FRAMEWORK FOR WEB 2.0 IMPLEMENTATION IN HIGHER EDUCATION: EXPERTS VALIDATION

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Abstract

Technology, and Web 2.0 in particular, has been the focus of many universities' efforts to respond to the 21st century learners' demands and the volatile nature of the modern workplace. Web 2.0, with the numerous benefits it presents, seems to fit the needs of a socially connected and information led society, but its integration in educational settings remains an intricate process. This paper examines the factors that potentiate the successful integration of Web 2.0 tools in higher education, by structuring them into a framework composed of six elements. The framework was validated by an online questionnaire that was distributed among higher education experts, who reiterated the importance of all the factors: technology selection, user-friendly tools, students' participation, high number of active students, relevant content, and features for content addition and communication.

Keywords: Web 2.0, Teaching/learning strategies, Learning technologies, implementation framework, online questionnaire.

Resumo

A tecnologia, e a Web 2.0 em particular, tem sido o foco do esforço de resposta, de muitas universidades, às demandas dos alunos do século 21 e à natureza volátil do local de trabalho contemporâneo. A Web 2.0, com os inúmeros benefícios que apresenta, parece atender às necessidades de uma sociedade socialmente conectada e orientada pela informação, mas a sua integração em ambientes educacionais permanece um processo complexo. Este trabalho examina os fatores que potencializam a integração bem-sucedida de ferramentas da Web 2.0 no ensino superior, estruturando-as numa *framework* composta por seis elementos. A *framework* foi validada por um questionário online, distribuído entre especialistas do ensino superior, que reiterou a importância de todos os fatores: seleção de tecnologia, ferramentas fáceis de usar, participação dos alunos, grande número de alunos ativos, conteúdo relevante e recursos para a introdução de conteúdo e comunicação.

Palavras-chave: Estratégias de ensino/aprendizagem, Tecnologias de aprendizagem, *framework* de implementação, questionário online.

1. Introduction

The higher education sector is assuming an active role in the modernisation of their curricula to attain, more effectively, their responsibility to educate and prepare the future workforce. Education has an important role in assisting learners to develop the 21st century skills that are required of them, such as problem-solving, collaborative working, critical assessment and information management. The swift rate at which technology evolves demands that education accompanies this change (Shields & Chugh, 2018) and places an emphasis on 21st century digital skills. These competences transcend the need for mere technical expertise and include the mastery of key skills (e.g. communication, critical thinking, information management, lifelong learning) in the context of digital settings, to ensure that learners are able to function proficiently in the information society era (Van Laar, Van Deursen, Van Dijk, & De Haan, 2017). As Selwyn et al. (2019, p. 1) argue "digital technologies will continue to be a significant part of how our future is shaped as the nature of the world's economies, politics, cultures, and societies steadily (and often unpredictably) shift." The pervasiveness of technology in all areas of society also affects higher education, where it has increasingly become mainstream (Castañeda & Selwyn, 2018; Dunn & Kennedy, 2019; Goodchild & Speed, 2019; Linda, Raimonds, & Daiga, 2019; Lytras, Sarirete, & Damiani, 2020; Pentoney, Halpern, & Butler, 2015).

Responsible for coining the term, O'Reilly (2007) identified seven core features to define Web 2.0: "the web as platform", "harnessing collective intelligence", "data is the next intel

inside", "end of the software release cycle", "lightweight programming models", "software above the level of a single device" and "rich user experiences" (pp.18-36). In practice, these features translate into applications that learn from and improve with user participation, harness collective intelligence and that are open and co-create value with their communities of linked users (O'Reilly & Battelle, 2009). Constantinides and Fountain (2008) outlined an initial classification of Web 2.0 into five core groups of applications, blogs, social networks, content communities, forums/bulleting boards and content aggregators, which have now grown considerably. Web 2.0 has evolved since its early days by empowering users to establish connections beyond their immediate friends' network and it has now become a commonplace. Its initial possibilities have expanded the array of connections that users can create with peers, groups, brands, events and other online actors, they have changed the manner in which they can receive constant updates on those connections and they have enabled the development and reach of closely connected global networks (Newman, Chang, Walters, & Wills, 2016). This evolution has been so notable that it can be said that currently 'it is taken for granted that free online technologies will serve our every interactive purpose, so "Web 2.0" has become a largely historical term." (Bower & Torrington, 2020).

Web 2.0 has revealed its potential as an educational technology and continues to be successfully implemented as a support mechanism in many higher education courses (Belanche, Casaló, Orús, & Pérez-Rueda, 2020; García-Morales, Martín-Rojas, & Garde-Sánchez, 2020; Ifinedo, 2018; Liu, 2016; Stathopoulou, Siamagka, & Christodoulides, 2019; Virtanen & Rasi, 2017). Twitter, Facebook, Flickr, Evernote, Pixlr, Mindomo, Google Maps. WorldClouds, YouTube, Muvee, Padlet, Prezi, Slideshare, Wikidot, Edublogs, Diigo, Feedly, Class Dojo represent examples of Web 2.0 tools that can be used for learning and they are part of Bower and Torrington (2020) typology of free online learning technologies. The authors published an update from their previous typology (Bower, 2016) where they highlighted a total of 226 free online learning technologies grouped into 40 categories and 15 clusters (Bower & Torrington, 2020).

There is equally a panoply of Web 2.0 tools that can be deployed in mobile devices. Mobile 2.0 emerges from a combination of "the mobility, connectivity, communication, content creation and context sensor affordances of mobile devices with the collaboration and sharing enabled by mobile optimised web 2.0 services"(Cochrane, 2014, p. 69). In line with the constant evolution of mobile communication technology, smartphones and their swift and widespread adoption have opened unlimited possibilities for ubiquitous learning, through various Web 2.0

tools ranging from instant messaging (e.g. WhatsApp) (So, 2016), microblogging (e.g. Twitter), geotagging (e.g. Google maps) (Cochrane & Bateman, 2010) and forums (Ko, 2019).

This study aims to address a core research question: What factors lead to the successful implementation of Web 2.0 in higher education contexts? In exploring this question, this study will intend to determine how higher education teachers are using Web 2.0 tools in their courses. In addition, it will try to identify the tools that are used more often and teachers' level of proficiency in the deployment of these tools. This paper begins with an overview of the conceptual framework of factors that can assist implementation. It then describes the methods that guided the empirical research and presents the results of the online questionnaires. The paper concludes with a discussion of the most relevant findings and an examination of the research limitations and avenues for further research.

2. Web 2.0 Successful Implementation: a Conceptual Framework

Web 2.0's impact in education is associated with autonomous learning, content creation and exchange, collaborative learning and an improvement of the student's ability to attain their learning objectives (Sumuer, 2018). Additionally, in some contexts, the use of Web 2.0 technologies seems to have a positive impact on students' preparation as part of the future workforce, namely because it assists them in the development of competences that will be essential for their professional life (García-Morales et al., 2020). Web 2.0, irrespective of the specific tools that are used, represents an innovative approach to learning, where the students assume a more proactive role in the creation of content. As the students benefit from collaboration and become prosumers, the instructors become closer to a more decentralised role of guides (Torres Kompen, Edirisingha, Canaleta, Alsina, & Monguet, 2019). Regardless of Web 2.0's pervasiveness in higher education settings, existing empirical evidence on the success of its deployment remains restricted (Bennett, Bishop, Dalgarno, Waycott, & Kennedy, 2012). The incorporation of Web 2.0 in higher education is associated with a panoply of challenges. In this sense, it is fundamental that educators disseminate their experience with Web 2.0, so that their successes and shortcomings can be used by others to improve their practices (Anonymous, 2014). The inadequate use of technology can be counterproductive and impair rather than support the learning process (Fan, Radford, & Fabian, 2016). Hence, it is crucial to examine the practices that can be conducive of a more effective application of Web 2.0 in higher education.

Despite the fact that in some cases the evidences point to a lack of direct impact on the learning performance of students, Web 2.0 has proved its value as an instructional reinforcer, an

instrument for the enhancement of student satisfaction, interest and learning experience (Karvounidis, Chimos, Bersimis, & Douligeris, 2018) and an ubiquitous provider of resources that are both directed at the student and authentic (Huang, 2019). Various studies examine the importance of Web 2.0 in higher education, featuring different technologies and platforms (Biasutti, 2017; Deng, Li, & Lu, 2018; Eid & Al-Jabri, 2016; Lackovic, Kerry, Lowe, & Lowe, 2017; Liu, 2016; Manca, 2020; Selwyn & Gorard, 2016). Since there is such an abundance of different Web 2.0 technologies, students can select the features and services that best suit their personal requirements (Torres Kompen et al., 2019).

Web 2.0 offers a novel and wide array of possibilities and experiences that can benefit the students' learning process (Afaf Mubarak & Andri, 2018). There are several recommendations that can be considered when implementing Web 2.0 in higher education courses. Some argue that it is important to select technology that provides an intuitive, high quality user interface (Fan et al., 2016), while others place the emphasis on the need to provide training sessions and explain the benefits of the activities where the technology is used (Fraj-Andrés, Lucia-Palacios, & Pérez-López, 2020). In addition, some authors argue that the students' learning experience is improved when they observe the presence of their peers and teaching personnel via social interaction (Luo & Chea, 2020) and that rubrics can be used to improve the objectiveness and transparency of the assessment of assignments involving Web 2.0 tools (Belanche et al., 2020).

Previous studies have proposed frameworks to assist the implementation of Web 2.0 in education, but they have placed their focus elsewhere. Baxter, Connolly, Stansfield, Tsvetkova, and Stoimenova (2011) failed to provide a succinct framework from which to guide Web 2.0 incorporation. Their framework, while encompassing several important aspects of implementation is more general and overly extensive with 17 elements divided between four phases (planning, support, development and implementation), which are individually developed into specific guidelines. Bower, Hedberg, and Kuswara (2010) uses the Technological, Pedagogical and Content Knowledge (TPACK) combined with Anderson and Krathwohl's Taxonomy of Learning, Teaching and Assessing to propose a framework for learning design employing Web 2.0. Although the framework is very comprehensive, it is mostly dedicated to direct technology selection by providing a structure to inform teachers on the particular purpose of different Web 2.0 technologies. Jimoyiannis (2015)'s framework was presented as a 2.0 version of the TPACK model. It is more focused on Web 2.0's characteristics of participation, interaction and learner centrality, but it is limited in terms of practical orientations. El Mhouti,

Nasseh, Erradi, and Vasquèz (2017) framework is based on concept-mapping strategies, but it is to be applied in online environments and pertains exclusively to e-learning content development.

The framework that is outlined in this paper aims to provide some structure to these and other best practices of implementation. The proposal of this framework, in defining the factors that maximise the effective deployment of Web 2.0 in higher education intends to build on the abovementioned studies and present a combined approach made of diverse, but mostly interdependent guidelines. Rather than addressing Web 2.0 from a one-sided perspective, this framework goes to the core of its most determining characteristics and recommends that it should be deployed by considering the technology itself, the users and the content. This approach is closer to Web 2.0 nature to ensure that educators are exploring its full potential. It is based on Anonymous (2017) proposed model and best practices (2019) for Web 2.0's implementation of higher education that consists of six main elements: technology selection, student participation, high number of active students, user-friendly tools, availability of content and features for content addition and communication. For the purpose of perfecting the framework, the element, availability of content, was changed to relevant content. Any implementation of Web 2.0 assumes the existence of content, and according to the literature, individuals do have content motivations and they do contribute to the tools to find and provide content (Ewing, 2008), but not just any content. The content needs to be relevant to the user. In the context of education, feedback constitutes an example of the kind of content that drives students' access to the tool (Baxter et al., 2011). Hence, this modification concerns the need to add further clarity to this element of the framework. Finally, to provide a clearer structure to the framework the six proposed elements were grouped into three layers of implementation: technology, learners and content. Figure 1 illustrates the modified conceptual framework that is proposed.

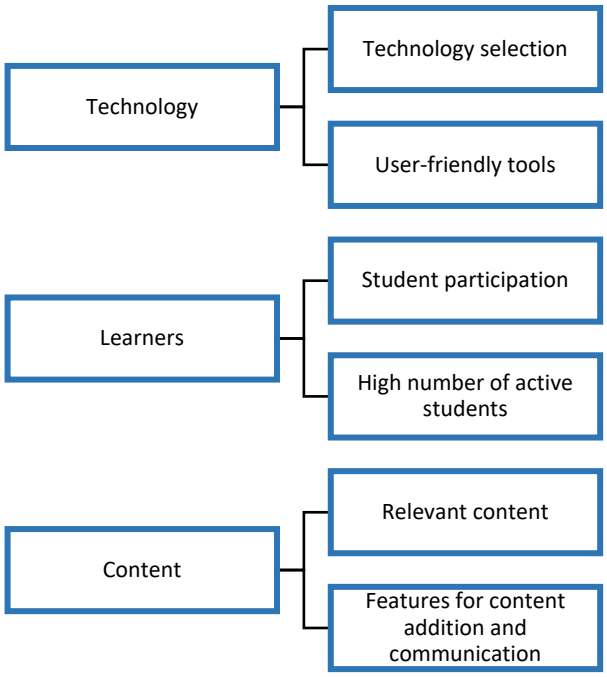

Figure 1. Conceptual Framework for Web 2.0 Implementation in higher education

2.1. Technology

The selection of the appropriate Web 2.0 tool should take into account the learning value of the tool (Bower, 2015; Bubas, Coric, & Orehovacki, 2011), i.e. the positive contribution it can make to the learning process. Web 2.0 tools have a panoply of features and services that differ from platform to platform and teachers need to take advantage of this diversity (Manca, 2020). Also technology selection requires guidance by pedagogical approaches (Bates, 2011; Karvounidis, Chimos, Bersimis, & Douligeris, 2014; Yuen, Yaoyuneyong, & Yuen, 2011) and to consider the subject that is being taught (Bates, 2011; Karvounidis et al., 2014). Additionally, it should be supported by the teachers' training on Web 2.0 tools (Baltodano, 2016; Jimoyiannis, 2015; Rogers-Estable, 2014; Zelick, 2013), to ensure that they can comfortably and proficiently benefit from the variety of options available to them.

User-friendly tools stand for another core aspect of Web 2.0, its intuitive use. Although there are reports of students' familiarity with Web 2.0 there are several measures that can be implemented to warrant ease of use, especially for those who have a lower degree of experience (Dalvi-Esfahani, Wai Leong, Ibrahim, & Nilashi, 2020). In order to ensure the ease of use, the teachers should provide students with training on Web 2.0 (Echeng & Usoro, 2016; Jimoyiannis, Tsiotakis, & Roussinos, 2012; Rahimi, van den Berg, & Veen, 2013), user-friendly tools should be selected (Echeng, Usoro, & Ewuzie, 2016; Pieri & Diamantini, 2014), help resources need to be available (Bubas et al., 2011) and an experimentation period should be used (Baxter et al., 2011; Bubas et al., 2011; Roussinos & Jimoyiannis, 2013). When the technology that is being

used for learning is easy to use, students can more easily deploy it to engage with content and their peers (Owusu-Agyeman & Larbi-Siaw, 2018). The proliferation of technology integration in education has resulted in some challenges for teachers at the level of their familiarity with technology and the need to meaningfully incorporate it into their teaching (Scherer, Siddiq, & Tondeur, 2020). Instructors who present some difficulties with computer literacy and familiarisation with Web 2.0 may require additional support at the design level (Karvounidis et al., 2018). Hence, educational institutions should provide teachers with training on Web 2.0 (Fan et al., 2016; Soomro, Zai, & Jafri, 2015; Yuen et al., 2011).

2.2. Learners

With concern to students' participation, in order to encourage their contribution in the Web 2.0 tool, advanced privacy settings should be used (An & Williams, 2010; Feldmann, 2014; Rogers-Estable, 2014) and their participation should be mandatory (Echeng & Usoro, 2016) and graded (Baxter et al., 2011). Furthermore, copyright issues need to be discussed (Anonymous, 2016; Lai & Ng, 2011; Olaniran, Burley, & Chang, 2013), and intellectual property concerns need to be addressed (Anonymous, 2016; Issa, 2016; Waycott, Sheard, Thompson, & Clerehan, 2013). Since one of the main precepts of Web 2.0 is collective intelligence, more users contributions imply a greater value (O'Reilly & Battelle, 2009). A high number of active students on the Web 2.0 tool will bring more value to the tool (Jimoyiannis, 2015), it encourages other students to participate (Chen, Yen, & Hwang, 2012) and it can be achieved by stimulating collaboration among the students (Echeng et al., 2016) and encouraging student interaction (Feldmann, 2014).

2.3. Content

With regards to relevant content, students should be provided with content that is pertinent to them (Baxter et al., 2011; McLoughlin & Alam, 2014), their own generated content should be encouraged (Jimoyiannis, 2015; Yuen et al., 2011) and teachers should resort to quality control mechanisms to regulate content (Shang, Li, Wu, & Hou, 2011; Waycott et al., 2013). Finally, in terms of features for content addition and communication, the selected Web 2.0 tool should have options for the creation of content (Shang et al., 2011), tools to allow the communication among the students (Feldmann, 2014), an option to leave comments on the contributions (Dlab, Candrlic, & Sabranovic, 2016) and features to add content in a variety of formats (ex. photo, video, text) (Jimoyiannis, 2015; Lai & Ng, 2011; Shang et al., 2011).

3. Methods

This paper is supported by a quantitative methodological approach for its capacity to facilitate the evaluation of theories via the scrutiny of measurable variables (Creswell & Creswell, 2018), which is pertinent for the assessment of the several variables that compose the framework. The research design was determined by the use of survey research, since it is a useful instrument for the collection of quantitative data deriving from a sample's opinion (Creswell & Creswell, 2018). In this particular research it was applied through the creation of an online questionnaire, which was a valuable instrument in terms of cost, time and access to a population that is scattered (Wright, 2005). The sample of the population was selected via a combination of purposive and convenience sampling (Lavrakas, 2008), since the respondents were invited from an international population of higher education teachers and researchers, who was accessible to the researchers and who was selected specifically due to their expertise.

The questionnaire was organised into three sections: the first intended to gather data about the demographic profile of the participants; the second concerned the use of and proficiency with Web 2.0 tools; and the third pertained to the use of an adapted Likert scale, using 1-6 ratings, to identify the sample's agreement or disagreement with the elements of the framework and their associated items/strategies. Prior to its distribution, a pilot questionnaire was sent to a portion of the respondents to determine if the questionnaire was clear, appealing and to assess if it would provide valid insight. The respondents for the pilot were asked to complete the questionnaire and then respond to some questions regarding the clarity of the instructions, the existence of bias in any question and the absence of important subjects of topics. They were also asked about any questions that they did not want to answer and to add any comment that they might see as relevant. The questionnaire's final version was adapted to reflect the feedback that was received during the pilot. The final version assumed the form of a self-administered questionnaire (Lavrakas, 2008), accessible via a hyperlink in an email message, sent through SurveyMonkey, to the selected sample. Research Ethics Committee approval was sought for this research.

The questionnaire (in appendix I) was open for responses from October 2017 to May 2018. The data that was collected via the questionnaire was analysed in SPSS. The analysis consisted of a preliminary approach with a descriptive statistical analysis and a further exploration of the results with a factor analysis of the items that composed the framework. The data analysis was performed in SPSS 20 and it was conducted in two phases. The first stage consisted of an analysis via descriptive statistics, namely frequencies, and mean and standard deviation calculations, to assist the identification of the elements that the experts found relevant

for the framework. The second stage, the factor analysis of the framework elements and its associated measurement items or strategies, enabled a reduction of the several items. Factor analysis was used for its importance as a technique for the identification of clusters of variables that assist researchers to understand the elements of a set of variables. Also, it's value lies in determining if the various measures that are being studied are the result of the underlying variable (Field, 2013).

4. Results

The online questionnaire received 235 responses from which 176 were deemed valid for analysis, after the data cleaning process.

4.1. The participants

The majority of the participants were female (54.5%) while 45.5% were male. Around 34% of the respondents were between the age of 41 and 50; 28.4% were between 51 to 60 years old; and 22.7% were between the age of 30 and 40. With concern to country of residence, a total of 38 countries were identified, including Australia, Germany, Italy, Portugal, Romania, Russia, Spain, United Kingdom and United States. The participants have mainly teaching positions (76.7%), such as professor, associate professor and senior lecturer. Only 13.1% hold research positions and 10.2% have other type of positions, e.g. educational designer, IT-leader and consultant.

4.2. Web 2.0 use and respondents' proficiency

In order to understand the participants background in terms of Web 2.0 it was necessary to assess their use of these technologies within the courses they teach (Figure 2).

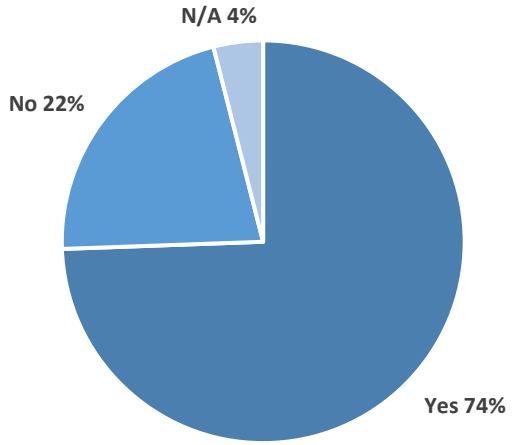

Figure 2. Web 2.0 use within higher education courses

As shown in figure 2 an expressive majority of the participants (74%) has used Web 2.0 tools in their courses. The participants were also asked about the type of courses in which they used the Web 2.0 tools. The majority selected blended learning (67.9%), 59.5% selected traditional classroom and 53.4% said that they have used them in e-learning. There was also a considerable percentage of respondents who have used it in the context of the flipped classroom format (20.6%). Concerning the specific tools that were used by the teachers and how often they are used, the responses show pronounced cleavages between different types of tools (Figure 3).

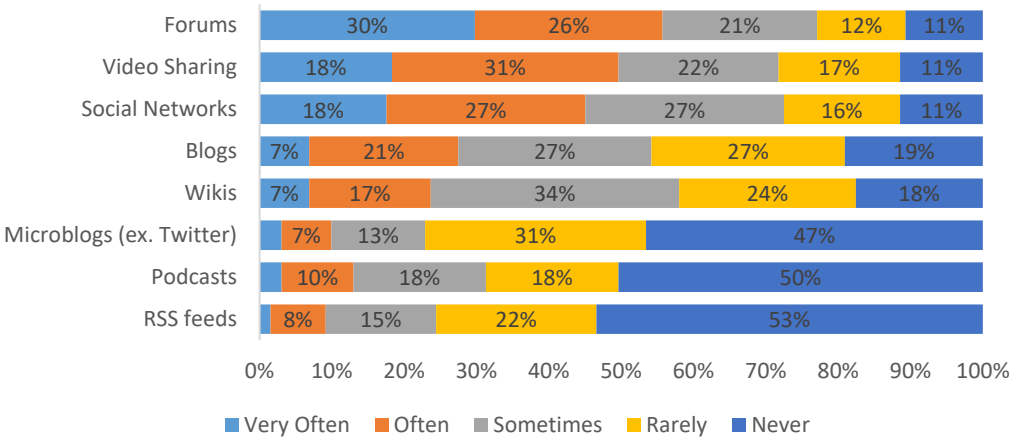

Figure 3. Frequency of use of specific Web 2.0 tools

Forums, video sharing and social networks are the tools that the participants use more often. Blogs and wikis are used with more moderate frequency and microblogs (such as Twitter), podcasts and RSS feeds are, according to the great majority of the participants rarely or never

used. Besides the tools that were listed, the participants were asked to add other tools that they have used or currently use in their courses. Only 61 participants added other tools and they mentioned Learning Management Systems, Youtube, file sharing tools, collaborative mindmaps and documents, instant messaging, online polling, community platforms and social bookmarking.

With concern to the respondents' proficiency with Web 2.0 tools, around 18% stated that they were very proficient, while 33% claimed to be proficient. On the other hand, 49% of the respondents were more moderate in the assessment of their skills, with 22% saying that they were moderately proficient, 17% considered themselves to be only somewhat proficient and 11% claimed that they had no proficiency.

4.3. Web 2.0 Implementation in higher education

The last part of the questionnaire focused on the factors that can assist a successful implementation of Web 2.0 in higher education and it started by asking the respondents about the impediments to a successful implementation (Table 1).

Table 1. Factors preventing the implementation of Web 2.0 tools in higher education

Barriers	**Percent of cases**
Lack of teacher training	65.9%
It's time consuming	35.8%
Copyright issues	34.7%
Intellectual property concerns	33%
Privacy concerns	29%
Lack of student participation	21%
Low number of participating students	17.6%
Other	15.9%
Lack of student proficiency	14.8%
These tools are distracting	10.2%
Web 2.0 technology is difficult to use	4%

As can be seen from table 1, lack of teacher training, the time it requires, copyright issues, intellectual property and privacy concerns were the reasons that the participants highlighted as being the most determinant in preventing the implementation of Web 2.0 tools in higher education. It is important here to underline the fact that the lack of teacher training was the only factor that was selected by the majority of the respondents. Additionally, the respondents were asked to select the factors that could support the successful implementation of Web 2.0 in higher education settings (Table 2).

Table 2. Factors for the successful implementation of Web 2.0 tools in higher education

Factors	**Percentage**
Selecting a Web 2.0 tool with learning value	55.7%
Integration of features that enable student interaction	53.4%
Availability of relevant content	48.3%
Selecting a Web 2.0 tool that is easy to use	47.2%
Students' participation	46%
Enabling content creation in multiple formats (photo, video, text, etc.)	45.5%
Provide students with training on Web 2.0 tools	40.9%
Managing the quality of the students' contributions	29.5%
Inclusion of advanced privacy settings	22.7%
High number of participating students	22.2%
Other	14.2%

The three factors that were selected more often by the respondents as being contributors to the successful implementation of Web 2.0 were selecting a Web 2.0 tool with learning value, the integration of features that enable student interaction and the availability of relevant content. A high number of participating students and the inclusion of options for advanced privacy settings were the factors that were less selected by the respondents. With the exception of the element high number of participating students, all the other elements of the proposed framework

were selected in this question as being important to the success of Web 2.0, by over 45% of the respondents.

To assess the validity of the framework, five of its factors were deconstructed into respective measurement items/strategies and they were further explored using a Likert scale that identified the respondents' level of agreement with each item. The factor pertaining to relevant content was not included in the Likert scale questions, since it was deemed redundant in the pilot of the questionnaire. The reasons pertain to the fact that the tool has to have adequate content to function and the items associated with it were already included in the other questions. This item was, nonetheless, validated by the respondents in the results of Table 2.

To validate the first element of the framework, technology selection, the respondents were asked to complete the statement "the selection of the appropriate Web 2.0 tool should" (Figure 4).

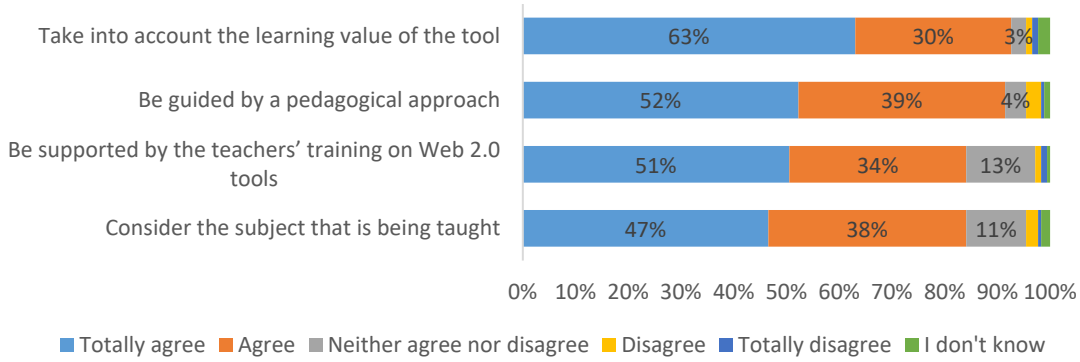

Figure 4. Technology selection items

All items had high agreement levels (total agreement between 84% and 93%), specially the fact that the learning value of the tool needs to be taken into account when selecting an appropriate Web 2.0 application in the context of higher education, and the fact that it needs the guidance of a pedagogical approach. All the Likert scale questions referring to the framework elements were followed by a comments section, where the respondents could expand their views. For this question, 5 respondents wrote comments saying that the tool should be compatible with the institution and have the support of administrative personnel, that it needs to consider the students' needs and interests and information work practices. Also, insufficient time and the lack of knowledge to combine both pedagogy and technology were highlighted.

With relation to user-friendly tools, the participants were asked to rate the items associated with the statement "in order to ensure the ease of use" (Figure 5).

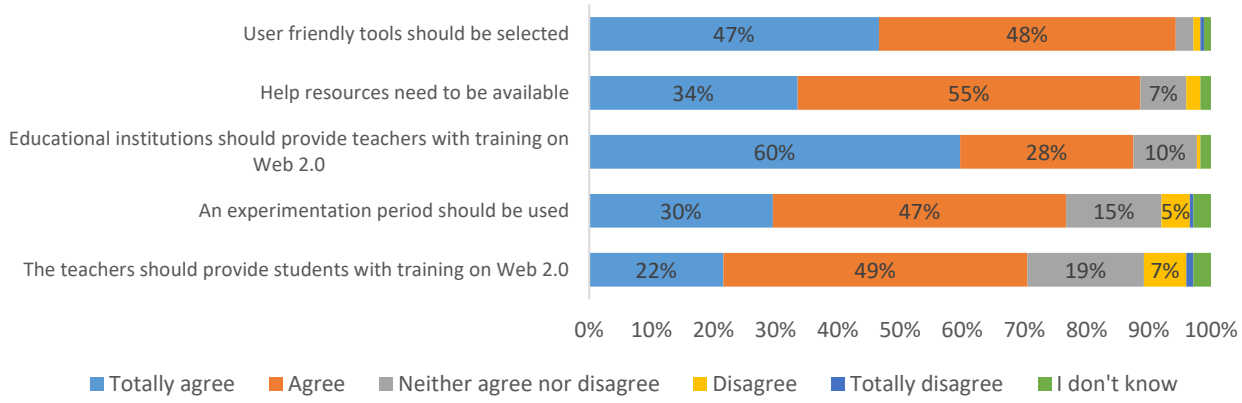

Figure 5. Items for user-friendliness

According to the respondents, Web 2.0 needs to be user-friendly. All the items pertaining to user friendliness received high agreement rates between 70% and 94% (total agreement). It is important to highlight, though, that two items had a significant percentage of neutral responses, 15% and 19% for "an experimentation period should be used" and "the teachers should provide students with training on Web 2.0", respectively. This question received 5 comments pertaining to the need to have appropriate personnel for administering the tools and to use them with purpose. In the comments, the participants, also argued that training is less necessary if the tools are easy to use and that office support and online tutorials should be made available.

For the third element, regarding students' participation, the participants completed the sentence "in order to encourage the participation of the students in the Web 2.0 tool" (Figure 6).

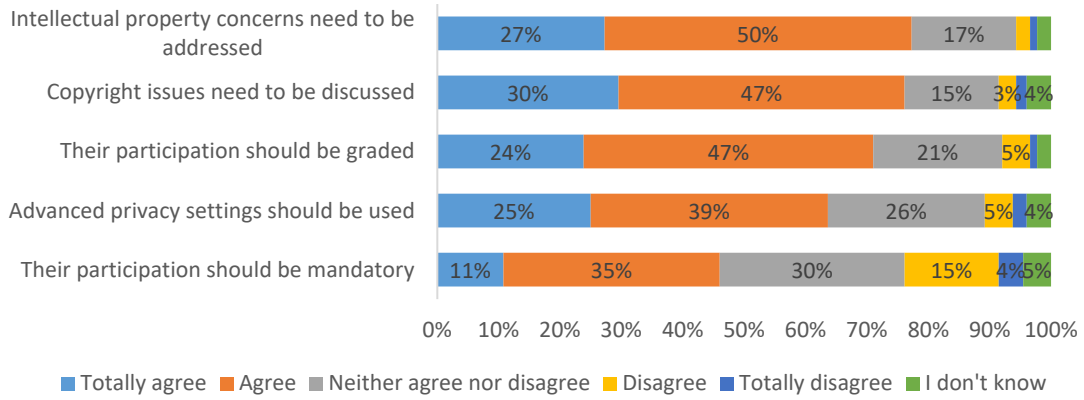

Figure 6. Items for students' participation

In this element of the framework, the agreement levels were less pronounced. The majority of the respondents did agree or totally agree with four of the items, but the total agreement scores were between 64% and 77%. Also, there was one item (their participation should be mandatory) with only 46% of total agreement, with 35% of non-committal responses (neither agree nor disagree/I don't know) and 19% of total disagreement. Moreover, all items had neutral values from 15% to 30%. For this question, 6 participants left a comment concerning the dilemma that using advanced privacy can create, the fact that mandatory participation can be difficult, arguing for the monitoring of the students' activities rather than resorting to grading, claiming that skilled moderation and motivating activities can increase the students' participation and defending the creation of tools by students' themselves.

With concern to a high number of active students, the participants rated the items that completed the sentence "a high number of active students on the Web 2.0 tool" (Figure 7).

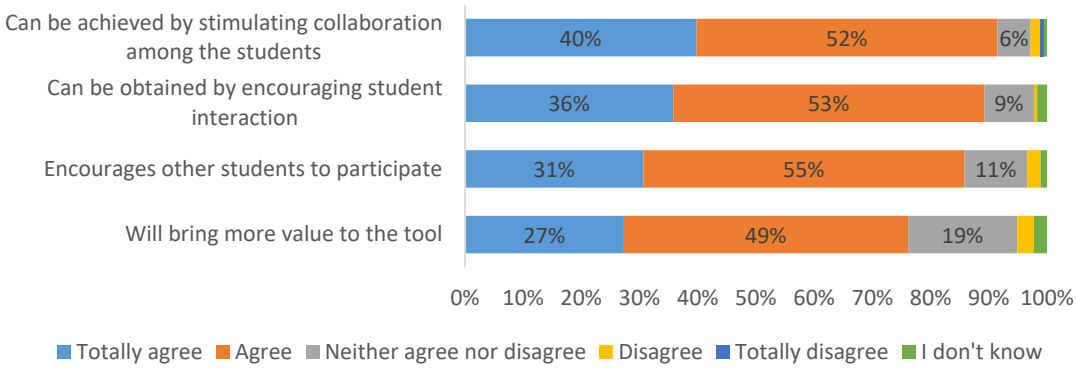

Figure 7. High number of active students' items

All the sentences registered high agreement levels (total agreement between 76% and 91%). The item with the highest score of total agreement pertained to the possibility of achieving a high number of active students via stimulating collaboration among the students. The item "encourages other students to participate" generated some (12%) non-committal responses as did the item "will bring more value to the tool" (21%), which might indicate that the respondents believed that per se, a high number of active students will not impact these items. Only 2 respondents left comments for this question, which related to the fact that students can engage with Web 2 tools to use or create instructional games and to the question of rewarding participation, which is deemed by the respondent as being difficult to balance with regular assessment.

Finally, in terms of features for content addition and communication, the respondents rated items related to the phrase "the selected Web 2.0 tool should have" (Figure 8).

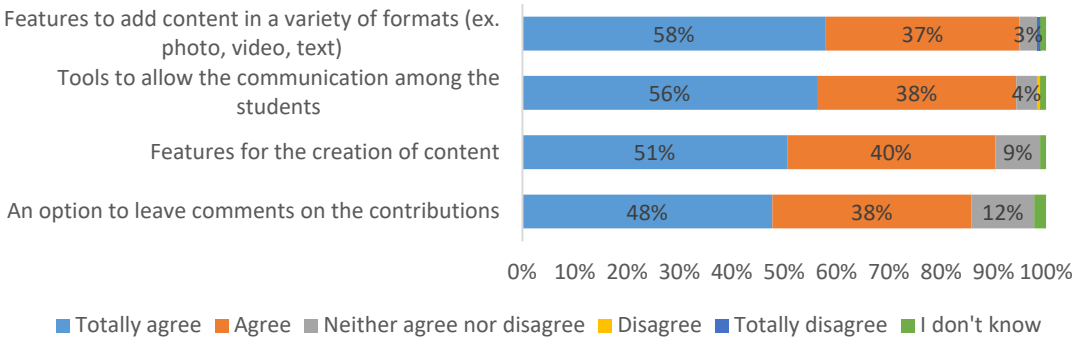

Figure 8. Features for content addition and communication's items

The great majority of the sample validated the need to have features for content addition and communication. This element of the framework received agreement levels ranging between 86% and 95%. The item "an option to leave comments on the contributions" received 12% of neutral responses, which is significant, but overshadowed by a high agreement rate. Only 3 participants contributed with their personal comments to this question. The comments highlighted the fact that the tools need to be compatible with content generated on smartphones, that enough computers should be available for students and that communication is the most important aspect.

Using further descriptive analysis, the mean and standard deviation of each item was calculated. Overall, the items have mean scores between 4.59 and 3.47 and their standard deviation range from 0.62 to 1.13. Four items were predominant, having registered means of over 4.5: take into account the learning value of the tool (4.59), features to add content in a variety of formats (ex. photo, video, text) (4.55), tools to allow the communication among the students (4.53) and educational institutions should provide teachers with training on Web 2.0 (4.51). The items with the lowest means (3.9 and 3.5) referred to students' participation and corresponded to the items with the highest standard deviation values (1.02 and 1.14), reflecting a more widely spread data: their participation should be graded; and their participation should be mandatory.

4.4. Factor analysis

The Likert scale questions were analysed further via a factor analysis in SPSS. To assess the factorability of the 22 items, the Kaiser-Meyer-Olkin (KMO) test was performed with a result of

.777, which is higher than the recommended minimum (0.5) (Field, 2013). Also, the Bartlett's test of sphericity resulted in a 0.000 value, meaning it is significant, since it is lower than 0.05 (Field, 2013). The analysis of the anti-image correlation matrix showed the adequacy of the sample and supported the inclusion of all items, as all the diagonals were over 0.5. The communalities table was equally examined, which showed that all the items shared a common variance, given that all the values were above 0.3. Since the factorability of the items was positively determined, the factor analysis was conducted via the Principal Component extraction method, using the Varimax orthogonal rotation. When performing the factor analysis the examination of the percentage of total variance and the scree plot (figure 9) resulted in the extraction of 7 core components.

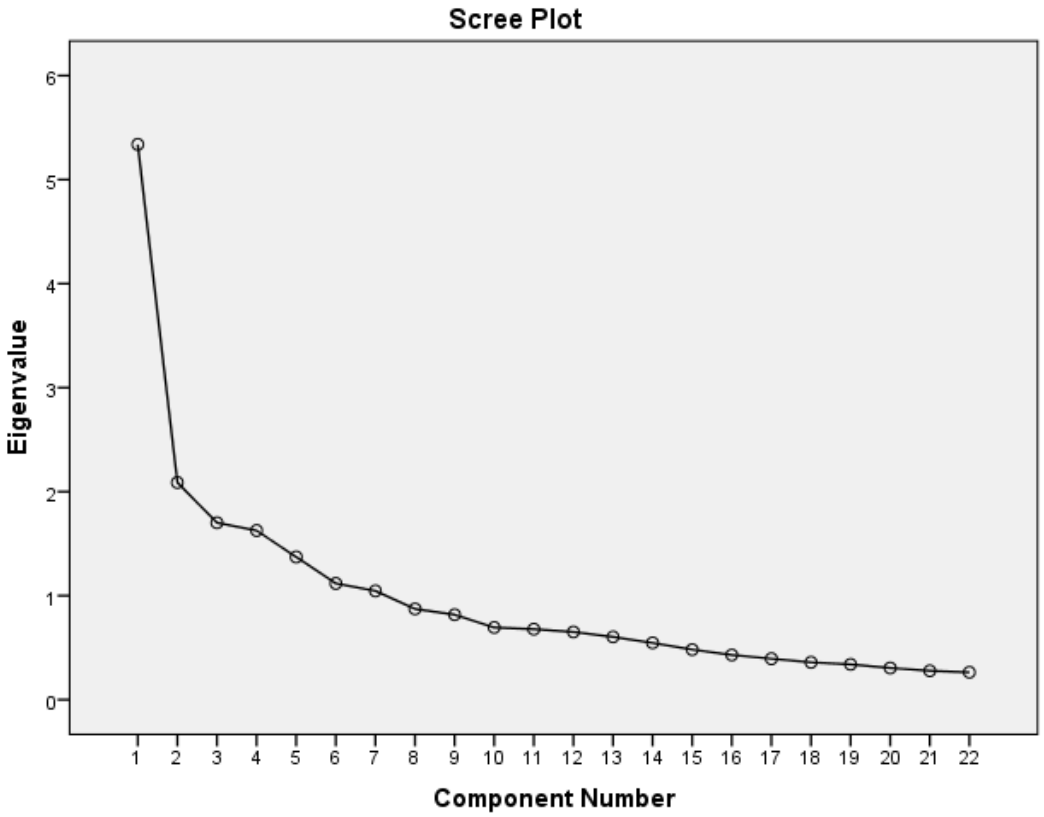

Figure 9. Scree Plot chart

The scree plot is used here to enable the identification of the factors that need to be considered. In considering the rotated component matrix table and aggregating the components to the highest factorial weight items, the following factors were extracted:

- Can be obtained by encouraging student interaction (0.788) – Learners layer

- Tools to allow the communication among the students (0.770) – Content layer
- Copyright issues need to be discussed (0.833) - Learners layer
- An experimentation period should be used (0.783) - Technology layer
- Be supported by the teachers' training on Web 2.0 tools (0.778) - Technology layer
- Their participation should be mandatory (0.856) - Learners layer
- Consider the subject that is being taught (0.781) - Technology layer

These 7 factors explain 65% of the total variance. This confirms the relevance of each of the elements of the framework to an effective implementation of Web 2.0 in higher education. Each of the implementation layers is represented in these 7 factors. With respect to the technology layer, the analysis highlighted three main aspects: the need to account for the specific subject of the course, and two items related to strategies to understanding the tools, one focusing on the teachers training and the other on the importance of implementing an experimentation period. The learners layer factors pertained to strategies to encourage participation, by means of establishing its obligatoriness and promoting interaction, and by addressing copyright issues. Finally, with concern to content it concentrated on communication and on the existence of features that facilitate the contribution of content, from the part of the students, to ensure their communication with each other.

5. Discussion

Technology evolves incessantly and relentlessly, exerting a profound impact on how education is delivered to students, and significantly shaping their learning experience. The wide array of technologies that have become available to educators to deploy in their courses, demands reflection and a deep knowledge not only about their operational specificities, but more importantly, about how these technologies impact the expect learning objectives. Reflecting on findings of this research, they reiterate the importance of key implementation elements for Web 2.0 in higher education.

The technological layer is central to implementation in the sense that its characteristics and features can either empower or restrict the learner. The need for technology adeptness was at the centre on this layer. The findings highlighted that an experimentation period should be used, as did the literature (Baxter et al., 2011; Bubas et al., 2011; Roussinos & Jimoyiannis, 2013); and argued for teachers' training on Web 2.0, which is consistent with the conclusions of previous research (Baltodano, 2016; Jimoyiannis, 2015; Rogers-Estable, 2014; Zelick, 2013). Furthermore, the examination of the obstacles to Web 2.0 implementation revealed that the lack

of teacher training led the list, followed by the fact that it is time consuming. This brings to question the preparedness of faculty for the deployment of Web 2.0 tools and the time it demands. These constitute central impediments to a more complete adoption of Web 2.0. The respondents' self-assessment of Web 2.0 proficiency revealed a significant percentage of participants with only a moderate competence. This is a fundamental aspect of implementation, as training might not be exclusively related with their lack of proficiency when using Web 2.0 tools, but it can also mean that they lack the skills to integrate it in educational settings. Their difficulty might reside in the concrete application of these tools to the context of their courses and all the transformations that requires. Moreover, these findings do not provide a relation between the two factors, but a question remains as to the impact that the lack of teacher training has on the factor of time. Is the incorporation of Web 2.0 in educational settings more time consuming due to insufficient teacher training?

Within the implementation layer pertaining to the learners, encouraging participation was the predominant aspect deriving from the analysis of the data. The findings corroborated the literature and underlined the fact that student participation should be mandatory, as argued by Echeng and Usoro (2016); that student interaction can foment a high number of active students, which was defended by Feldmann (2014); and the need to discuss copyright issues, evident also in past studies (Anonymous, 2016; Lai & Ng, 2011; Olaniran et al., 2013). Copyright issues also emerged in the results as impediments to implementation alongside other aspects, which are also commonly underlined as challenges of Web 2.0 in the literature, intellectual property (Anonymous, 2016; Issa, 2016; Waycott et al., 2013), and privacy concern (An & Williams, 2010; Feldmann, 2014; Rogers-Estable, 2014). These findings explored key aspects of student participation, but what other factors can be determinant? How do some characteristics of technology influence student's input? Does accessibility and connectivity impact the students' participation? Is that participation equally conditioned by the students views on and adoption of technology? What is the role of ubiquitousness and mobile 2.0 in facilitating and increasing this participation?

With concern to content, the third layer, it is important to underline the significance of relevant content and interaction and communication features. In this layer, the existence of relevant content was one of the most mentioned factors for the successful implementation of Web 2.0 and it was equally supported by existing literature (Baxter et al., 2011; McLoughlin & Alam, 2014). The need for Web 2.0 technology to include features for content addition and communication, supported by previous studies (Feldmann, 2014) emerged as a key element of the framework according to the respondents' input. These findings seem to suggest that the

interaction and communication among students is a significant part of content and of the students' participation within Web 2.0 technology, which poses some questions. Is moderation important to regulate students' content addition? Who determines the relevance of the content?

6. Conclusion

This study aimed to highlight the importance of a successful integration of Web 2.0 technologies within the context of higher education, by firstly examining its value, and secondly, by proposing a framework to guide its successful deployment. Despite the fact that this framework cannot provide a universal, one size fits all approach, to the implementation of Web 2.0, it does aspire to offer a founding structure to the process. It aspires to assist practitioners to gain a deeper insight into how Web 2.0 thrives and how it can serve educational settings, in particular, in higher education. Although the popularity of these tools is unequivocal, adoption can be challenging. The specific strategies associated with each of the elements of the framework intend to address very concrete needs and concerns that may arise from Web 2.0 use and that can hinder its successful implementation. On a theoretical level, this paper expands upon the conceptual matrix of core precepts related to the very nature of Web 2.0 and its related technologies, which can assist a deeper examination of this new version of the Web. In addition, this paper offers a multi-layered and encompassing structure, which demonstrates how the fundamental theoretical principles of Web 2.0 are intertwined and interdependent.

Notwithstanding the contribution that these results aim to add to the existing body of research, its limitations include the sample size and technique and the use of an online questionnaire for data collection. Despite design and dissemination efforts, the size of the sample was greatly impacted by a high non-response rate. Additionally, since the sample was based on non-probability sampling, more specifically purposive and convenience sampling, it is not possible to attest to the generalisability of the results. With concern to the data collection instrument, although, wherever possible, the questionnaire offered the respondents a variety of comment fields to provide them with ample opportunity to voice their opinion, it remains an insufficient instrument to explain why certain answers were provided. It was a valuable tool to depict the opinions of the experts, but in future research initiatives it should be complemented with qualitative data obtained from interviews and focus groups with faculty and researchers. This will intend to provide a deeper understanding of the relevance of the factors that constitute the framework and explore what other strategies can be used to implement these factors.

Additionally, it would be valuable, for prospective research ventures, to engage other stakeholders, namely students and higher education institutions, in examining the success factors

of implementation, using a mixed methods approach. Students can provide essential insights into Web 2.0 adoption factors and offer their views on best practices for implementation. Institutions could, in turn, offer their perspective on the role they play in fomenting Web 2.0's implementation, namely in terms of supporting training and ensuring scalability. Finally, to assess the empirical soundness of the framework, it is imperative that further research focuses on evaluating the deployment of specific Web 2.0 tools and platforms, using the proposed framework and its elements as a guiding structure.

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Tables

Table 1. Factors preventing the implementation of Web 2.0 tools in higher education

Barriers	**Percent of cases**
Lack of teacher training	65.9%
It's time consuming	35.8%
Copyright issues	34.7%
Intellectual property concerns	33%
Privacy concerns	29%
Lack of student participation	21%
Low number of participating students	17.6%
Other	15.9%
Lack of student proficiency	14.8%
These tools are distracting	10.2%
Web 2.0 technology is difficult to use	4%

Table 2. Factors for the successful implementation of Web 2.0 tools in higher education

Factors	**Percentage**
Selecting a Web 2.0 tool with learning value	55.7%
Integration of features that enable student interaction	53.4%
Availability of relevant content	48.3%
Selecting a Web 2.0 tool that is easy to use	47.2%
Students' participation	46%
Enabling content creation in multiple formats (photo, video, text, etc.)	45.5%
Provide students with training on Web 2.0 tools	40.9%
Managing the quality of the students' contributions	29.5%
Inclusion of advanced privacy settings	22.7%

High number of participating students	22.2%
Other	14.2%

Figure legends

Figure 1. Conceptual Framework for Web 2.0 Implementation for higher education

Figure 2. Web 2.0 use within higher education courses

Figure 3. Frequency of use of specific Web 2.0 tools

Figure 4. Technology selection items

Figure 5. Items for user-friendliness

Figure 6. Items for students' participation

Figure 7. High number of active students' items

Figure 8. Features for content addition and communication's items

Figure 9. Scree Plot chart

Data availability statement - The data that support the findings of this study are available from the corresponding author upon reasonable request.

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