results, in academic skills and in their social life [21]. Internet-enabled technology tools also promote the creation of online learning communities, making possible the interaction through learning networks, synchronously or asynchronously. The versatility of social software and other collaborative tools (allowing the collaboration via Internet, adding a new dimension to learning) seeks to motivate, cultivate and meet the current learning needs of students [1].

1.2.2 Use of ICT and collaborative tools in teaching-learning

[11] verified that the most interested students were the ones who used and took advantage of the technological environment, having better classifications. These tools also proved to contribute to a greater literacy among students and teachers. Students and teachers that used these resources in the teaching-learning process, in an innovative and creative way, revealed a more positive feeling about technologies. This type of cooperative education tends to adopt constructivist ideas and is described as being a learning process through which the student creates his own network of personal knowledge supported by social networks, which through connection with other individuals, contact with other ideas, communities leads to more creativity and knowledge [7]. Collaborative tools allow students to suggest topics (based on subject content and dynamic content), giving them more control and enabling more efficient knowledge building, new learning models point to reciprocal learning among students, as well as between students and instructors [1]. Tools such as wikis, blogs, news feeds and social networks allow students to learn in a collaborative social environment, which is familiar to them, since most students use it to relate to their social network outside the school environment. The use of these tools will be the future of learning and it is particularly important now that students and teachers have to maintain social distancing, we need to understand which tools are used by teachers and what are the main factors that can hinder its adoption.

2 METHODOLOGY

2.1 Research question and Objectives

This paper aims to understand secondary education teachers' opinions about collaborative tools and what are role they play in the teaching-learning process, as a way to transmit knowledge and communicate, facilitating the interaction between teachers and students. The following research question follows: "To what extent do collaborative tools contribute to the teaching-learning process from the teachers' perspective?"

Thus, we propose the following objectives:

- Investigate the collaborative tools most used by teachers in the context of their profession.
- Determine what is the opinion of teachers regarding the advantages of using these tools (in terms of productivity, communication with students, utility).
- Determine which factors hinder the adoption of collaborative tools.

2.2 Participants

Data was obtained between May and September of 2019, through an online questionnaire, to which 104 participants responded: 33 were men (31.7%) and 71 women (68.3%), having an age range between 23 and 58 years old all of them work as secondary education teachers.

2.3 Design

The questionnaire was divided in 5 groups of questions: 1) Demographic characterization of the participants; 2) Determine which tools teachers use the most in the context of their work ; 3) Determine teachers' opinion regarding collaborative tools ; 4) Determine which factors hinder the adoption of collaborative tools;

3 RESULTS

3.1 Tools that teachers use the most in the context of their work

Regarding the tools that teachers use most in the context of their work on a scale where 1 corresponds to "Never" and 5 corresponds to "Very Often".

The most commonly used tools are personal contact, email contact that tends to "Frequently".

The telephone contact, File sharing without the possibility of editing tends to "Sometimes".

The tools rarely used by teachers are Video Sharing, File Sharing Applications with no editing option, Shared Presentations, Instant Messaging using SmartPhone, Computer-based Instant Messaging, Audio, which tends to "Rarely".

The tools least used by teachers are Video Conferencing, E-Learning, Blogs that tend to "Never".

Regarding the use of social networks by teachers the most used is Youtube, WhatsApp, Facebook which tends to "Rarely". The least used are Messenger, Instagram and Twitter that tends to "Never".

Table 1. Tools that teachers use the most in the context of their work

Tools	M
Personal	4.36
email	3.62
Telephone	3.33
File sharing without the possibility of editing	2.45
Video Sharing	2.31
File Sharing Applications with no editing option	2.17
Shared Presentations	2.08
Instant Messaging using SmartPhone	1.76
Computer-based Instant Messaging	1.68
Audio	1.48
Video Conferencing	1.43
E-Learning	1.38
Blogs	1.33
Youtube	1.78
WhatsApp	1.46
Facebook	1.45
Messenger	1.41
Instagram	1.29
Twitter	1.26

3.2 Opinion regarding collaborative tools

A principal component analysis (PCA) was made in order to transform a set of correlated variables into fewer independent variables, main components, in order to simplify the description of the data.

3.2.1 Find out what teachers' opinion about collaborative and cooperative learning

Table 2. PCA - Matrix after Varimax rotation, with Kaiser normalization, KMO=0.835, Bartlett test with significance 0.000.

	Factor 1 Promote learning in a technologically rich environment, consolidate learning and promote socialization	Factor 2 Development of cognitive reasoning and logical structures	Factor 3 Active learning community
% Explained variance	26.153	20.689	13.303
% Cumulative variance	26.153	46.841	60.145
Cronbach's Alpha	0.897	0.854	0.748

The first factor - Promote learning in a technologically rich environment, consolidate learning and promote socialization encompasses the following items: Promotes learning (C=0.617), Learning in a technologically rich environment is advantageous for students given them access to more information (C=0.784), Increases motivation (C=0.560), Students benefit from a technologically rich environment (C=0.780), Promotes socialization (C=0.760), Helps consolidate knowledge acquired in classes by providing didactic tools (C=0.590), Helps consolidate knowledge acquired in the classes since it provides information (C=0.759), Learning in a technologically rich environment is advantageous for students since they have more access to didactic tools (C=0.806), Promotes personal development (C=0.517).

The second factor - Development of cognitive reasoning and logical structures encompasses: Development of cognitive structures (patterns of physical and mental action underlying specific acts of intelligence) (C=0.639), Development of formal thinking (C=0.763), Makes learning more effective, with a greater probability of knowledge retention in the long run (C=0.592), Increases the ability to solve problems (C=0.745), Promotes logical reasoning (C=0.806).

The third factor - Active learning community encompasses: Students actively participate (C=0.865), Increases the feeling of learning community (C=0.750), Promotes the learning of theoretical concepts (C=0.610).

The factor 1 - Promote learning in a technologically rich environment, consolidate learning and promote socialization presents a minimum of 1.67 that tends towards the "Partially Disagree" and a maximum value of 5.00 that tends towards the "Totally Agree", the average is 4.07 that tends to "Partially agree" with a deviation from the average of 0.61.

The factor 2 - Development of cognitive reasoning and logical structures presents a minimum of 1.80 that tend towards the "Partially Disagree" and a maximum value of 5.00 that tends towards the "Totally agree", the average is 3.51 which tends to "Partially agree" with a deviation from the average of 0.77.

The factor 3 - Active learning community presents a minimum of 1.00 that tends towards the "Totally Disagree" and a maximum value of 5.00 that tends towards the "Totally Agree", the average is 3.52 which tends to "Partially agree" with a deviation from the average of 0.86.

3.2.2 Relevant factors for verifying teachers' opinions on the main advantages of using collaborative tools

Table 3. PCA - Matrix after Varimax rotation, with Kaiser normalization, KMO=0.800, Bartlett test with significance 0.000.

	Factor 1 Productivity and utility	Factor 2 Technological environment and communication

% Explained variance	42.025102	14.760578
% Cumulative variance	42.025102	56.785680
Cronbach's Alpha	0.825	0.680

The first factor - Productivity and utility encompasses the following items: Increases your productivity (C=0.794), Helps you communicate with your students (C=0.792), Are useful for you (C=0.722), Help in your work (C=0.614), Enhance and facilitate the learning of your students (C=0.715).

The second factor - Technological environment and communication encompasses the following items: It is important for students to learn in a technological environment (C=0.537), Facilitate communication with the outside world (entities outside schools) (C=0.818), Facilitate internal communication (at school) (C=0.840), Increase your technological literacy (C=0.451).

Factor 1, Productivity and utility has an average of 4 that tends to "partially agree", with a minimum of 2 that tends to "partially disagree" and a maximum of 5 that tends to "totally agree" and with a standard deviation of 0.5.

Factor 2, Technological environment and communication has an average of 4 that tends to "partially agree", with a minimum of 2.25 that tends to "partially disagree" and a maximum of 5 that tends to "totally agree" and with a standard deviation of 0.5.

Table 3. PCA - Matrix after Varimax rotation, with Kaiser normalization, KMO=0.847, Bartlett test with significance 0.000.

	Factor 1 Sharing provided by social networks	Factor 2 Boost the classroom, facilitate students' work
% Explained variance	29.919	25.565
% Cumulative variance	29.919	55.484
Cronbach's Alpha	0.736	0.736

The first factor - Sharing provided by social networks: Social networks make it possible to keep in touch (C=0.761), Social networks facilitate the exchange of ideas (C=0.799), Social networks simplify the sharing of resources (C=0.851), Social networks facilitate the work together for a common goal (C=0.815).

The second factor - Boost the classroom, facilitate students' work.

Contributes for the teaching-learning process (C=0.379), Contribute for boosting the classroom (C=0.732), Contribute for preparing lessons (C=0.508), Contribute for students to study (C=0.719), Contribute for students to do individual work (C=0.744), Contribute for students to do group work (C=0.571).

Factor 1, Sharing provided by social networks has an average of 4.2 that tends to "partially agree", with a minimum of 2 that tends to "partially disagree" and a maximum of 5 that tends to "totally agree" and with a standard deviation of 0.6.

Factor 2, Boosts the classroom and facilitates the students' work presents an average of 4.2 that tends to "partially agree", with a minimum of 3 that tends to "indifferent" and a maximum of 5 that tends to "totally agree" and with a standard deviation of 0.4.

3.3 Factors that hinder the adoption of collaborative tools

The main obstacles that respondents encounter in the adoption of collaborative tools (To what extent the following factors hinder the adoption of collaborative methods) on a scale where 1 corresponds to "Has no Influence" and 5 corresponds to "Influences very much". The items that most influence the non-adoption of collaborative tools are Lack of time to adapt the curriculum (M=3.70), Lack of resources (M=3.70), High number of students (M=3.68), Internet network (non-existent or with an

unsatisfactory functioning) (M=3.67), Requires an effort to adapt the curriculum (M=3.66) , Lack of didactic tools (M=3.58), which tend to "Influence Enough". Lack of time to know the software (M=3.43), Lack of interest on the part of students (M=3.13), Lack of time to acquire necessary skills (M=3.11), Lack of proficiency of teachers (M=2.97), Little cooperation among teachers (M=2.88), Lack of training (M=2.82) , which tend to "Influences"

4 CONCLUSIONS

In this work we aimed to understand the extent of how collaborative tools contribute to the teaching-learning process from the teachers' perspective. According to the analysis of the literature on the use of collaborative tools in secondary education it is expected that collaborative software will not be widely used in this context, however and given the positive contributions that it may have it is important to understand why and if there is the perception on the part of teachers of the importance that this type of tools can have and also what might be the main factors hindering the adoption of collaborative tools.

The results point to the use of collaborative tools to be infrequent by teachers, the most used remain the most traditional the personal contact and e-mail. The following is the phone and file sharing without the possibility of editing that are sometimes used. The rest such as video sharing, file sharing applications with editing possibilities, shared presentations, instant messaging using the smartphone, instant messaging using the computer, audio video conferencing, e-learning tools, blogs point to a rare or non-existent use. Social networks as collaborative tools are not widely used by teachers Youtube, WhatsApp and Facebook point to a rare use and tools such as Messenger, Instagram and Twitter point to a non-existent use.

Taking into account the results obtained, teachers consider that collaborative and cooperative learning is important and all the factors obtained in the principal component analysis present an average that points to high levels of agreement about the advantages of this type of learning for students. Through the analysis of the results, the respondents classify it as highly important.

According to the respondents, it was observed that the factors that most hinder the adoption of collaborative tools are lack of time to adapt the curriculum, lack of resources, the high number of students, internet network (non-existent or unsatisfactory functioning), the effort to adapt the curriculum and lack of didactic tools.

This is of particular importance given the current pandemic situation, where both teachers and students are forced to stay in their homes and work remotely. The only way for this remote work to function is through the use of emerging technologies, and a large effort to quickly adapt our workflow to them is being undertaken. This article aims to provide a deeper understanding regarding teachers' perspectives on collaborative tools and elaborates on what are the factors that need improving in order for teachers to use them. It also opens a window for future work that could further explore the adoption of collaborative tools in this context.

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