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Artículos científicos

Usabilidad de una app móvil para el aprendizaje y elaboración de estados financieros en México

Usability of a mobile app for learning and preparing financial statements in Mexico

Usabilidade de um aplicativo móvel para aprender e preparar demonstrações financeiras no México

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Resumen

El objetivo de esta investigación fue evaluar la usabilidad que tiene una aplicación móvil como herramienta para el aprendizaje y elaboración de estados financieros en México. Para el desarrollo de la *app* se aplicó la metodología establecida en la norma ISO 13407, mientras que para el diseño se empleó el método estructural basado en las Normas de Información Financiera (NIF) de la serie B2, B3, B4 y B6, para la correcta presentación y revelación de la información financiera. En la medición se aplicó un instrumento de evaluación —diseñado según la norma ISO 9241— a 100 docentes de diferentes instituciones públicas de nivel superior del área económico-administrativa. Los resultados muestran que 100 % de los participantes evaluaron la *app* con un nivel excelente de usabilidad para la enseñanza de los estados financieros debido a que genera información eficiente, eficaz y satisface los requerimientos exigibles por los interesados sobre la situación financiera, flujo de efectivo, movimientos de capital y desempeño financiero en un periodo determinado, lo cual resulta esencial para tomar decisiones efectivas sobre los recursos y para obtener rendimiento y beneficios económicos en la entidad.

Palabras claves: aprendizaje móvil, estados financieros, normas de información financiera, tecnologías de la información y comunicación, usabilidad.



Abstract

The objective of this research is to evaluate the usability of a mobile application as a tool for learning and preparing financial statements in Mexico. For the development of the app, the methodology established in the ISO 13407 standard was applied, and the structural method based on the Financial Information Standards (NIF's) of the B2, B3, B4 and B6 series was used in the design for the correct presentation and disclosure of financial information; in the measurement an evaluation instrument designed with respect to the ISO 9241 standard was applied to 100 teachers from different public institutions of higher level in the economic-administrative area, the results show that 100% of the participants evaluated the app with an excellent level of usability for the teaching of financial statements because it generates efficient and effective information and satisfies the requirements demanded by the interested parties about the financial situation, cash flow, capital movements and financial performance at a given date or period with a view to making effective decisions about resources in order to obtain performance and economic benefits in the entity.

Keywords: mobile learning, financial statements, financial reporting standards, information and communication technologies, usability.

Resumo

O objetivo desta pesquisa foi avaliar a usabilidade de um aplicativo móvel como ferramenta de aprendizagem e preparação de demonstrações financeiras no México. Para o desenvolvimento do aplicativo, foi aplicada a metodologia estabelecida na norma ISO 13407, enquanto para o projeto foi utilizado o método estrutural baseado nas Normas de Informação Financeira (NIF) das séries B2, B3, B4 e B6, para a correta apresentação e divulgação de informações financeiras. Na medição, um instrumento de avaliação - elaborado de acordo com a norma ISO 9241 - foi aplicado a 100 professores de diferentes instituições públicas de nível superior da área econômico-administrativa. Os resultados mostram que 100% dos participantes avaliaram o aplicativo com excelente nível de usabilidade para ensino de demonstrações financeiras, pois gera informações eficientes e eficazes e atende às necessidades dos interessados sobre a situação financeira, fluxo de caixa, movimentos de capitais e financeiros. desempenho em determinado período, essencial para a tomada de decisões eficazes sobre os recursos e para a obtenção de desempenho e benefícios econômicos na entidade.



Palavras-chave: aprendizagem móvel, demonstrações financeiras, padrões de informação financeira, tecnologias de informação e comunicação, usabilidade.

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Introduction

The transformations in the workplace have caused not only that students are in contact with technologies, but also that the exercises presented in the classroom adhere to reality, hence the teachers rely on simulators to improve the quality of teaching. education and training professionals who meet the needs and demands of the labor market. The foregoing is especially significant when preparing the financial information of economic entities, which must adhere to the provisions of the Financial Information Standards approved since 2006, which have undergone important changes.

This task is simple when you have knowledge and technological tools that facilitate its construction and determination; However, it is worth noting that some digital resources do not prioritize regulatory foundations, which is why the lack of adherence to regulations on the balance sheet, the statement of comprehensive income, the statement of cash flow and the statement of changes in Stockholders' equity, vital elements for making effective decisions. Due to this, a mobile app has been developed -based on the Financial Information Standards (NIF) in force in fiscal year 2019- to be used on different devices (such as electronic tablets, smartphones, laptops and PCs with Android emulators) with the purpose of presenting a functional tool in education and within the labor market.

This initiative arose due to the need for educational institutions to implement learning and knowledge technologies (TAC) as didactic tools to strengthen knowledge and simulate situations with attachment to reality. The purpose is to seek training, training and skills development, as well as the application of technical knowledge that efficiently and effectively solve business problems in different contexts through the use of immediate reach technologies such as the smartphone.

The influence of technologies in the classroom has been the guide to respond immediately to any question made by the teacher, although without taking into account the normative aspects or the support referenced from a reliable source. This has caused the teacher to continue to be the bearer of reliable knowledge to respond to the information provided by the student.

However, with the use of mobile applications in the educational field, meaningful learning environments can be created, where active interaction and experience are



translated into competencies that contribute to a comprehensive training of the professional.

The objective of this study, therefore, was to evaluate the level of usability of an app created for learning in the preparation of financial statements and as a tool to generate financial information from the operations or transactions carried out by economic entities for the purpose of profit in Mexico.

Theoretical framework

Rodríguez (2015) explains that m-learning is "a form of multimedia learning that allows learning anywhere and at any time, without the need to coincide in a specific space and time, through mobile devices" (p. 37). While Elkheir and Mutalib (2015) highlight that the use of mobile phones and tablets could encourage students to become interested in a topic and consequently to spend more time studying it (p. 440).

For Ally and Samaka (2016) m-learning is considered as "any type of learning that occurs when the student is not in a fixed and predetermined location; or learning that occurs when the student takes advantage of the opportunity offered by learning through mobile technologies" (p. 443). While Rodríguez and Coba (2017) estimate that "currently m-learning software developers have made applications of various topics available to educators so that they can be used as support in the learning process (inside or outside the classroom of classes)": (para. 10).

UNESCO (cited by Carreras, Gamallo, Díaz 2018) specifies "by adapting the appropriate resources for use on mobile devices, educators can greatly expand the reach of these resources, given that many more students and teachers own mobile devices than laptops. or desktop" (p. 998). Zamora (2019) points out that "the educational practices of M-Learning become significant as long as they have the permanent guidance of the teacher" (p. 34).

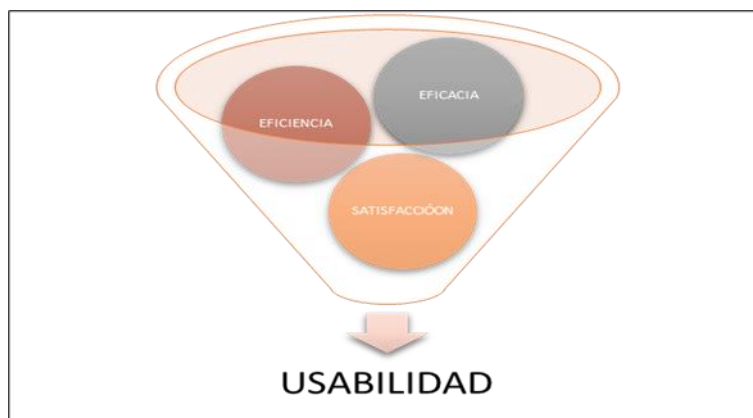
Haag and Berking (cited by Ramos, 2020) specify that mobile learning takes advantage of ubiquitous technology for the adoption or increase of knowledge, behaviors or skills through education, training or counseling.

Having noted the above, in this research we understand as m-learning the application of mobile technology (smartphones, smart TVs, tablets, laptops and PCs) in the development of knowledge, skills and abilities to generate its transmission from different places or times and to be used in face-to-face or virtual classes.

With the increase in new technologies and their implementation in different contexts, the education sector could not be left out of this transformation. Currently, students use their smart phone to solve situations that may arise in the classroom, from conducting research to performing calculations. In fact, some teachers in charge of teaching in the financial area look for tools that allow them to support students in the learning process and that facilitate the performance of financial activities that comply with legal specifications. For this reason, it is essential that the applications are accessible and comply with the descriptions of the ISO 25010 standard on usability, understood as the “ability of the software product to be understood, learned, used and be attractive to the user, when used under certain conditions ”((para. 1).

Usability is an anglicism that can be interpreted as ‘ease of use’, a meaning that is preferred to be avoided due to its vague and subjective connotations (Bevan, Kirakowski & Maissel, 1991). In a literature review, usability is defined as ease of learning, ease of memorization, effectiveness or number of mistakes made, efficiency or time spent to complete a task, operability and ease of understanding, and subjective attributes such as user satisfaction or attractive (Folmer and Bosch, 2004). Instead, ISO 9126 defines it as the ability of software to be not only understood, learned and used, but also attractive to the user, under specific conditions. For their part, ISO 9241 and 14598 (1998) define it as the degree to which a product can be used by specific users to achieve particular objectives with effectiveness, efficiency and satisfaction in a given context of use (figure 1) (Nielsen, 2003).

In short, and based on the literature, we can establish that usability is a process of interaction between the subject and the object to fulfill specific tasks or activities efficiently and effectively. In addition, usability has two dimensions: objective or inherent usability, which can be measured or evaluated by observation of the user while performing interaction tasks (effectiveness and efficiency), and subjective or apparent usability, related to questions for the user after completing their tasks. Tasks to determine your satisfaction with use, ease of use and knowledge acquired (Fu y Salvendy, 2002; Kurosu y Kashimura 1995).

Figura 1. Factores de usabilidad

Fuente: Elaboración propia

However, the main usability related issue in software development is that only the requirements are taken into account in the product, and the user's perspective (how they are going to use it) is ignored. This causes a learning curve or abandonment of interest towards the application (Cysneiros and Kusniruk, 2003; Hakiel, 1997; Singh, 2008; Tao, 2005), which is why it is important to clearly establish the procedures, objectives and goals of the functions and tasks to be carried out in order to obtain the expected results with the help of technological tools. In this way, useful information is generated for the user, who will realize the importance of using the app in practice and will create added value in meaningful learning. It is an approach to the development of systems where quantitative levels of usability are specified a priori, and the system is built to achieve these levels, which are known as metrics (Preece et al., 1994), considered as variables: effectiveness, efficiency and satisfaction of use (Frojkær, Hertzum and Hornbaek, 2000). Nielsen (2003) establishes five quality components to measure usability: Learnability, easy to learn (how easy is it for users to accomplish basic tasks the first time they come across the design?); Efficiency, efficiency (once the design has been learned, how quickly can the tasks be completed?); Memorability, memorability (when the user returns to the design after a period of not using it, how easily can the acquired skill be restored?); Errors, errors (how many errors can users make, how serious are those errors, and how easily can they recover from errors?); and Satisfaction, satisfaction (how pleasant is the use of the design?).

Florián, Solarte and Reyes (2010) establish that usability tests can be divided into three groups: analysis tests, when the user works on their own tasks using the system or prototype; inspection test, at this stage the specialist evaluates the tool; Inquiry tests, in this phase the needs are identified and the satisfaction of the need is evaluated. During the evaluation process, it is necessary to establish action guides that allow their analysis

through the information provided by the organization; Subsequently, the app is used by specialists in the financial area to know their perception of their employment. Finally, the results are evaluated and processed to know their appreciation and the level of usability with a view to making concrete and precise decisions about the purposes and goals that are pursued in relation to the structure of financial statements for organizations.

Method

The design of the intelligent application mentioned in this research was carried out taking into account the concepts issued by the financial information standards of series B, applicable to basic financial statements. In addition, all the elements necessary to improve the learning conditions for the determination and preparation of basic financial statements were considered. The applied methodology was based on the Financial Information Standards in force for 2019 in order to comply with a quality service for the correct presentation and disclosure of financial information.

Method description

In the development of the financial mobile application, the procedure reflected in the guide of the ISO 13407 standard was applied, which establishes the processes that must be fulfilled and the specific minimum requirements. The implementation began with the identification of the user's need. At this stage, the following objectives were set: knowledge of the elements, items, classes, and items of the statement of financial position; income, costs and expenses for the statement of comprehensive income; operating, financing and investment activities for the statement of cash flow and movements on the capital investment made by the partners or shareholders of the entity for the statement of changes in stockholders' equity.

The foundation was based on the normative theory contained in NIF A3, which establishes the needs of users on basic financial statements. The statement of financial position or statement of financial position or balance sheet indicates the need to know the own and other resources in relation to the existence of stockholders' equity. The comprehensive income statement establishes the need to know the operational and administrative efficiency of the entity. The cash flow statement requires knowing the movements of cash, and the statement of changes in stockholders' equity requires a sample of the investment movements in order to make effective decisions about the resources that comprise them.



Subsequently, the understanding and specification were carried out, important dimensions to understand the normative content of the NIF B2, B3, B4 and B6, as well as the foundation of the presentation and disclosure rules, provisions that regulate the form, order and place of each of the elements that make up the financial statements.

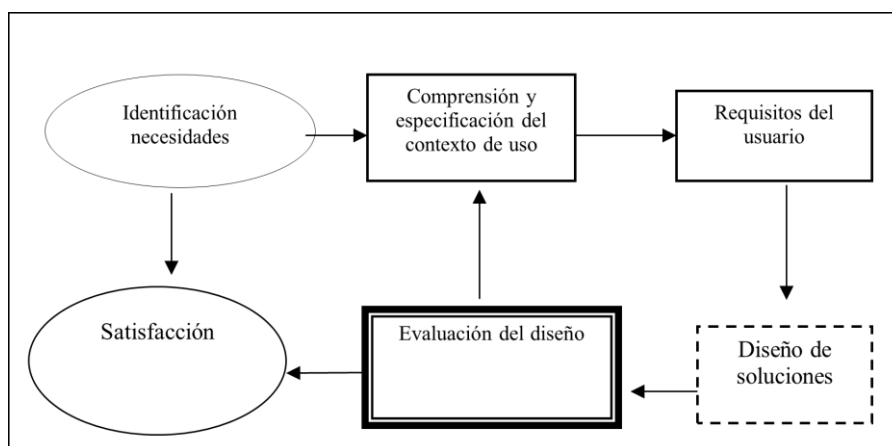
Next, the activities and tasks to be carried out in the structuring of the financial information were identified to design the app based on the structural method, applying the provisions contained in each of the FRS, attending this phase in the development process.

In the next stage, the purpose was set to exemplify the usefulness of the mobile application in financial practice, for which real data from an economic entity were considered.

The four financial statements were then prepared manually and compared with the data obtained by implementing the application.

Finally, the design was evaluated and compliance with regulations, the objective, response times and data processing were verified, as well as the results shown in order to verify user satisfaction (Figure 2).

Figura 2. Proceso de usabilidad



Fuente: Elaboración propia

For the evaluation of the usability of the app, the provisions of the ISO 9124 standard were applied, which establishes the independent variables to measure the usability of the mobile application and shows the constructs that should be considered in the development of the evaluation. Likewise, the objectives were identified and the results (effectiveness), the resources used (efficiency) and the results obtained (satisfaction and contextualization of use) were specified; Therefore, it was essential to consider its components and the relationships established between them.

For the measurement, usability was examined as a dependent variable, and efficiency, effectiveness and satisfaction as independent variables; In the evaluation instrument the global objective and secondary objectives were considered, as well as the criteria of user requirements; User characteristics were described (knowledge, skills, experience, education, training, physical attributes, and motor and sensory abilities); the tasks and attributes of the activities were described (frequency and duration); the characteristics of the material, exercises and documents associated with the application, such as the physical environment (workplace) and social environment (work procedure, organizational structure, individual attitudes); usability measures, a measure was assigned to each of the efficacy criteria (comparison between the global objective and the secondary objectives, with precision and achievement); efficiency (effectiveness-resources, physical and mental effort, time and costs), and satisfaction (discomfort, attitude).

The regulations suggest that the interpretation of the measures should not be considered for short periods, since it could not show errors about the particular facts; Therefore, it suggests measuring them in various contexts and real situations, which would generate better results in each of the independent variables that make up usability. In this way, the user achieves progress in the specific activities and tasks of the application context, improves the quality of the processes and generates greater organizational profitability (figure 3).

Figura 3. Descripción del método



Fuente: Elaboración propia

To meet the objective and verify the level of quality in usability, the study was carried out during the period from January to March 2019. An evaluation instrument was applied based on the ISO 9124 quality standard (effectiveness, efficiency, satisfaction), with a Cronbach's alpha of .92, made up of 24 items that offered five options on a Likert-type scale: 1 excellent, 2 good, 3 fair, 4 poor, 5 poor.

100 teachers from different public institutions of higher level of the economic-administrative area participated. The criteria to participate in the study were the following: have a professional degree in Accounting, teach the subject of basic accounting in the last three years and work experience in the management and structure of financial statements.

The validation and evaluation of the application (carried out in five phases) was carried out with the participation of experts in the financial area of a financial institution in the municipality of Ecatepec de Morelos in the State of Mexico.

Procedure for obtaining data

The method used in the operationalization was divided into five phases:

First phase

A pilot test was carried out with five professors from the financial area to show them the app and the questionnaire, which is made up of 24 items. They pointed out that the questions did not present difficulties for understanding, so they were applied.

Second Phase

Subsequently, 100 teachers from different public institutions of higher level of the economic-administrative area were gathered, who were divided into groups made up of 10 participants and a time of approximately 50 minutes was granted for each session.

Third phase

In the third phase, the financial mobile application was presented, its operation was explained later, a file was provided to them via email, Bluetooth and WhatsApp so that they could load it on one of their mobile devices (smartphone, lap top and tablets).

Subsequently, the concepts that made up the financial application were described (that is, each element that makes up the basic financial statements). Afterwards, the amounts that had to be entered to obtain the required results were determined and explained, in this way the subjects were trained to use the application.

Fourth phase

In the fourth phase, they were asked to evaluate said application using an instrument designed for that purpose, and each of the instruments applied by group was collected.

Fifth phase

Finally, in this phase, the data processing and analysis was carried out. For this, the SPSS statistical package (version 20) was used, a statistical computer program used for quantitative analysis, as it facilitates the handling of data obtained in field research. Through this program, the following was carried out:

- A descriptive analysis in order to have an overview of the user's profile and their sociodemographic data.
- An inferential analysis with the purpose of arguing about the affirmations of the participants and with the objective of finding the degree of correlation between the independent variables of usability; In addition, linear regression was used to predict the variables of efficiency, effectiveness, and satisfaction that most strongly influence usability.

Results

The sample consisted of 100 participants, of which 30% were men and 70% women; all were teachers belonging to higher education institutions in the economic-administrative areas of the municipality of Ecatepec de Morelos, State of Mexico. They are currently working with technology tools that they apply during the educational session to generate financial information on the financial situation and performance of the entities (table 1).

Tabla 1. Distribución del género

Genero	Frecuencia	%
Masculino	30	30.0
Femenino	70	70.0
Total	100	100.0

Fuente: Elaboración propia

Regarding the age of the participants, the range of 30 to 35 years (50%) predominated, followed by the range of 36 to 40 years (40%) and the range of 41 to 45 years (10%) (Table 2). This shows that the participants were adults, which offers greater assertiveness and objectivity during the evaluation of the technological tool.

Tabla 2. Distribución de las edades

Años	Frecuencia	Porcentaje
30 a 35	50	50.0 %
36 a 40	40	40.0 %
41 a 45	10	10.0 %
Total	100	100.0 %

Fuente: Elaboración propia

Based on the statistical results, the descriptive evaluation criteria were the following: mean (X) and standard deviation (SD) of the usability factors, we have that the usability level is ($X = 1.20$) and ($SD = 0.10$); in each of its subscales: efficacy (1.20), ($SD = 0.10$); efficiency (1.20), ($DE = 0.10$); satisfaction (1.20), ($SD = 0.10$) their opinion is in complete agreement (table 3). In statistical terms, the participants considered that the tool had a level of excellence because it was easy to use in financial practices.

Tabla 3. Medias y desviación

	N	Mean	Std. Deviation
Eficacia	100	1.20	.10
Eficiencia	100	1.20	.10
Satisfacción	100	1.20	.10
Usabilidad	100	1.20	.10

Fuente: Elaboración propia

Multiple regression coefficients (r^2) allowed to confirm the level of usability in which each independent variable predicts the behavior of the dependent variable. In general terms, usability - based on statistical data— it was of $r^2 = .970$. All the variables presented significance with a very high level in the prediction of the behavior of the variable usability, efficiency ($r^2 = .970$), effectiveness ($r^2 = .970$), satisfaction ($r^2 = .970$).

Discussion

The statistical results show that there was a greater participation of the female gender with respect to the male gender, which shows that women have a greater presence in teaching in the economic-administrative areas of the Ecatepec de Morelos area. Likewise, the predominant age range of the participants was between 30 and 40 years. From this data it can be inferred that the majority had the ability and experience to use mobile devices, which facilitated the explanation on the use of the financial application. On the other hand, in the case of older people, it was necessary to foresee that they needed more training on the use of technological resources.

On the other hand, it can be affirmed that the mobile application had an excellent level of usability, since it fulfilled its purpose and did not present errors in obtaining the results. This increases the security levels and generates greater reliability for the user. Regarding efficiency, the participants highlighted that it had a level of excellence because the response time was appropriate and allowed the development of financial statement tasks, which reduces the time invested in said activity. In the satisfaction evaluation, the users specified that it is an easy-to-operate and reliable tool with the results, so they would include it in their work in the classroom. In short, the app could be used to increase the skills and professional development of students when it comes to preparing financial statements.

Conclusions

Teachers who work in the financial context have the assurance that the content and structure of the mobile application meet the optimal conditions to generate reliable, comparable, understandable and relevant financial information, essential aspects to contribute to the performance of the participants in the learning the structuring of basic financial statements. In addition, the fact that the app has reached levels of excellence in its handling, complying with the usability criteria specified in the international standard ISO 9124, shows that technological tools can be used in the financial context to strengthen the skills of the professional.

In this sense, the financial application —being executed on mobile tools such as smartphones, laptops, PCs or tablets— offers greater practicality, as well as better handling and disposition at any place and time, since it also meets the requirements established by the NIF for the structuring of financial statements in for-profit economic entities.

Now, taking into account the three elements that make up usability, it can be said that in the efficiency aspect the application reduces the physical and mental workload, the time used in the activities and the minimization of costs. Regarding effectiveness, it is deduced that the tasks are carried out with precision and the objectives set are achieved, promoting competitiveness and academic and professional productivity. In relation to satisfaction, the comfort in use and the achievement of the objectives set by the user stand out. In general terms, usability favors technological-educational development in the different contexts of the economic-administrative area of higher-level institutions in Mexico.

Future lines of research

Finally, future works may show the achievements in terms of the transfer of information between different devices, voice interaction, the sending of information by various electronic means and the quality of the application to strengthen teaching strategies in the classroom.

References

- Ally, M. and Samaka, M. (2016). Guidelines for Design and Implementation of Mobile Learning. In Khan, B. H. (ed.), *Revolutionizing Modern Education through Meaningful E-Learning Implementation*. USA: McWeadon Education. Pag. (443).
- Bevan, N., Kirakowski, J. and Maissel, J. (1991). What is Usability? *Proceedings of the 4th International Conference on HCI, Stuttgart*. Retrieved from <http://www.usability.serco.com/papers/whatis92.pdf>
- Carreras, G., Gamallo, F. y Díaz R. (2018). El aprendizaje móvil como herramienta de trabajo en la enseñanza de inglés en la Universidad Médica. *Universidad Ciencias Médicas de la Habana*, 17(6).
<https://www.redalyc.org/jatsRepo/1804/180459095014/html/index.html>
- Cysneiros, L. M. and Kushniruk, A. (2003). Bringing usability to the early stages of software development. *Requirements Engineering Conference. Proceedings*. 11th IEEE International.
- Elkheir, Z. and Mutalib, A. A. (2015). Mobile learning applications designing concepts and challenges: survey. *Research Journal of Applied Sciences, Engineering and Technology*, 4, 438-442. Doi: 10.19026/rjaset.10.2509
- Florián, E. B., Solarte, O. y Reyes, J. M. (2010). Propuesta para incorporar evaluación y pruebas de usabilidad dentro del proceso de desarrollo de software. *Revista EIA*, (13), 123-141.
- Folmer, E. and Bosch, J. (2004). Architecting for usability: a survey. *Journal of Systems and Software*, 70(1-2), 61-78.
- Frokjaer, E., Hertzum, M. and Hornbaek, K. (2000). Measuring usability: are effectiveness, efficiency, and satisfaction really correlated? *Chi Letters*, 2(1), 345-352.
- Fu, L. and Salvendy, G. (2002). The contribution of apparent and inherent usability to a user's satisfaction in a searching and browsing task on the Web. *Ergonomics*, 45(6), 415-424.
- Hakiel, S. (1997). Delivering ease of use. *Computer & Control Engineering Journal*, 8(2).
- ISO 13407 (1999). *Procesos de diseño para sistemas interactivos centrados en el operador humano*. http://webdiis.unizar.es/asignaturas/IPO/wp-content/uploads/2013/02/UNE-EN_ISO_134072000.pdf
- ISO 25010 (2020). *Calidad de software y datos*. Recuperado de <https://iso25000.com/index.php/normas-iso-25000/iso-25010>



- ISO 9241-11 (2019). *ISO 9241-11: Guide on Usability*. Retrieved from http://www.usabilitynet.org/tools/r_international.htm#9241-11
- Kurosu, M. and Kashimura, K. (1995). Determinants of the Apparent Usability. *Proceedings of IEEE SMC, 1995^a*, 1509-1513.
- Nielsen, J. (2003). *Usability 101: Introduction to Usability*. Retrieved from <http://www.useit.com/alertbox/20030825.html>
- Normas de Información Financiera (2019). *Instituto Mexicano de Contadores Públicos*. México. DF.
- Preece, J., Rogers, Y., Sharp, H., Benyon, D., Holland, S. and Carey, T. (1994). *Human-Computer Interaction*. Addison Wesley.
- Ramos, F. (2020). Recurso educativo de m-learning para la formación posgraduada en la Universidad de La Habana. *Revista Atlante: Cuadernos de Educación y Desarrollo*. Recuperado de <https://www.eumed.net/rev/atlante/2020/03/recurso-educativo-mlearning.html>
- Rodríguez, J. y Coba, J. (2017). Impacto del m-learning en el proceso de aprendizaje: habilidades y conocimiento. *Revista Iberoamericana para la Investigación y el Desarrollo Educativo*, 8(15).
- Rodríguez, L. (2015). *Diseño de una metodología m-learning para el aprendizaje del idioma inglés* (tesis de maestría). Ecuador: Escuela Superior Politécnica de Chimborazo, Riobamba. Recuperado de <http://dspace.esPOCH.edu.ec/bitstream/123456789/4532/1/20T00602.pdf>
- Singh, M. (2008). *U-SCRUM: An agile methodology for promoting usability*. In AGILE '08, Toronto, Canada.
- Tao, Y. (2005). *Introducing usability concepts in early phases of software development*. Proceedings 35th Annual Conference. Indianapolis.
- Zamora, R. (2019). El m-learning, las ventajas de la utilización de dispositivos móviles en el proceso autónomo de aprendizaje. *ReHuSo: Revista de Ciencias Humanísticas y Sociales*, 4(3), 29-38.