Impact of Mobile Applications Utilized In the Education of Accounting and Auditing At the Central University of Ecuador

Patricia JIMBO SANTANA*, Mónica JIMBO SANTANA**

*Central University of Ecuador. Ecuador Faculty of Administrative Sciences
**Central University of Ecuador. Ecuador Faculty of Administrative Sciences

---

ABSTRACT: *For efficient management in organizations in the administrative area, auditing and accounting regulations are key factors. For this reason, it is essential that the knowledge acquired by students in these areas be firm, and therefore new approaches and forms that new information and communication technologies provide us, especially the use of devices that allow ubiquitous access to information, must be considered in the teaching and learning process. It is important to consider mobile applications as didactic tools in the teaching-learning process.In this work, the different mobile applications that have been used and that can be used in the subjects of accounting and auditing are studied, as well as the analysis of Smartphones as tools to be used in the teaching-learning process. The study carried out is quantitative, descriptive and exploratory. The population is the eighth, ninth and tenth semester students enrolled in the 2019-2020 semester of the accounting and auditing cart of the Faculty of Administrative Sciences of the Central University of Ecuador. The data was analyzed with multivariate techniques. The results obtained allow us to affirm that mobile applications have a significant influence on the teaching-learning process, allowing the student to have an active role, using a personalized learning environment in order to consolidate their knowledge in specialization subjects such as accounting and auditing.*

KEYWORDS: *Mobile Applications; Accounting; Auditing; Teaching-Learning; Education*

I. INTRODUCTION

The increasing popularity of mobile technology (phones and tablets) and the access to an almost unlimited internet connection from wherever we can enjoy today, have enabled the emergence of a new approach to e-learning (learning through internet) known as m-learning or mobile learning. Mobile learning allows a more personalized learning in any situation, taking advantage of the different learning contexts that our daily lives offers us (Rashidet al., 2017). Although mobile devices and apps (applications for mobile devices) have technological features that can improve the teaching and learning processes (portability, mobility, immediacy, interactivity and self-organization), their true potential lies in the pedagogical design.

Using m- learning in education represents several advantages, the same that should be exploited by teachers, among these we can cite as one of the main the learning that can be carried at any time and place (ubiquitous), you can interact synchronously and asynchronously. The previous characteristics empower student-centered learning (Cacheiro et al., 2016), allow personalization of learning (LerisandSein-Echaluce, 2011), favor communication between the student and educational institutions (Del Vastoand Marcela, 2015), collaborative learning is achieved (Coto et al., 2016), allows an immediate evaluation of educational content, productive use of time is made in the classroom, which contributes to improving continuous training, formal and informal tasks are linked in learning, supports students with disabilities (Herrera et al., 2013), one of the main factors is that mobile technology allows the use of tools that improve la digital inclusion of people with disabilities (Sanromá et al., 2017).

In higher education, according to (Rodriguez et al., 2017) students use smartphones for academic purposes, however their ability to use them in academic activities is limited, because they have not been taught to use them as they learn.

On the other hand, accounting information has made the quality of information a benchmark, this is why it is important to consider problem-based learning (AraujoandSastre, 2018). In the accounting area, the evolution of the ICT (information and communication technologies), and the development of accounting information have been following parallel paths. The new General Accounting Plan approved in 2007, based on International Accounting and Financial Information Standards (IAS/IFIS), leads to a systemic application of legislation with technology. By following the accounting principles, it ensures the reliability of the information and it then constitutes in an instrument that allows the information to flow so that the decisions made are better, therefore the objectives of accounting principles are met (Anshari et al., 2017).

In the case of the audit we cannot talk about it without the ICT, however the learning is mainly based on the software utilized for the development of the audit and not on Apps that allow us to guide the development of an audit or cases are presented for knowledge (Gallego et al., 2016).

Aside from the teachers' lack of knowledge about the Apps that can be used in the teaching-learning process, it is important to indicate that according to what (Norouzizadeh et al., 2016) mentions, one of the drawbacks to using a smartphone as a tool for the teaching-learning process, is the lack of well-defined rules that allow its use in the classroom.

Section 2 of this article analyzes mobile applications, emphasizing in the accounting and auditing areas. Section 3 indicates how the data was collected, materials and methods used. Section 4 presents the results obtained. Finally, section 5 indicates the conclusions and future work.

II. MOBILE APPLICATIONS

Mobile applications are understood as those programs that run on mobile devices, tables, and are generally distributed in stores such as "iTunes store" (Para iPhone y iPad), "Google play" (para Android). Among its features we have that these must be downloaded and installed on the device before being used. It is important to differentiate between mobile applications and mobile websites; the latter can be accessed through the mobile device using the internet and a browser (Vittoneand Cuello 2013). According to (Santamaríaand Hernández 2015) there is no consensus regarding the terminology to describe them; therefore, it is proposed to use the term "App" to refer to applications specifically for mobile phones.

According to figures from the consulting firm International Data Corporation (IDC), of the smartphones marketed in 2019, 87% had the Google operating system, while the remaining 12% had Apple, which means that the platforms that have grown the most are Android (Samsung), and iOS (Apple), the remaining 2% is found on other platforms such as Windows Phone, Blackberry, Symbian, Firefox O.S, Ubuntu Touch. Each of these platforms has a particular development infrastructure. One of the main challenges for application providers is to offer solutions for all platforms, however, building cross-platforms applications aims to maintain the same code base for different platforms. In this way the effort and cost of development is significantly reduced.

The educational contents developed to be distributed or used through mobile devices have certain restrictions that correspond to limitations of the interfaces and functionality of said devices (Chiappe 2016). For the design of mobile applications, one must take into account the restrictions that may be presented due to the size of the screen, the layout and size of keyboards, the ability to reproduce audio and video, the size and weight of the device, among others. It is important that mobile applications consider in their design, that the information components to be displayed on small screens, must be taken into account in educational applications. (Sanromá et al., 2017)(GarcíaandCabero 2017).

Below are three approaches to mobile application development: a native approach and two multiplatform approaches (web and hybrid).

Native APPS: Are the ones developed specifically for an operating system, among its benefits are that they take advantage of the device's functionalities and that they can work without an Internet connection (Fortunatoand Bernardino 2018). These apps are present in the Apple Store and Google Play, so, in terms of marketing, they gain visibility. However, one of the main problems they present is that they only work for that operating system, which leads to a high cost in their development and maintenance.

*Web APPS:*This type of application adapts to any operating system, as well as the mobile browser. Its development has a lower cost, however, among its disadvantages it is found that they need an internet connection, and they are not published on any platform for distribution (Sheppard 2017).

Hybrid APPS: They are in charge of combining native applications and web applications, thus allowing adaptation to any operating system, as well as to the functionalities of the device (Hu et al., 2019) (Palomba et al., 2019).

According to what several authors indicate (Vu et al., 2015) (Villarroel et al., 2016)(Ali 2016), Table 1 shows a comparative matrix between the different types of APPS.

Table 1: Features of Mobile Applications

	Native Apps	*Web Apps*	*Hybrid Apps*
Use of the hardware and software resources of the device	√		√
Multiplatform	√		√
They can be free for the end user		√	√
They have a cost for the end user	√		
They are published in stores for distribution	√		√
They need internet execution		√	

It is important to keep in mind that the stores that distribute the applications bring together users who have the same operating system (Chiles 2014). The online software distribution platforms can be free and paid, among them we can mention the following:

- *Google Play*: Property of Google Inc, it is specific for devices with Android operating system.
- *App Store*: Developed by Apple, it is used in smartphones with iPhone OS (iOS) operating system.
- *Windows Phone Store*: Used by Microsoft for distribution of applications for devices which use Windows Phone (WP) operating system.
- *BlackBerry World*: Developed by BlackBerry Limited, specifically for its devices.
- *Amazon Appstore*: It is an application store for the Android operating system operated by Amazon.com
- *Aptoide*: It is a market of applications that work with the Android operating system, the difference with google play is that each user can run his own store.
- *Uptodown*: It is a portal to download mobile applications for Android

Mobile App Categories

In the state of the art there are several categories in which the apps are found (Zhao and Balagué 2015). Among these we can mention the mobile applications that can be "entertainment", the same that are responsible for providing fun to the user. Within these we have for example, Candy Crush.

Within this classification we can also find the "social applications" that are in charge of interrelating people and are the most widely used, for example Facebook, Twitter, Instagram.

Other types of applications that are used to carry out certain activities such as Evernote.

Educational Applications

Finally, we can mention the educational or learning applications, it is here where our research is focused, they are characterized because they transmit knowledge improving the teaching-learning process. Our life cannot be conceived without technology, that is why it is necessary to propose new learning routs attached to today's society (Villalonga and Marta-Lazo 2015).

Mobile applications will also differ depending on the learning that the student can obtain, so we can have those that allow us to:

- Know concepts and terminology;
- Apply concepts, tools and methods learned in problem solving.
- Collaborate, allowing to build knowledge

2.1. Accounting

In the classroom, in order for the student to consolidate certain accounting knowledge, we can use various mobile applications that assist the student during the teaching process. The use of these mobile accounting applications aims to provide resources and tools for each of the accounting activities that can be carried out both at the personal and business level. However, it is important to consider that a set of factors must be taken into account for the selection of those that can be used in the classroom. Among these characteristics we can mention the language, the distribution license, the user interface, the processing speed, the function library, whether or not they can work with collaborative teams, among others.

In Figure 1 you can see several mobile applications, which can be used in the accounting area.
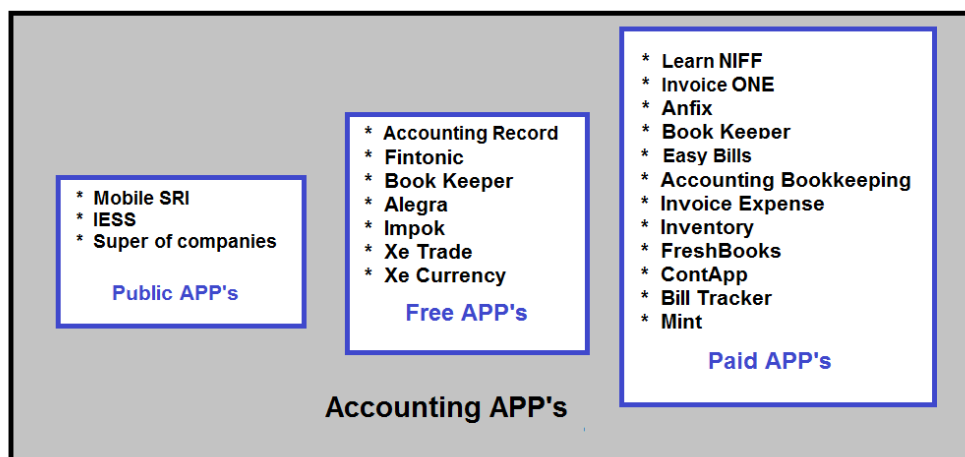
Figure 1: Mobile applications in the accounting area

There is a part of paid apps that have free versions with limited functions, for example Mint and Anfix. In their paid versions they enable all the functions.

2.2. *Audit*

For auditing applications are more restricted, most of them are paid versions, they allow their installation for a limited test time, among them we can mention:

- *IAuditor – IAuditoria*: It is possible to manage clients, inspections, reports, it has a limited version that is free.
- *Audit App*: Allows you to create your own forms, regardless of the type of audit, it is a paid version
- *AuditX*: Exclusively to document financial audits based on NIA
- *ISOTools*: Optimizes the management of the internal audit, becoming a guide for the process, it doesn't have a free version.
- *Audits.io*: It allows audits, regardless of the type of device, it doesn't have free versions.
- *Asset Panda*: Basically, it is an asset tracking platform, it doesn't have any free version.
- *QMA Audits*: It allows to carry out internal audits, and to execute a final report. It has a free version, one of which has had the greatest number of downloads, the ISO 9001 internal audit app.
- *Nimonik Audit*: Used to carry out specific internal audits or control operations, it doesn't have free versions.
- *Checklist ISOTools:* It is considered and app for diagnosing organizations, where the activities to be evaluated are registered and controlled, and the reports and results are consulted. Its version is paid.
- *Snag – Audit & Report*: Allows audits to be carried out, and their respective reports, doesn't have a free version.
- *IFS Audit Manager:* Guides the auditor in the audit process, considering international standards, doesn't have free versions.

III. MATERIALS, METHODS AND DATA

The research carried out is of a quantitative, descriptive, and exploratory type; it is not considered experimental. The data was obtained through surveys carried out to students from the accounting and auditing programs of the eighth, ninth and tenth semesters enrolled in the period of September 2019 – February 2020, from the Faculty of Administrative Sciences of Central University of Ecuador.

The variables used are quantitative or numerical and qualitative or categorical variables.

A 95% reliability level was used, a maximum allowable error of 5,2%, P and Q were assigned the value of 50%.

At the Faculty of Administrative Sciences of the Central University of Ecuador, in the 2019 – 2020 semester in the Accounting and Auditing Program, the face-to-face modality has 1585 students, of whom 435 are between the eighth, ninth and tenth semesters. They were considered as the population in this investigation. A Google Drive survey was applied as an evaluation instrument to a sample of 378 students. It is important to indicate that this population was chosen because they have already taken specific subjects in their majors and could give a more accurate criterion on their experience in the use of mobile applications in their teaching-learning process. The survey was applied to students, 140 men and 238 women between 23 and 29 years old. The questionnaire that was developed was based on the elements of Table 2.

Table 2: Elements considered when collecting information

m-learning	Smartphones
	Operating systems
	Information and communication technologies
	Mobile applications
	Accounting information
	Auditing
Teaching-Learning	Teaching-learning process

A Cronbach of 8,97 was obtained

IV. RESULTS

Figure 2 shows the main results of the questions in the survey, which refer to the characteristics of the smartphones used.
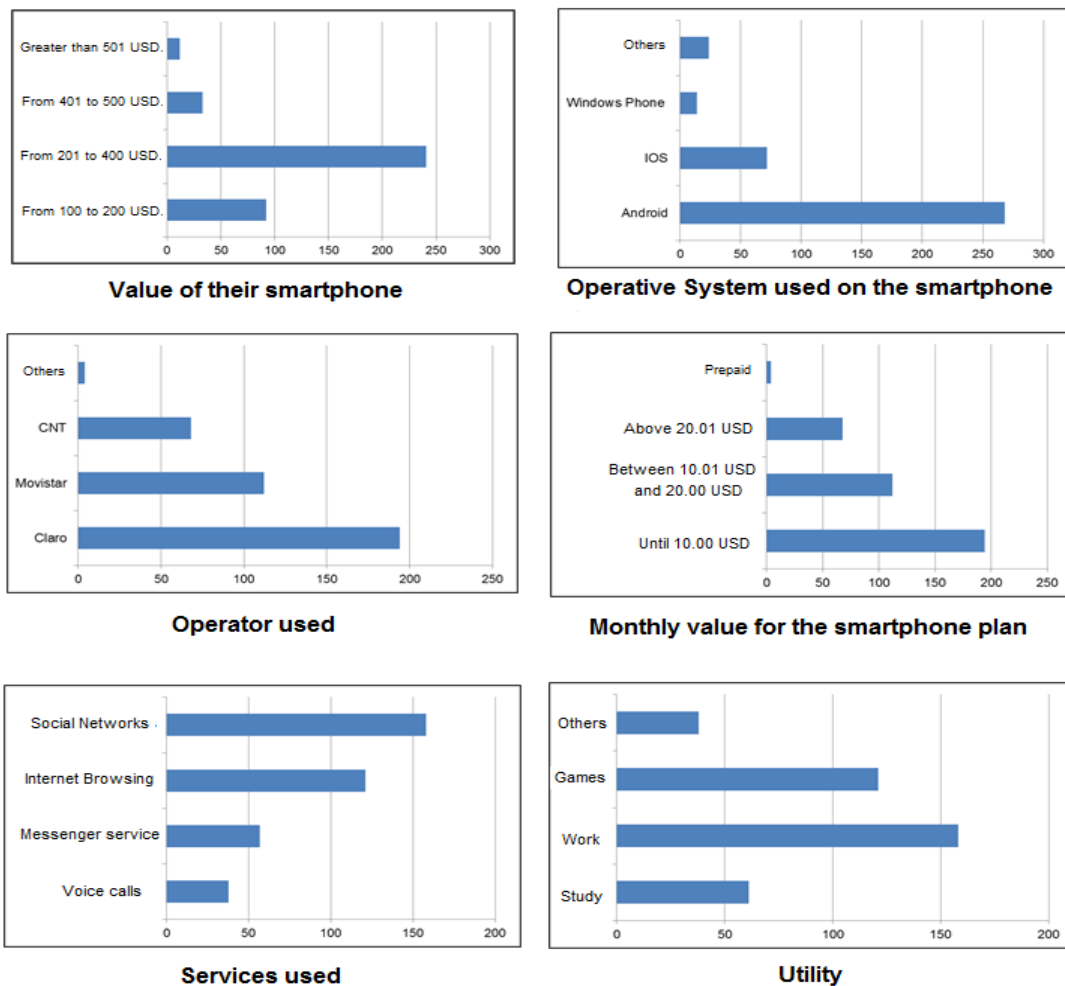

Figure 2: Smartphones features

Figure 2 shows that students in a large percentage have smartphones with a plan, however it is mostly used on social networks, paying little attention to its use in learning.

Figure 3 presents the results of the questions, which refer to the knowledge that students have about the apps, as well as those that are used in the teaching-learning process.
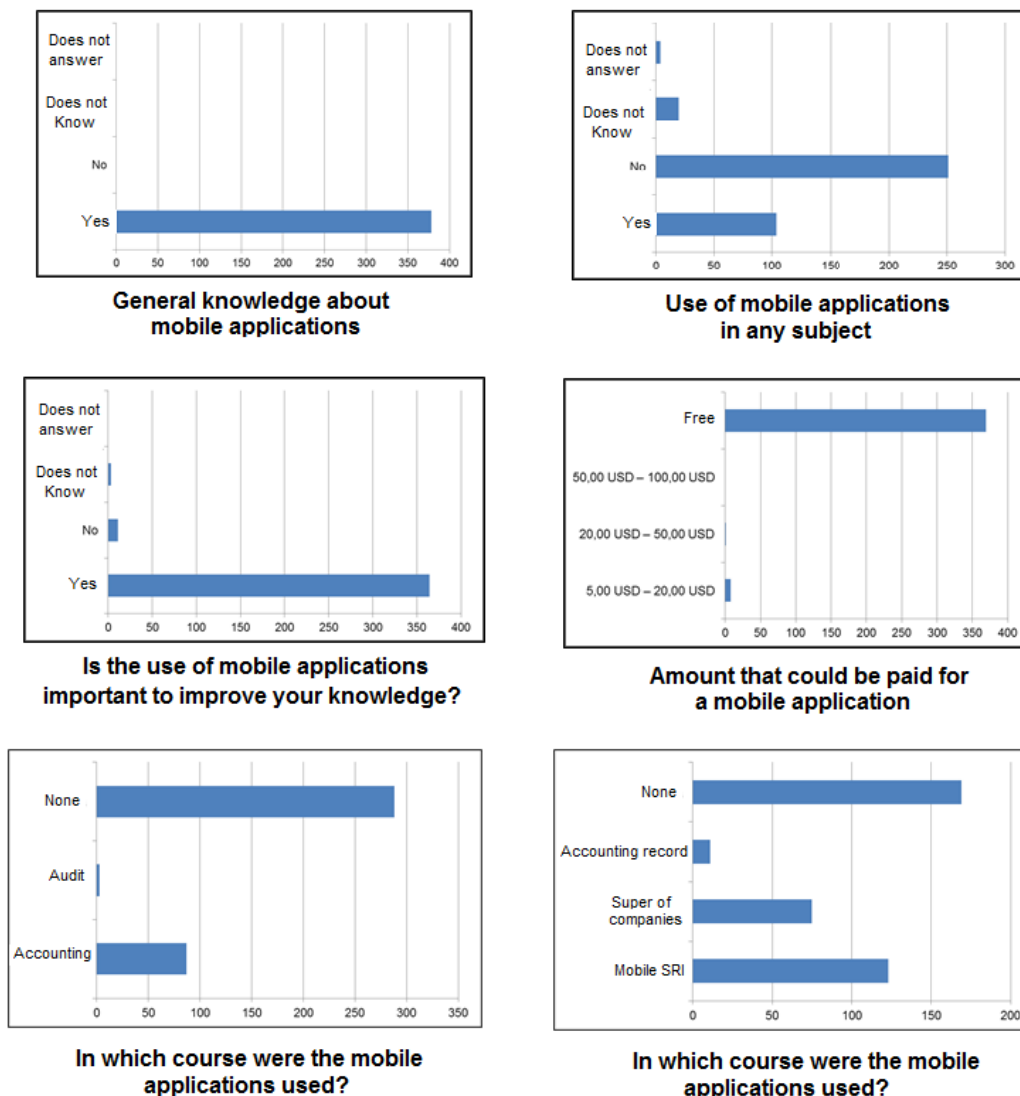
Figure 3: m-learning considering mobile applications in m-learning

As can be seen in Figure 3, students consider the use of a mobile application to be important in their learning process, however very few are known, basically the one that has been used is the mobile SRI.

V. CONCLUSIONS AND FUTURE WORK

Taking advantage of the popularity of mobile devices among students, will allow educational apps to significantly influence the teaching-learning process, giving the student an active role, using a personalized learning environment, adapted to each of them, characterized by self-directed learning.

Using smart devices and wireless internet (Wi-Fi) will allow students in the medium-term to optimize the management of their work time and increase their productivity in their field. This is the main reason for teachers to incorporate the apps, as didactic material in the teaching of accounting and auditing subjects that are considered as a basis in the formation of the accounting and auditing career.

It is important that, in higher education institutions, that licenses for mobile applications are acquired for certain periods, so that students, without making any payments, can use the applications with all their functionalities. This will allow students to know all the benefits of mobile applications, improve their knowledge, and build loyalty with the tool, so that they will be able to use the paid versions in future activities. Another limitation is the language, especially because those applications that have more extensive databases are in English, not all of them allow the change of language, which should also be taken into account.

For future work, after using mobile applications in different courses, evaluations of the teaching-learning process should be considered and the use in the student's professional fields should be analyzed.

BIBLIOGRAPHIC REFERENCES

[1]. Ali A., (2016) Mining and characterizing hybrid apps. *Proceedings of the International Workshop on App Market Analytics* (WAMA).ACM. 50–56

[2]. Anshari M., Almunawar M., Shahrill M., (2017). Smartphones usage in the classrooms: Learning aid or interference?. EducInfTechnol 22, 3063–3079. https://doi.org/10.1007/s10639-017-9572-7

[3]. Araujo U., Sastre G., (2018). El aprendizaje basado en problemas. https://books.google.es/books?id=fJecCwAAQBAJ

[4]. Cacheiro M., Sánchez C., y González J. (2016). Recursos Tecnológicos en contextos educativos. *Uned*Recuperado de: https://books.google.com.ec/books?id=kj-ZCwAAQBAJ

[5]. Chiappe A., (2016). Tendencias sobre Contenidos Educativos Digitales en América Latina. 10.13140/RG.2.1.4743.9604.

[6]. Chiles A., (2014). Aplicaciones: Todo lo que usted necesita sabe. https://books.google.com.ec/books?id=uEwRBAAAQBAJ

[7]. Coto, M., Collazos, C. A., y Mora Rivera, S., (2016). Modelo Colaborativo y Ubicuo para apoyar los procesos de enseñanza-aprendizaje a nivel Iberoamericano. Educación a Distancia, (48). Recuperado a partir de https://revistas.um.es/red/article/view/253521 (Consultado el 05/12/2019)

[8]. Del Vasto H., y Marcela P.,(2015). Influencia de las tecnologías de información y comunicación (TIC) en el proceso enseñanza-aprendizaje: una mejora de las competencias digitales. *Revista Científica General José María Córdova*, 13(16), 121-132. https://doi.org/10.21830/19006586.34

[9]. Fortunato D., and Bernardino J., (2018). Progressive web apps: An alternative to the native mobile Apps. *13th Iberian Conference on Information Systems and Technologies (CISTI)*, Caceres, 1-6, doi:10.23919/CISTI.2018.8399228

[10]. Gallego Cossio, L., Hernandez Aros, L., y Clavijo Bustos, N. (2016). Evaluación de herramientas tecnológicas de uso libre, aplicadas a procesos de auditoria. *Scientia et technica*, 21(3), 248-253. doi:http://dx.doi.org/10.22517/23447214.8997

[11]. García C., Cabero J., (2017). El diseño instruccional inverso para un recurso educativo abierto en la Formación Profesional española: El caso de Web Apps Project. *Education in the Knowledge Society [Internet]*. 2, 9-32. https://www.redalyc.org/articulo.oa?id=535554766002

[12]. Herrera S., SanzC. V., y Fénnema M., (2013). MADE-mlearn: un marco para el análisis, diseño y evaluación de experiencias de m-learning en el nivel de postgrado. *Revista Iberoamericana De Tecnología En Educación Y Educación En Tecnología*, (10), 7-15. Recuperado a partir de https://teyet-revista.info.unlp.edu.ar/TEyET/article/view/276 (Consultado el 11/11/2019)

[13]. Hu H., Wang S., Bezemer, C. *et al.* (2019), Studying the consistency of star ratings and reviews of popular free hybrid Android and iOS apps. *Empir Software Eng 24*, 7–32. https://doi.org/10.1007/s10664-018-9617-6

[14]. Lerís D., y Sein-Echaluce M.,(2011). La personalización del aprendizaje: un objetivo del paradigma educativo centrado en el aprendizaje. *Arbor*, 187, 123-134. https://doi.org/10.3989/arbor.2011.Extra-3n3135

[15]. Norouzizadeh F., Dehghantanha A.,Eterovic-Soric B., y Kim-Kwang R., (2016). Investigating Social Networking applications on smartphones detecting Facebook, Twitter, LinkedIn and Google+ artefacts on Android and iOS platforms. *Australian Journal of Forensic Sciences*, 48(4), 469-488. DOI: 10.1080/00450618.2015.1066854

[16]. Palomba F., Salza P., Ciurumelea A., Panichella S., Gall H., Ferrucci F., De Lucia A., (2017) Recommending and localizing change requests for mobile apps based on user reviews.*Proceedings of the 39th International Conference on Software Engineering (ICSE).IEEE Press,* Piscataway, 106–117

[17]. Rashid S., Cunningham U., y Watson K. (2017). Task-based language teaching with smartphones: A case study in Pakistan. Teachers and Curriculum [Internet]. 17(2), 33–40. Recuperado de: http://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-354216 (Consultado el 18/12/2019)

[18]. Rodríguez H., Restrepo L., y García G., (2017). Habilidades digitales y uso de teléfonos inteligentes (smartphones) en el aprendizaje en la educación superior. *Universidad Católica del Norte, 50, 126-142*. Recuperado de http://revistavirtual.ucn.edu.co/index.php/RevistaUCN/article/view/816/1334 (Consultado el 07/01/2020)

[19]. Santamaría P., y Hernández-Rincón E., (2015). Aplicaciones Médicas Móviles: definiciones, beneficios y riesgos. Salud Uninorte, 31(3),599-607. Recuperado de https://www.redalyc.org/articulo.oa?id=817/81745378016 (Consultado 24/01/2020)

[20]. Sanromá-Giménez M., Lázaro-Cantabrana J., y Gisbert-Cervera M.(2017). Tecnologiamóvel: Umaferramenta para melhorar a inclusão digital de pessoascom TEA. Psicología, *Conocimiento y Sociedad*, 7(2), 173-192. https://dx.doi.org/10.26864/pcs.v7.n2.10

[21]. Sheppard D., (2017). Introduction to Progressive Web Apps - Beginning Progressive Web App Development: Creating a Native App Experience on the Web, *Apress Berkeley*, CA, 978-1-842-3090-9, 3-10, https://doi.org/10.1007/978-1-4842-3090-9_1

[22]. Villalonga C., Marta-Lazo C., , (2015). Modelo De Integración Educomunicativa De 'Apps' Móviles Para La Enseñanza Y Aprendizaje, *Píxel-Bit. Revista de Medios y Educación*. 46, 137-153, doi: http://dx.doi.org/10.12795/pixelbit.2015.i46.09

[23]. Villarroel L., Bavota G., Russo B., Oliveto R., Di Penta M., (2016). Release planning of mobile apps based on user reviews. *Proceedings of the 38th International Conference on Software Engineering (ICSE).ACM*, 14–24

[24]. Vittone J., Cuello J., (2013). Diseñando apps para móviles, https://books.google.com.ec/books ?id=EZFtngEACAAJ 2013

[25]. Vu P., Nguyen T., Pham H., Nguyen T., (2015). Mining user opinions in mobile app reviews: A keyword-based approach. *30th IEEE/ACM International Conference on Automated Software Engineering (ASE)*, 749–759

[26]. Zhao Z., Balagué C., (2015). Designing branded mobile apps: Fundamentals and recommendations, Business Horizons, 58(3), 305 - 315, https://doi.org/10.1016/j.bushor.2015.01.004.