

THE POTENTIAL OF AN “APP” THAT FACILITATES SMARTPHONE EXPLORATION IN THE CLASSROOM

Francisco Veiga*

António Andrade**

Abstract

Today we are living difficult times due to the pandemic situation we are facing, schools reinvent themselves daily and “finally” reach to technology to get to the student, whether through a simple but sometimes complex videoconference or a myriad of other applications that always depend on the knowledge and skills of each teacher in the technical field and in the pedagogical acuity of adapting the resource to the training purpose. Simulators, games and robots, among other resources, which will culminate in the integration of Artificial Intelligence in education, are at an advanced stage of incorporation of technology, but there are intermediate phases with potential that are important to disseminate so as to be explored.

Often considered a distractor, the smartphone does, however, play an important role in learning. Always available with internet access, it allows information search, collaborative work, image, video, sound, games, virtual and/or augmented reality, among other potentialities. It can better motivate and involve students in their learning process and in the development of transversal skills such as creativity, communication, cooperation and critical thinking.

Despite the numerous apps available, it is difficult to identify those that are appropriate for teaching and learning, in any particular topic in each subject. Thus, in November 2019, we provided our teachers with a repertoire of apps, through an application developed by us that allowed them to discover, install, try and use them, in the context of the classroom. At the same time, they can evaluate them and share with the community examples of good practices in their use. This study seeks to identify the effective use given to this app in its different features by the teaching community.

The satisfaction recognised by the teaching community regarding this resource brings together the relevant factors that allow the dynamic evolution of this project.

Keywords: Smartphone, education, educational innovation.

* CEDH – Centro de Estudos para o Desenvolvimento Humano - Universidade Católica Portuguesa, Porto, Portugal. xfveiga@gmail.com.

** CEDH – Centro de Estudos para o Desenvolvimento Humano - Universidade Católica Portuguesa, Porto, Portugal. aandrade@porto.ucp.pt.

Introduction

In the last decade, there has been an exponential growth in the use of mobile devices, in particular smartphones, for purposes that are not only functional, but also academic, informative, social and for entertainment (Godwin-Jones, 2017). This generation of students needs to access information, interact and learn from anywhere, at anytime and with anyone, which brings teachers new technological and pedagogical challenges. The literature suggests that priority should be given to the design of learning and experimentation spaces that, using technologies, allow students to be free to create, question and learn from each other (Landin, Lucas, & Monteiro, 2013). Some studies have concluded that the introduction of mobile technologies such as tablets or smartphones with touch screens increases students' motivation and improves learning outcomes (El-Sofany, El-Seoud, Alwadani, & Alwadani, 2014). The implementation of mobile technologies in the construction of learning scenarios has been progressively increasing due to the advantages they offer (Rojas, Valderrama, Lancheros-Cuesta, & Ardila, 2020) (Eduardo & Ardila, 2013). The presentation of digital content adapted to different subjects, with high resolution and color tactile interfaces, allowing the integration of multimedia resources such as videos, music presentations, among others, are characteristics currently found in mobile applications (Ocsa, Suero, Herrera, & Villalba, 2014).

The use of technology in the classroom is very important as it provides students with opportunities to learn how to work in the age of information technologies (KORAL GÜMÜŞOĞLU, 2017) (Poláková & Klímová, 2019). So teachers need to develop skills that allow them not only to identify good educational resources but also share with the community those that better suit their pedagogical objectives, the group of learners and the type of teaching. It's essential that the chosen technology is appropriate to the contents of the subject, the target audience and the skills to be worked on (Gonçalves, 2018). Its introduction doesn't just change the role of students and teachers: the speed, the closeness and the multiplicity of communication channels and social media redesign the contexts in which the learning process occurs (Castro, 2014). The author highlights the role of the Internet as an important catalyst for creativity, collaboration and innovation, creating opportunities that would have been impossible to imagine two decades ago.

Methodology

Throughout these two years of research, always adopting grounded and appropriate methodological approaches at each stage, it was sought to design, develop and streamline an app that, being an app identifier repertoire, allows teachers to easily find the one that best suits the contents under study, use it in the classroom, evaluate it through an instrument developed by us and share examples of good practices.

The purpose of this investigation is to analyse the perceptions that teachers at Almeida Garrett Secondary School had when using the smartphone in the classroom and to identify the apps they used.

Thus, to achieve our goal, a brief description of the EDUAPP mobile application will be made. Data collection for this investigation was obtained through the EDUAPP database, through which a quantitative analysis was carried out, namely (i) users, (ii) apps evaluated, (iii) comments, and (iv) suggestions for new apps.

The developed app was created to disseminate apps with pedagogical potential for all areas of study; it contains a strategy that involves teachers in the apps assessment and the sharing of their pedagogical adequacy. It also promotes the participation of teachers in the identification and sharing of new applications that are not yet included in the app portfolio. This way, it contributes to the pedagogical innovation in the adoption of technology inside and outside the classroom in a device that students value highly and allows bringing the world to the school and taking the school to the world.

Description of EDUAPP mobile application

The development process of the mobile application involved several fundamental steps: identification of requirements and analysis, conception of the design, implementation of ideas and testing. The design of the app started with the identification of the functional and non-functional requirements that were defined through the data collected in the literature review.

So, the following were defined as functional specifications: (i) For an unauthenticated user: login and / or create account. (ii) For authenticated users: search for apps, see their details, comment, rate, suggest new apps and log out. The user with an administrator profile can take advantage of the requirements of the normal user and also add, update and delete an app.

These are the defined non-functional specifications were: (i) Security: only persons with a password should access the application for confidentiality and privacy reasons. (ii) Simple use: intuitive, the language and graphics are easy to understand. (iii) Speed: fast navigation between pages and in the registration of information. (iv) Reliability: the user can successfully complete his tasks.

As stated earlier, the main objective of this project is to provide teachers with a repertoire of apps which: (i) provides them with a set of applications that can be used in the classroom, (ii) allows them to evaluate the apps through a model and (iii) permits the sharing of experiences and good practices in their use.

The EDUAPP mobile application implements the functionalities and modules that are considered essential for the teacher to search for apps in a repertoire and, above all, that allow: (i) to provide relevant information in real time, (ii) to access the installer of an app regardless of the smartphone's operating system, (iii) to make comments and view previous comments, and (iv) to evaluate an app.

It is important to emphasize that mobile devices have a large number of specificities, for example, the size of the screen, particular implementations of the operating system (Android, iOS, among others), physical interaction, and other aspects that dictate how the application will behave in a specific environment. In this context, a multiplatform development was used, within the IONIC CORDOVA programming environment, which prevented depending on implementations in different mobile operating systems. This means that an application can be compiled and launched to be supported by multiple devices, with different operating systems, without having to develop versions of the application according to different ecosystems.

The different modules of the application, which in the IONIC programming environment are represented by pages, are presented below.

Login

After logging in, the app presents, on its home page, a user authentication form (User and Password) to enter the application (figure 1).

In the first access, the user must create a new account by clicking on the page where a new user is registered by filling in a form (Username, Password, Password Repeat and Email).

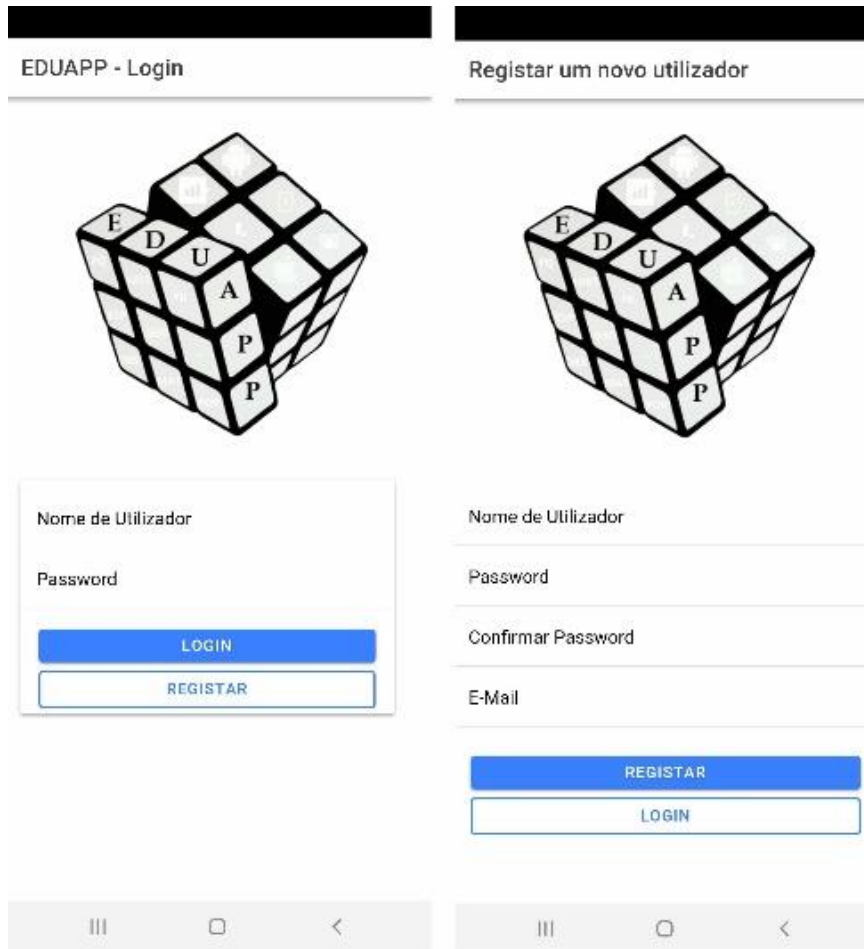


Figure 2 EDUAPP – Login and registration screen

List of apps available in the repertoire

After validating the login, it is in the main page of the application that the list of all apps in the repertoire is presented, with the logo and the name of each one. As it can be seen in figure 2, at the top, there is a search field that allows the user to make a filter, or several at the same time, to find one or more applications. The search is launched whenever a character and search is added in the name and / or tags field, which allows the user to find an app by name or by the information found in the tags field, for example, the acronym of a subject (math) or features of the app (collaborate, evaluate,...). In each of the apps, when moving to the left with one’s finger, two buttons appear, enabling the user to view and comment on or evaluate the selected app.

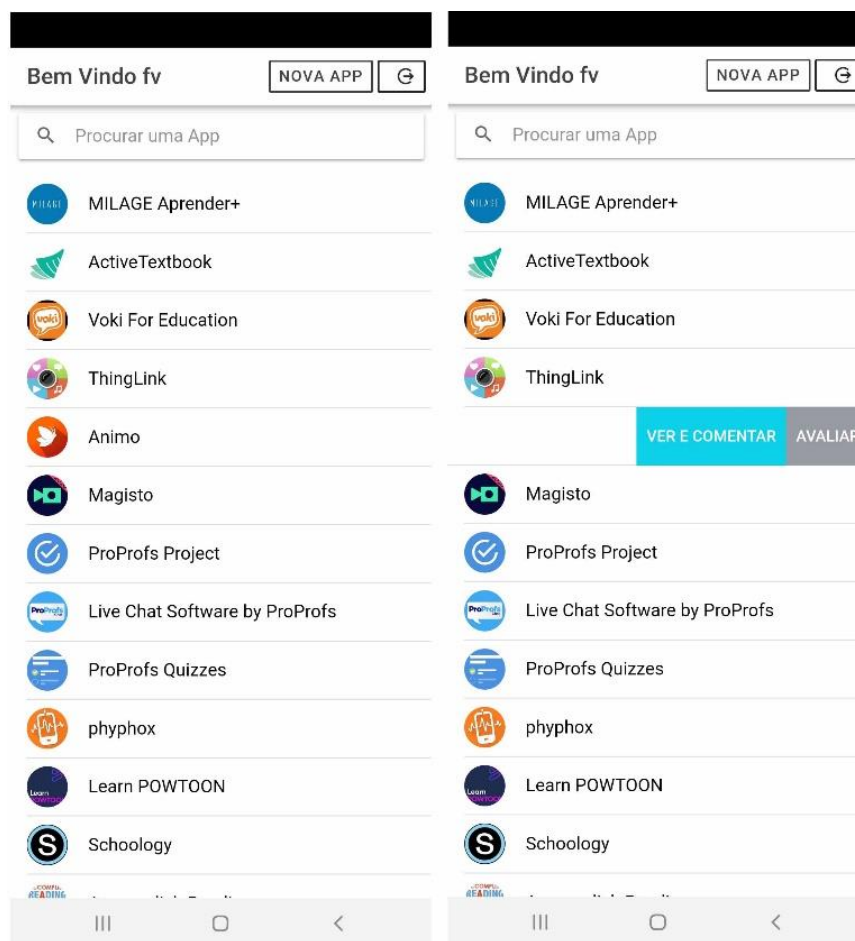


Figure 2 EDUAPP - screen with the List of Apps

In the upper right corner, there are two buttons, one - new app - that allows the user to suggest a new app so that, after being analysed and tested, it can be introduced in the repertoire, and the other - logout - to exit the application.

View and review an app

This page shows the details of an app with the name, the number of reviews, the logo, a brief description of the app, the tags - set of characteristics that allow its classification -, a summary graph of the evaluations (Total, Pedagogical, Intrinsic Quality and Motivation), user comments and a field to add a comment.

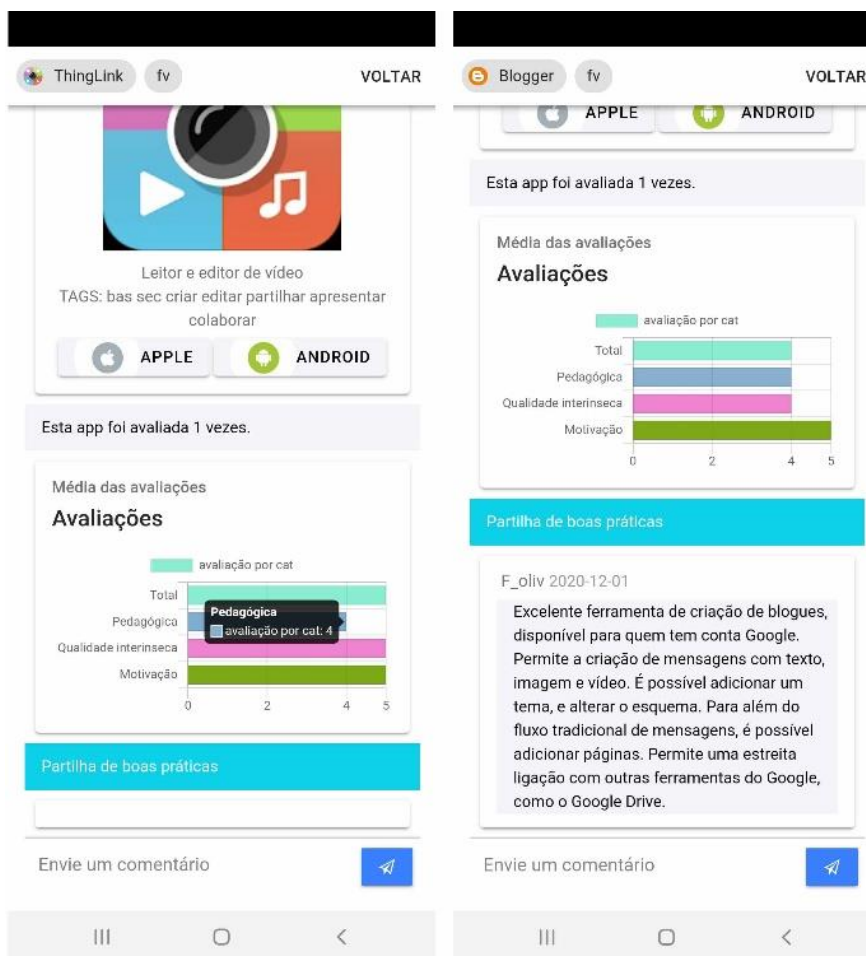


Figure 3 EDUAPP - Detail screen commenting on an app

It should also be emphasized that the APPLE and ANDROID buttons will only be visible if that application is available on the Apple store and on the Google playstore. If the app is only available in one of them, only one button will appear. By clicking on one of the buttons (depending on the smartphone's operating system) to install the app, a search for the name of the app is launched at the istore or the playstore, which leads directly to its most updated version. This method is considered to be the most effective, since the speed with which new equipment appears implies a constant update of mobile applications so that they remain functional, regardless of the version of the operating system and / or smartphone.

Rate an app

The evaluation model used at EDUAPP, the result of a previous investigation, is divided into three categories: (i) pedagogical, (ii) intrinsic quality and (iii) student motivation (Veiga & Andrade, 2020).

This module enables users to rate an app. As shown in figure 4, the list of 21 questions related to the evaluation of an app is presented in the pedagogical, intrinsic quality and motivation dimensions, and

the user can score each item from one to five. When submitting, the number of ratings is updated as well as a graph with the summary for each of the apps.

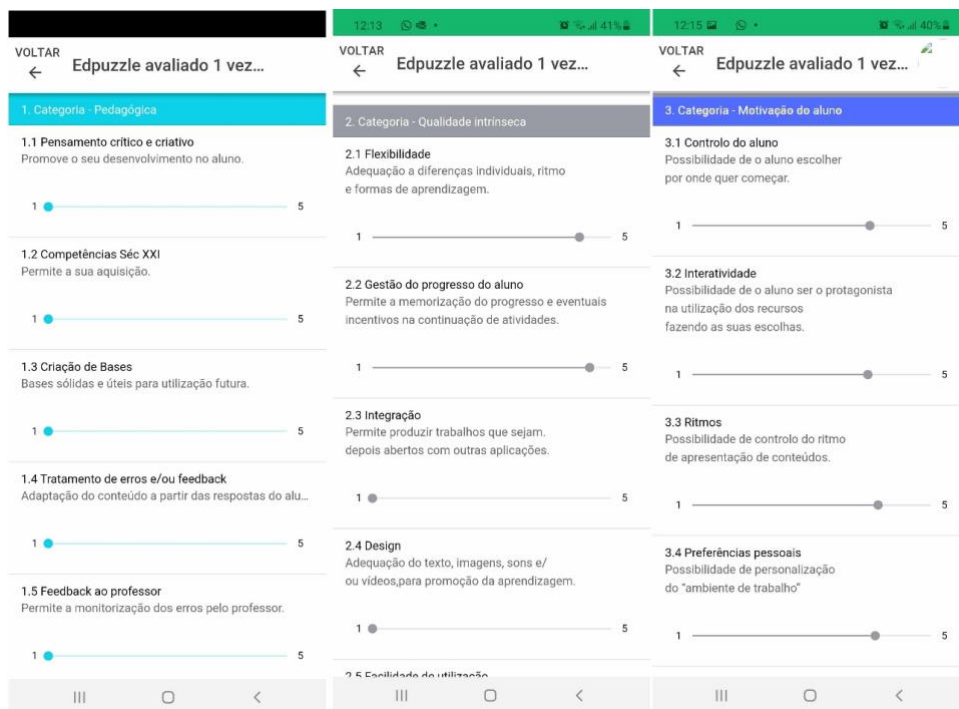


Figure 3 EDUAPP – App evaluation screen

Add / Edit an App

This module is only available to the administrator so that new applications can be added and each of the apps in the repertoire can be edited.

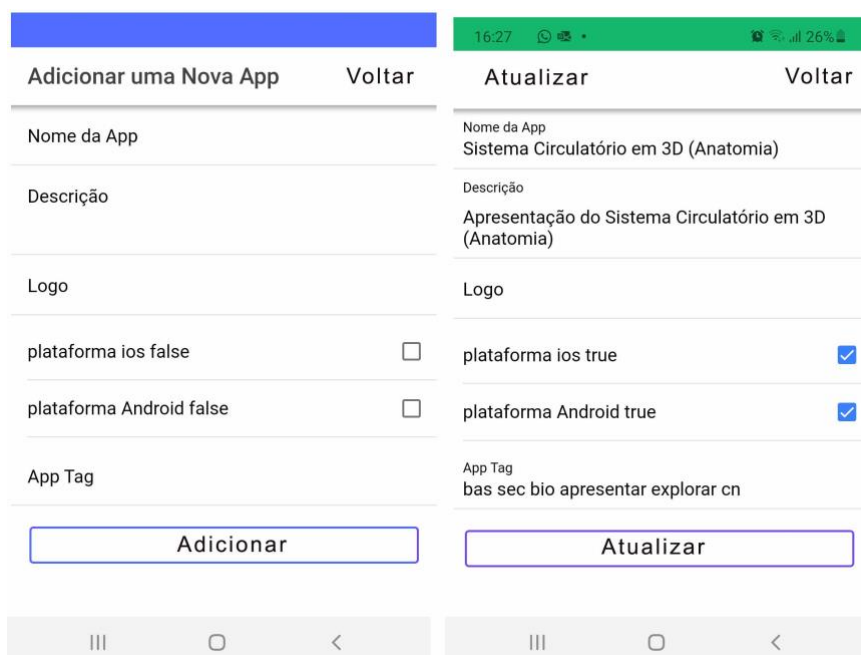


Figure 4 EDUAPP – Add and update an app screen

Results analysis

In a first stage, EDUAPP was made available along with a tutorial, in November 2020, via email, to the 116 teachers at Almeida Garrett Secondary School (ESAG), since, due to the pandemic situation we were experiencing, we were unable to invite the teachers for a live presentation of the project at school. Subsequently, two sessions were scheduled via "Teams", at the beginning of the second term, to present the project, the app and its characteristics and potential.

The repertoire contained 137 apps at the time of its distribution, some of which were already known and used; for the remainder, "Top Tools for Learning 2020" was used, which annually provides the result of a questionnaire on the most used teaching tools, checking whether there was an app for each of these tools (<https://www.toptools4learning.com/>).

In the first two months of use, 41 teachers were registered, 207 evaluations were carried out and 46 new apps were added. Graph 1 represents the number of evaluations carried out in the different apps in the repertoire, and it can be seen that 45 apps have not yet obtained any evaluation, 92 one evaluation and the remaining two or more evaluations.

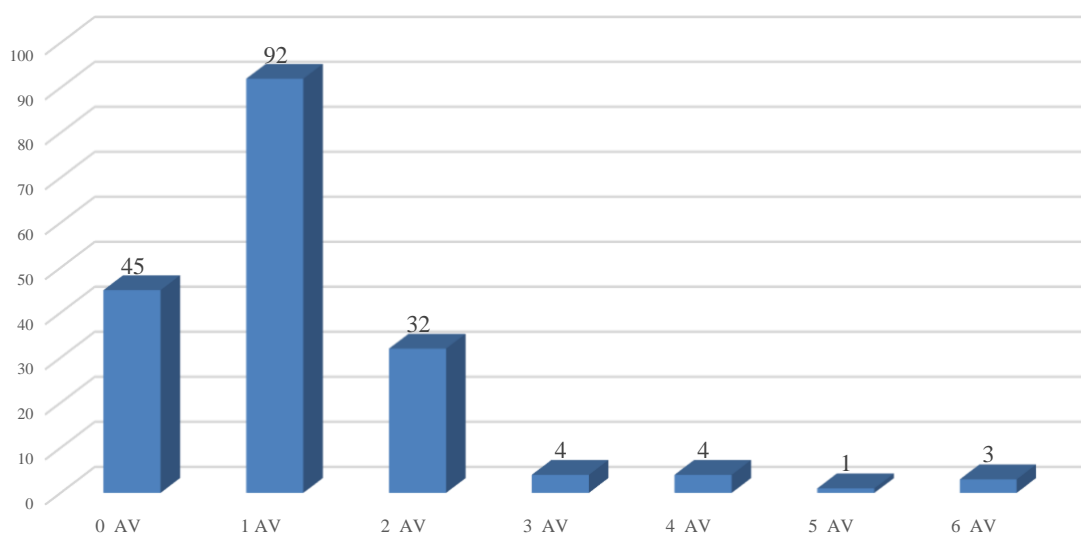


Chart 1 Distribution of app ratings

The apps most rated by teachers can be organized into three major groups: the group which allows students to be assessed through questionnaires, the one containing the presentation of a content / material repository and communication with students, and the one including elaboration and presentation of tasks (graph 2). "Kahoot" and "Mentimeter" stand out for evaluation, with partial characteristics of LMS, or just communication, "Google Classroom", "Microsoft Teams", "Edmodo" and "Zoom", which, in addition to providing content, such as "NASA", allow, in some cases, the evaluation of students, and "Ted", "Padlet" and "Canva", for the creation and presentation of work.

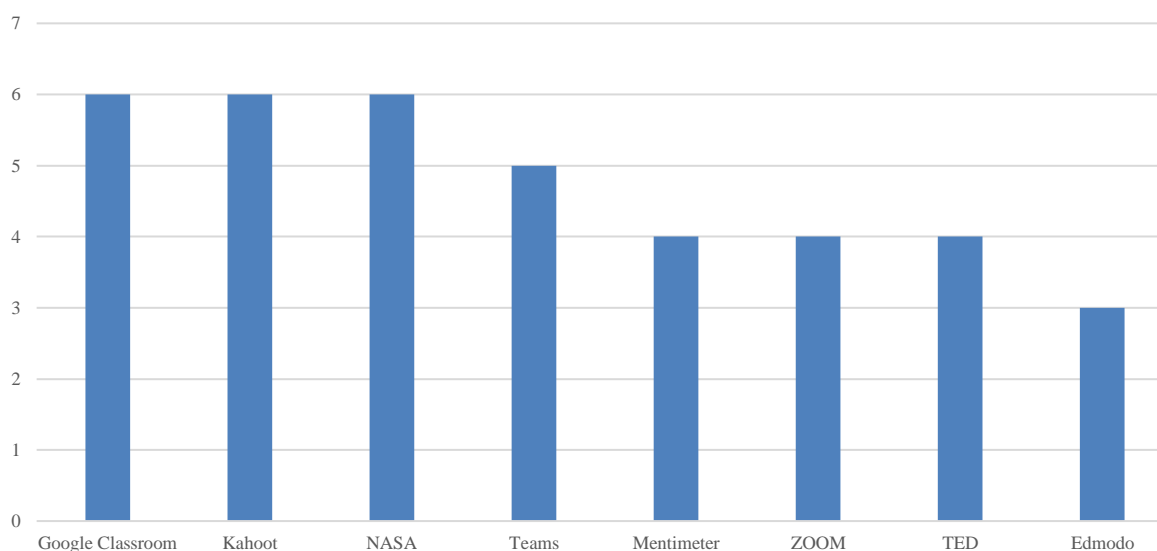


Chart 2 Apps with more ratings

EDUAPP also offers the possibility for a teacher to suggest an app to be included in the repertoire, with 42 new apps being suggested and introduced in the first two months of use. If most of them provided content for students to have access to data or information to carry out their tasks or study, others were for a more specific job in terms of activities in the classroom, requiring skills from the teacher for its implementation in class. In this context, the highlight is in “Milagre Aprender +”, a tool to support students in the autonomous resolution of worksheets and teachers in the management of their time in the classroom, and in “Nearpod”, which allows the creation of interactive sheets with videos, texts and images.

Conclusions

The use of smartphones inside and outside the classroom is now a reality at ESAG. In this academic year 2020/2021, institutional emails were created for all students and teachers through the protocol established with Microsoft, thus making available to the school community the different Office 365 applications, including Microsoft Outlook, Microsoft Teams, Microsoft Forms, Microsoft Classnotebook, Microsoft Onenote, Microsoft Word, Microsoft Excel and Microsoft PowerPoint. Most teachers used “Microsoft Teams” in their classes throughout the schoolyear, taking advantage of it, either to develop a questionnaire or a task, or to communicate and transmit classes to students who were confined at home. The evaluations carried out so far lead to conclude that, in addition to Microsoft Teams, teachers like and use other platforms such as Edmodo, Zoom or Google Classroom. The apps with an immediate interaction were the most used, because a questionnaire allowing to evaluate, in real time, if a certain content is being understood by the students enables the teacher to organize the next lessons and better guide the students to overcome any difficulties. It could be noticed, with satisfaction,

that a group of teachers uses these tools and expresses, through shy comments, the need for more free features in some apps.

The different evaluations of the apps made by the teachers permitted to witness their pedagogical value as well as their attributes of quality and the motivation of the students by using them. It is emphasized the importance of teachers' training for their update and the presentation of new educational apps, which should combine pedagogy with the use of technology in the classroom. The suggestion of new apps reveals that some teachers already know and use them in their teaching activities as a complement to textbooks and / or worksheets.

This is a continuous process of learning and discovery that promotes creativity, fosters collaboration and develops new skills in teachers and students in the search of a greater and more appropriate contribution to the improvement of teaching and, consequently, of learning.

Bibliographic references

- Castro, C. G. de S. (2014). *A utilização de recursos educativos digitais no processo de ensinar e aprender: práticas dos professores e perspectivas dos especialistas*. Retrieved from <http://repositorio.ucp.pt/handle/10400.14/15830>
- Eduardo, S., & Ardila, G. (2013). Context-Aware and Adaptive Mobile.
- El-Sofany, H. F., El-Seoud, S. A., Alwadani, H. M., & Alwadani, A. E. (2014). Development of mobile educational services application to improve educational outcomes using android technology. *International Journal of Interactive Mobile Technologies*, 8(2), 4–9. <https://doi.org/10.3991/ijim.v8i2.3509>
- Gonçalves, A. J. B. dos S. (2018). Contributos dos recursos educativos digitais para promover a aprendizagem interdisciplinar: um estudo com o recurso digital La Vouivre no ensino básico, 593. Retrieved from <http://hdl.handle.net/1822/55786>
- KORAL GÜMÜŞOĞLU, E. (2017). Measuring Technology Acceptance Level of Teachers by Using Unified Theory of Acceptance and Use of Technology. *International Journal of Languages' Education*, 1(Volume 5 Issue 4), 378–394. <https://doi.org/10.18298/ijlet.2239>
- Oca, A., Suero, G., Herrera, J., & Villalba, K. (2014). Propuesta Para El Diseño Y Desarrollo De Aplicaciones M-Learning: Caso, Apps De Historia Del Perú Como Objetos De Aprendizaje Moviles. *Nuevas Ideas En Informática Educativa TISE*, 873–878.
- Poláková, P., & Klímová, B. (2019). Mobile technology and generation Z in the English language classroom – A preliminary study. *Education Sciences*, 9(3). <https://doi.org/10.3390/educsci9030203>
- Rojas, F. N., Valderrama, M. T. P. J., Lancheros-Cuesta, D. J., & Ardila, S. E. G. (2020). Development of a mobile application: Optimization problems for differential calculus. *Iberian Conference on Information Systems and Technologies, CISTI, 2020-June(June)*, 24–27. Retrieved from

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-85089018633&doi=10.23919%2FCISTI49556.2020.9140868&partnerID=40&md5=8f91be78c2a1117f40e1e958061115d8>

Veiga, F., & Andrade, A. (2020). Evaluation of apps used in an educational context. *Iberian Conference on Information Systems and Technologies, CISTI, 2020-June(June), 24–27.*

<https://doi.org/10.23919/CISTI49556.2020.9140964>