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Free Software on High School Teaching-Learning Process in Ecuador

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Abstract*---*The use of software in educational processes has proven to be a valuable tool in the teaching-learning process, however the use of proprietary software has greatly diminished its potential due to access difficulties in educational systems, where investment for the provision of computer licenses it is little, in addition to conditioning educational processes on software with closed codes, it represents a very limited option because these do not allow improvements or adaptations to be adapted to new situations, in this sense This work seeks expose how free software can positively impact education at the baccalaureate levels, showing the usefulness in supporting the teaching-learning process. To carry out this research, a systematic review of the literature was carried out, regarding the mechanisms together with the most generalized support tools in the use of educational processes, in order to subsequently generate a valid proposal for increasing motivation and performance in students in different areas.

Keywords*---*Free software, Proprietary software, Baccalaureate, Teaching-Learning, GNU.

I. Introduction

In its beginnings, the programs to carry out calculations were used in applications for research areas, mainly in military applications, space projects, among others, but it was not until the decade of the eighties that their use became common as accessible programs. for all. This change was made possible by events that occurred, such as the large-scale integration of electronic devices and the decrease in the costs of computers, among many others (Campbell, Aspray, Snowman, McKay, & Christian, 1997; Jorgenson & Vu, 2007).

Technological progress has gone hand in hand with paradigm shifts, where large mainframes were replaced by small computers (Personal Computers), this resulted in a very significant increase in the number of users with access to Personal Computers (PCs), in addition to an increase in the utility of applications and range of PC use (Garrido, 2008). Soon computers were used for various functions in a number of areas, among which we mentioned industry, commerce, communications, education, among others, including the home (Llaca, 2017).

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The expansion of the number of computer users created a market for software designers, which has become very significant, which is why important companies such as IBM, Microsoft, Apple, among others, decided to actively participate in this trade, creating a new paradigm for the use of its products, called proprietary software or proprietary software, although this type of paradigm is covered by many types of licenses, there are general aspects that characterize them, within which there is the established time of use, limitation in the number of users of the software, preventing the delivery of source codes directly affecting the way of use (Culebro, Gómez, & Torres, 2006; González, Seoane, & Robles, 2003).

These limitations have led to rethinking new paradigms for the use of software, as opposed to proprietary software, a movement has emerged that has the name Free Software, although this name has been associated with the free software, it is not an exact description, since that the term is associated with four intrinsic freedoms that this paradigm has, such as a) freedom to run the program anywhere, for any undefined purpose, b) freedom to study it or adapt it to the user's needs, requiring that the user have access to the source code, c) freedom of redistribution, so that you can collaborate with others, d) freedom to improve the program by publishing the improvements made, this freedom also requires the source code (González et al., 2003).

All of the aforementioned have contributed to shape the Free Software movement, which has had great growth. Within this trend, there are names that have stood out, among them we can mention Richard Stallman and Linus Torvalds, the first was the creator of the concept of free software, while the second genre is the core of the Linux operating system, the first operating system that included this philosophy (Stallman, 1994; Torvalds, 1994).

The use of proprietary software has spread, in addition to being supported by expensive advertising campaigns with marketing, however, in many cases its use in the educational sector significantly impacts the budget of the institutions that acquire them, in addition to being uphill assimilation of technology, due to lack of access to the source code. In this sense, its use is limited to schools with important budgets for the technological area, leaving few opportunities for low-income ones. An element to consider is the little diffusion that free software has in the community of teachers or student conglomerate, so its possibilities of its use are usually unknown. It is necessary to establish strategies in order to publicize the advantages of free software, particularly in the educational sector where its contributions are really significant when adapting to local realities, such as the low available budget (Serrano & Narváez, 2010).

Efforts have been made in Latin America to incorporate free software in education, promoting regulations, together with laws that allow the construction of educational processes based on this type of software. The creation of own programs, supported by regional developments, with the purpose of generating technological independence has also been encouraged. To this end, an endless number of platforms have been created in the educational field, for all levels or for multiple areas (Freire , Díaz, & Vera, 2019; Naranjo, 2016).

In the Republic of Ecuador, there is a regulatory framework that promotes the use of free software, the regulation of which is framed in Decree No. 1425, dated 2017, this legal framework regulates the implementation of software in government institutions, where The educational system is included, this has forced to increase the use of this technological tool at that level (Decree: 1425, 2017; Tinajero & Pérez, 2019). This work has the objective of identifying the way in which the use of free software can positively impact the educational sector at the baccalaureate levels in institutions with low technological budgets, showing the usefulness and support of the teaching-learning process. In addition, a review of the mechanisms with the most generalized support tools in their use in educational processes, as a valid proposal for increasing motivation that leads to student performance in different subjects (Cerritos, 2017; Duque, Uribe, & Tabares, 2016; Valencia, 2016).

II. Materials and Methods

Based on the defined objective, the type of research to be carried out was evaluated, for which various types of methodologies were evaluated, selecting the so-called Desk Research methodology, which is a type of research that is based on scientific articles and Similar documents that are available in databases, public libraries or websites, among others, consider primary studies, where there are data obtained from already published surveys, secondary studies, among others (Nazarko & Kuźmicz, 2017).

The review was carried out on studies on the subject, subsequently an analysis was carried out that allowed the conclusions of the problem raised to be drawn up, the evidence-based research approach was used, based on the review of studies on mechanisms with support tools Based on software used in educational processes, it was also evaluated which of these tools are valid proposals for increasing motivation and performance of high school students.

This type of selected research technique allows knowledge to be created, based on publications made in studies (Revelo, Collazos, & Jiménez, 2018). With this, a series of steps to follow are contemplated, these being a) choosing criteria for inclusion, extraction and synthesis of documents found, considering the quality of the databases to be selected, b) search using as the keywords defined in the research, c) preliminary selection of suitable articles, d) evaluation of article quality according to the function of the context or search criteria (mainly last 5 years), analysis and synthesis of the most relevant data found, e) report of results

III. Analysis and discussion of results

The implementation of free software in the educational field has been carried out with greater intensity in the last 20 years, experiences such as in the Province of Extremadura, in Spain, in which the project was carried out o LinEx, for the development of a free educational software version, which led to savings of € 130 million, and its implementation included the installation in 60,000 computers. As a second part of this successful experience, it was also

installed in the Province of Andalusia, in a total of 15,500 more computers, which shows the potential for savings with the possibility of its implementation in a large number of users.

Another world-wide experience of incorporating free software in schools is in Norway, where support for the teaching of that country's second language is carried out through free software. In the case of the United Kingdom, the British Education Communication Technology Agency, established in the law a regulation of digital file formats, taking free software standards for office programs, thus promoting software developers to contribute to educational systems (Berrocoso, Arroyo, & Díaz, 2010; Naranjo, 2016).

In Latin America, the incorporation of free software in government systems, specifically in educational processes, had its beginnings in Brazil with the incorporation of new legislation, followed by Venezuela, Peru, among others. In the particular case of Venezuela, a program for educational support was implemented, in which students of the different educational levels were provided computers, these teams were equipped with a Linux distribution, based on a line of origin called, this merger was called Canaima, in its different learning modules were incorporated, allowing the support materials to be available for the regular elementary, basic and high school courses (Duque et al., 2016; Freire et al., 2019; Naranjo , 2016).

In Ecuador, as has already been pointed out, measures have been adopted to incorporate free software in educational institutions, studies have been carried out on the application plus the benefits that these software provide in the teaching-learning process, resulting in high motivation for part of the students, in addition to considering the preparation by the teachers in these tools (Borja, 2017; Freire et al., 2019; Gonzales & Trelles, 2017).

Free software presents a set of advantages that make it very attractive when it comes to supporting high school classes, because it must also be easy to use, it is simple to obtain, install, configure or execute, allowing it to be a task simple for both teacher and students. These programs can become an iterative tool, so that the student can explore and experiment with its use. Another element to consider as characteristic, is the breadth of the content handled by these software's, considering the virtues of the digital media handled, in addition to allowing the incorporation of different components, such as videos, interactive screens, self-evaluation questions, among others, this allows that its configuration is made according to the needs of the course or the students.

The elaboration of the software must propose a directionality that corresponds to the objectives planned by the teacher, in this way it is structured to complement the teaching-learning process, where the student builds and consolidates his own knowledge, always with the guidance of the teacher. The software applied to education can be classified according to its structure and function, being its use in accordance with the strategy outlined, in this sense the types of software can be simulators, emulators, informative, exploration, practices, tutorials, among others. Each one

has explicit functions that support or complement learning, by taking advantage of the digital culture that underlies today's youth.

Simulators are programs aimed at representing simulated processes and phenomena, where the student interacts with them, configuring their parameters, modeling behavior; In this way, significant learning is experienced, while appropriating the operating structures of physical, mathematical, and chemical systems, among many others (Rodriguez, Perez, Lituma, & Perez, 2020).

Emulators have a very particular utility, their behavior depends on the participation of hardware interfaces, where the variable thrown by the simulated processes can go out into the real world and interact with real processes, allowing the exchange of information with their respective actions. These types of programs allow training in technical areas, where the environment is controlled, giving security in the manipulation of the equipment (Pérez, Rodriguez, Vázquez, & Bowen, 2020).

The Informative Software promotes pleasant and interactive readings in the students, where you can navigate through the content, depending on curiosity or motivation, where it allows you to appropriate the concepts expressed in connection with other notions. The exploration software immerses the student in a virtual reality, where he allows him to live experiences very close to real environments, in this way he can associate previous knowledge by providing structure, through a common thread, or a story, that gives meaning to this knowledge , in safe circumstances for the participant.

The programs carried out for practices are aimed at generating skills in students, in addition to contrasting theoretical concepts with quasi-experimental results (virtual experiments), thus reducing the costs of carrying out practices, in addition to allowing the student advance in practice according to your potential. The Tutorials are software that allow the content to be directed in a certain area, directed by a script that was previously structured, its use is usual to support the compression of fundamental and specific knowledge, the student advances independently, allowing self-evaluations to be carried out Periodically, it has become a commonly used interactive learning object.

In the Republic of Ecuador, during high school, approximately twelve subjects are taken at each level, according to Curriculum 1.- Language and Literature, 2.-English, 3.-Mathematics, 4.-Chemistry, 5.-Bilogy, 6 .-Physics, 7.-History, 8.- Philosophy, 9.-Education for Citizenship, 10.- Physical Education, 11.- Cultural and Artistic Education, 12.-Entrepreneurship and Management.

Within the range of Free Software aimed at the educational field, there is a wide set of programs, which can be complements to help the courses taught according to the approved curriculum in Ecuador, in this work some alternatives are presented. The selection of these was made based on the subjects that represent the greatest difficulties

for the student, in the field of science, such as Mathematics, Physics or Chemistry (Cuenca, 2019; Molina, 2019; Ruiz, 2019).

In the area of mathematics there are many programs that help practice, among which we can mention GeoGebra (Institute, 2020), which has a GNU distribution license (Free Software Foundation, 2019), common in this type of program, It is widely used in many schools to support the teaching of mathematics in conjunction with physics (Campaña, 2019; Rubio, Prieto, & Ortiz, 2016), the student through this tool can appropriate typical calculation concepts by graphing various types of functions.

The program can be executed under platforms based on Smartphone, Tablets, Computers and On line, in addition to working under different operating systems, allowing its easy use, its interface is friendly, allowing the student to interact with the parameters of mathematical structures, in This program contains elements to carry out simulation practices. Figure 1 shows the interface of the GeoGebra Program.

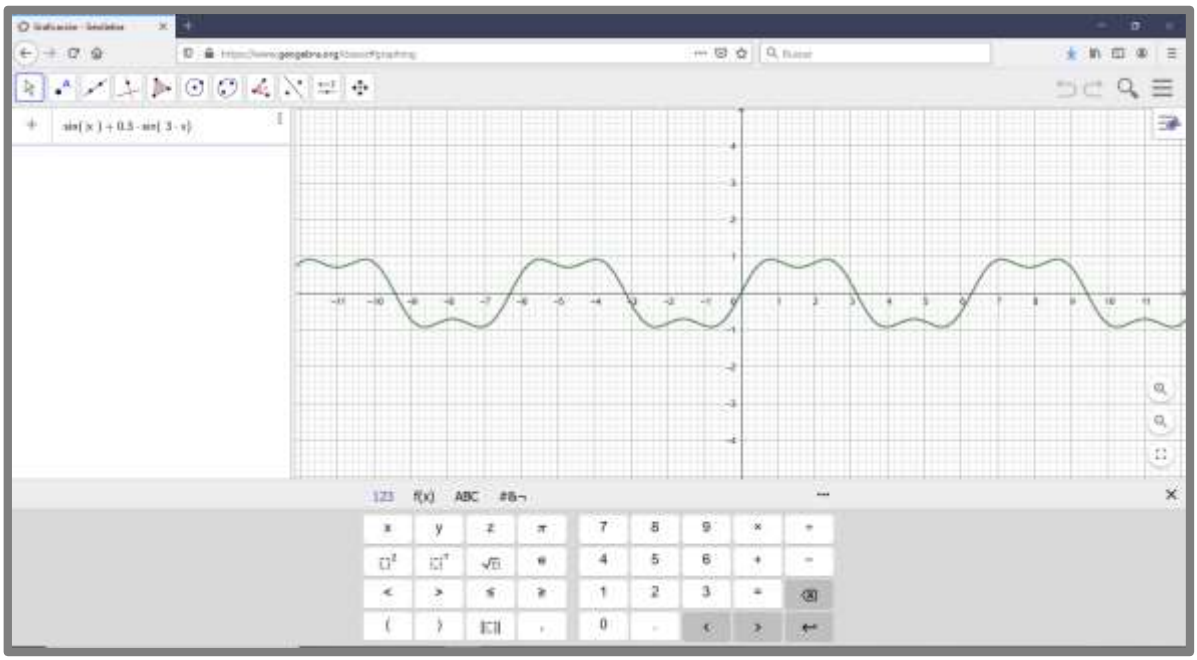

Figure 1. GeoGebra Main Window

In physics courses, it is relevant to carry out practices, where the student verifies the theoretical concepts taught in the subject, for this purpose the PhysicalLab program (Arias, 2018), has a set of practices, where it incorporates kinematics, dynamics, thermal, among others; allowing students to interact and solve the different characteristic problems of high school courses. PhysicalLab, is distributed under the GNU license, can be run on different hardware platforms and different Operating Systems, its presentation is user-friendly, the software window is shown in figure 2.

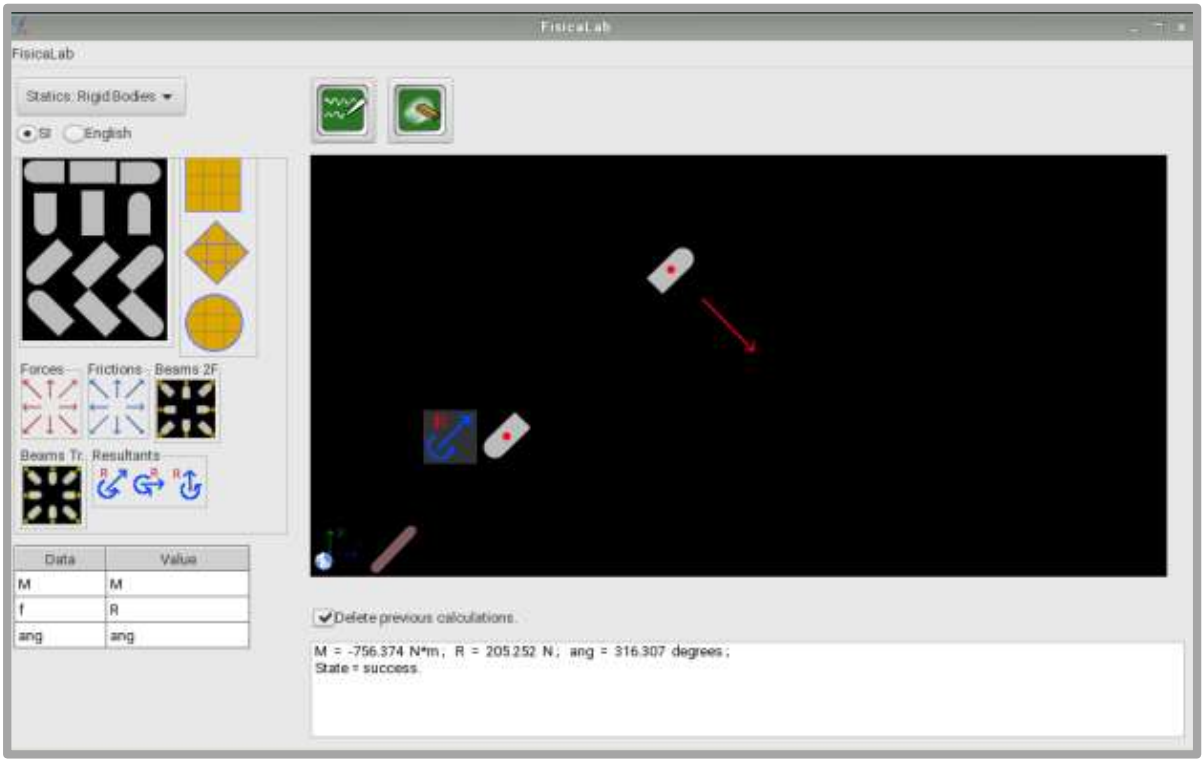

Figure 2. PhysicalLab window.

The chemical subject, does not escape the current of free software, the Avogadro program (Project, 2017), is distributed under the GNU license, it can also be run under different operating systems, it is easy to use, the presentation of the software is friendly, very intuitive to use, it presents images of attractive quality, being a factor of motivation and interest for the student, its presentation is shown in figure 3.

Avogadro software presents the student with an opportunity to explore molecular structures, allowing them to see 3D images, interact with the models or build them, where they put into practice the knowledge acquired in the classroom. There are many other examples that are framed within the philosophy of free software, which comply with the GNU license, allowing teachers to address the different topics covered in their courses, following proper planning, evaluating the support of these interactive tools, seeking to the student has a motivating experience in their interaction as shown on the interactive screen in figure 3.

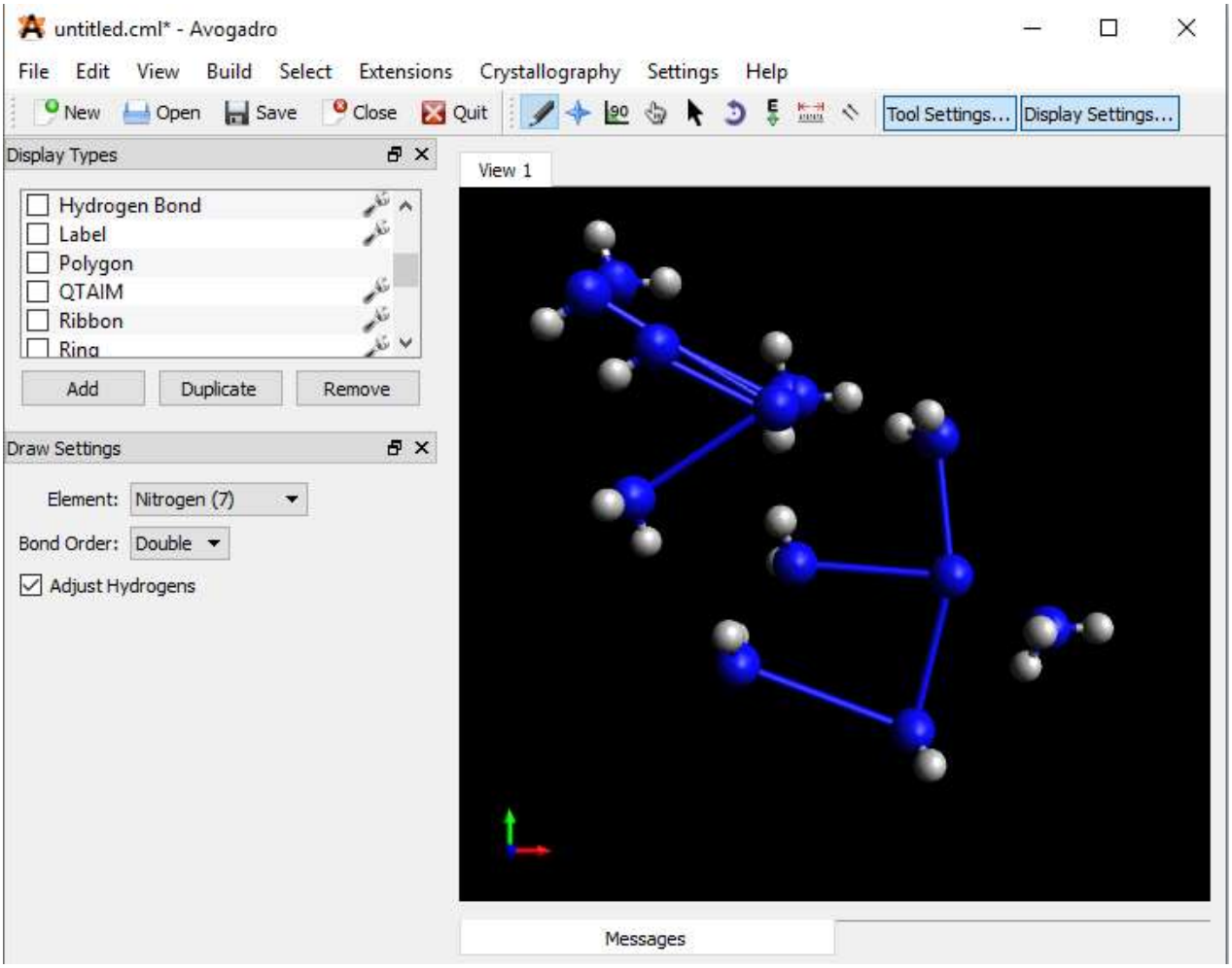

Figure 3. Avogadro version 1.2 program window

In general terms, these employment programs in the educational field must have a set of requirements for inserted as a valid support tool, among the technological prerequisites to avoid limiting their use, they are at liberty in the platforms for the use of operating systems, and regarding teachers, they must have sufficient knowledge of the tools that allow guiding the student , motivating him to get the most out of it.

IV. Conclusions

Different countries worldwide, as well as in Latin America (including Brazil, Venezuela and Ecuador), have made efforts to incorporate the use of free software in their legislation for use in public institutions or in the educational field. This type of software has proven to be a valuable support tool for teachers, they can even be used and adapted to each institution, thanks to the availability of open source code. The programs carried out and distributed under free software licenses are useful tools to increase student achievement, improving student motivation in the different baccalaureate subjects, especially those oriented to the sciences, in which experimentation allows investigation, understanding and interpretation of results, that is why the multiple multimedia resources that are usually used in these

software, as well as the wide range of functions or formats in which they are presented make them highly accessible and attractive to high school students, for thus they increase interest in these areas.

References

[1] Aithal, P. (2016). Ideal banking concept and characteristics. *International Research Journal of Management, IT and Social Sciences, 3*(11), 53-63.

[2] Arias, G. (2018). GNU FísicaLab (Version 0.3.5). Retrieved from https: //www.gnu.org/software/fisicalab/index.es.html

[3] Berrocoso, J., Arroyo, M., & Díaz, M. (2010). Educational policies for the integration of ICT in Extremadura and its effects on didactic innovation and the teaching-learning process: the perception of teachers. *Education magazine, 352*, 99-124.

[4] Borja, M. (2017). *The free software ict in the quality of the learning process of mathematics in the first year students of unified general high school, in the Fiscal Sur Quito Educational Unit, zone 09, district 06, province of Pichincha, of the canton of Quito, during the period school year 2016-2017.* (http://repositorio.ug.edu.ec/handle/redug/27263), Universidad de Guayaquil. Faculty of Philosophy, Letters and Sciences of the….

[5] Campaign, M. (2019). *Didactic Guide for the Learning of Mathematics using GeoGebra in students of Second of Bachillerato.* (doi: https://repositorio.uisrael.edu.ec/handle/47000/2308), Quito-UIsrael. Retrieved from https://repositorio.uisrael.edu.ec/handle/47000/2308

[6] Campbell, K., Aspray, W., Snowman, D., McKay, S., & Christian, W. (1997). Computer A history of the information machine. *Computers in Physics, 11*(3), 256-257. doi: https://aip.scitation.org/doi/pdf/10.1063/1.4822551

[7] Cedeño, M. L. G., Meza, A. K. T., & Mejía, R. G. C. (2018). Resilience and Support Networks for University Students with Disabilities. *International Research Journal of Management, IT and Social Sciences*, *5*(2), 164-174.

[8] Cerritos, V. (2017). Impact of free software in schools in the department of Santa Ana. Doi: http://hdl.handle.net/123456789/183.

[9] Chica, T. M., Meza, A. K. T., Chavez, S. A. R., & Quiroz, M. A. M. (2017). Necessity of social worker in the educational system. *International Research Journal of Management, IT and Social Sciences*, *4*(2), 81-86.

[10] Cuenca, K. (2019). *School discontinuity as an incident factor in academic performance in the mathematics subject at the baccalaureate level of the Amazon and doctor high school colleges. Benjamín Carrión from the city of Loja, academic period September 2018-July 2019. Alternative guidelines.* (doi: https://n9.cl/cuenca). Retrieved from https://n9.cl/cuenca

[11] Culebro, M., Gómez, W., & Torres, S. (2006). Free software vs. proprietary software. *Advantages and disadvantages. Creative Commons, Mexico*doi: https://n9.cl/librevspropietario.

[12] Dahiya, M., & Chaudhary, B. (2016). Salaried strata investment behavior towards financial products-review and prospects for future research. *International Research Journal of Management, IT and Social Sciences*, *3*(7), 15-26.

[13] Danga, A. Y. (2015). Research on the impact of globalization on education in Indonesia. *International Research Journal of Management, IT and Social Sciences*, *2*(5), 20-22.

[14] Decree: 1425. (2017). *Regulation for the acquisition of software by contracting entities of the public sector*. San Francisco de Quito: Presidential Platform, dated 05/22/2017 Retrieved from https://minka.presidencia.gob.ec/portal/usuarios_externos.jsf.

[15] Dewi, N. N. A., & Mustika, I. W. (2018). Nutrition content and antioxidant activity of black garlic. *International Journal of Health Sciences, 2*(1), 11-20. https://doi.org/10.29332/ijhs.v2n1.86

[16] Duque, N., Uribe, A., & Tabares, V. (2016). Free Software to support educational processes. *Teknos Scientific Review, 16*(1), 28-36. doi: https://doi.org/10.25044/25392190.804

[17] Dwitariani, I. G. A., & Rasmini, N. K. (2019). The influence of education level and individual character in deciding financial report establishment. *International Research Journal of Management, IT and Social Sciences*, *6*(1), 95-102. https://doi.org/10.21744/irjmis.v6n1.593

[18] Fogel, T. B., Lucky, S. S., Mandy, J. A., & Wellbirth, B. B. (2019). Reducing the PDEs to ODEs through lie vectors using the integrated factors. *International Research Journal of Management, IT and Social Sciences*, *6*(5), 193-203. https://doi.org/10.21744/irjmis.v6n5.732

[19] Free Software Foundation, I. (2019, 09/15/2019). The GNU Operating System. https: //www.gnu.org/licenses/licenses.es.html

[20] Freire, R., Díaz, J., & Vera, N. (2019). Free culture and free software: towards digital empowerment. *Prisma SocialMagazine*doi: https://revistaprismasocial.es/article/view/3115(26), 50-72.

[21] Garrido, C. (2008). *History of computing.* (Master's Degree), University of San Carlos de Guatemala, Guatemala. Retrieved from http://biblioteca.usac.edu.gt/thesis/07/07_2010.pdf

[22] Gonzales, N., & Trelles, C. (2017). Modeling with the support of free software and changes in the learning processes in mathematics in high school students. *Magazine Education and Social Development, 11*(1), 64-73. doi: https://n9.cl/revistasunimilitarpdf

[23] González, J., Seoane, J., & Robles, G. (2003). *Introduction to free software* (doi: https://dspace-libros.metabiblioteca.com.co/handle/001/344): Barcelona: Fundació per a Universitat Oberta de Catalunya, 2003.

[24] Grant, L. S., Gode, B. S., & Amstrong, M. G. (2017). Ideology of translation concept approach on determining a decision by the translator. *Linguistics and Culture Review*, *1*(1), 1-12. https://doi.org/10.37028/lingcure.v1n1.1

[25] Institute, IG (2020). GeoGebra (Version 6.0.583.0). Austria. Retrieved from https: //www.geogebra.org

[26] Jorgenson, D., & Vu, K. (2007). Information technology and the world growth resurgence. *German Economic Review, 8*(2), 125-145. doi: https://doi.org/10.1111/j.1468-0475.2007.00401.x

[27] Kusum, P. A., & Yinghua, S. (2017). Effectiveness of on-the-job learning for enterprises' innovativeness. *International Research Journal of Management, IT and Social Sciences*, *4*(4), 35-43.

[28] Lein, A. A., & Setiawina, N. D. (2018). Factors affecting the fishermen household income and welfare. *International Research Journal of Management, IT and Social Sciences*, *5*(4), 80-90. https://doi.org/10.21744/irjmis.v5n4.266

[29] Llaca, M. (2017). The personal computer and its history. Retrieved 05/08/2020, 2020, from https://parceladigital.com/2017/01/19/el-ordenador-personal-y-su-historia

[30] Molina, B. (2019). *Influence of educational software in the teaching of structured mathematics and academic performance.* (doi: https://n9.cl/ucefilpdf), Quito: UCE. Retrieved from https://n9.cl/ucefilpdf

[31] Musbah, E. M. M., Bilal, K. H., & Mustafa, N. (2015). Comparison of QoS performance over WLAN, VoIP4 and VoIP6. *International Research Journal of Management, IT and Social Sciences*, *2*(11), 29-37.

[32] Nandhini, M., Usha, M., & Palanivelu, P. (2015). Employee morale and its impact on employee efficiency in spinning mills with reference to Coimbatore district. *International Research Journal of Management, IT and Social Sciences*, *2*(9), 18-25.

[33] Naranjo, FR (2016). Justifications and Free Software from the government. Retrieved 05/22/2020, 2020, from https://n9.cl/govsl

[34] Naveen, -, & Priti, -. (2015). The right to information in India implementation and impact. *International Research Journal of Management, IT and Social Sciences*, *2*(1), 11-16.

[35] Nazarko, J., & Kuźmicz, KA (2017). Introduction to the STEEPVL analysis of the New Silk Road Initiative. *Procedia Engineering*, *182*, 497-503. doi: https: //www.sciencedirect.com/science/article/pii/S1877705817312791

[36] Nino, I., Manafe, J., & Setyorini, T. (2019). Simple bookkeeping model using Microsoft excel for culinary micro-business in East Nusa Tenggara Indonesia. *International Research Journal of Engineering, IT & Scientific Research*, *5*(2), 29-41. https://doi.org/10.21744/irjeis.v5n2.609

[37] Ogbo, A., Anthony, K. A., & Kosisochukwu, O. (2017). An assessment of hygiene maintenance factors effect on employees productivity in Nigerian telecommunication industry. *International Research Journal of Management, IT and Social Sciences*, *4*(1), 61-70.

[38] Pant, I., & Yadav, R. K. (2016). Impact of emotional intelligence on the job performance of employee. *International Research Journal of Management, IT and Social Sciences*, *3*(1), 7-14.

[39] Pérez, JA, Rodriguez, CG, Vázquez, A., & Bowen, CA (2020). Emulation of System as Strategy for Teaching of Mechanical System. *International Journal of Psychosocial Rehabilitation, 24*(2). doi: https://n9.cl/a8sm

[40] Priya, N., & Ravi, A. (2016). Factors influencing college teachers to buy a car in Krishnagiri district: Tamilnadu. *International Research Journal of Management, IT and Social Sciences*, *3*(3), 40-47.

[41] Project, C. (2017). Avogadro. Retrieved from https://sourceforge.net/projects/avogadro/

[42] Rahimi, H. (2015). Social commerce and consumer intention to purchase evidence from popular social networks in Iran. *International Research Journal of Management, IT and Social Sciences*, *2*(3), 11-22.

[43] Revelo, O., Collazos, C., & Jiménez, J. (2018). Collaborative work as a didactic strategy for programming teaching / learning: a systematic literature review. *TecnoLógicas, 21*(41), 115-134.

[44] Rinartha, K., & Suryasa, W. (2017). Comparative study for better result on query suggestion of article searching with MySQL pattern matching and Jaccard similarity. In *2017 5th International Conference on Cyber and IT Service Management (CITSM)* (pp. 1-4). IEEE.

[45] Rodriguez, C., Perez, J., Lituma, E., & Perez, A. (2020). Software Development for Transformer Model Supporting Significant Learning Electrical Machines. *International Journal of Psychosocial Rehabilitation, 24*(2). doi: https://n9.cl/wx8or

[46] Rubio, L., Prieto, J., & Ortiz, J. (2016). Mathematics in simulation with GeoGebra. An experience with free fall movement. *IJERI: International Journal of Educational Research and Innovation*doi: https://upo.es/revistas/index.php/IJERI/article/view/1586(5), 90-111.

[47] Ruiz, PKA (2019). *Management of study techniques in the academic performance of the subject of mathematics by high school students of the Marieta de Veintimilla educational unit in the province of Loja, period September 2018-June 2019. Alternative guidelines.* (doi: https://n9.cl/karinaruizpdf). Retrieved from https://n9.cl/karinaruizpdf

[48] Septian, I., & Astika, I. B. P. (2019). Halo effect moderating: impact of professional skepticism on auditor performance. *International Research Journal of Management, IT and Social Sciences*, *6*(4), 189-196. https://doi.org/10.21744/irjmis.v6n4.680

[49] Serrano, J., & Narváez, P. (2010). Use of free software for the development of educational content. *University education, 3*(6), 41-50. doi: doi: 10.4067 / S0718-50062010000600006

[50] Sidiartha, I. G. L., & Pratiwi, I. G. A. P. E. (2018). Implementation of STRONGkids in identify risk of malnutrition in government hospital. *International Journal of Health Sciences*, *2*(2), 18-24. https://doi.org/10.29332/ijhs.v2n2.117

[51] Stallman, R. (1994). Why the software should not have owners *Internet, hackers andsoftware*doi: https://n9.cl/stallmanpdf.

[52] Suacana, I. W. G., & Suaib, E. (2016). Democracy model based on Bali local wisdom values for capacity building of regional governance. *International Research Journal of Management, IT and Social Sciences, 3*(9), 27-36.

[53] Suryanata, I. G. N. P. (2018). Poverty strategy by extension of expanding creative economy. *International Research Journal of Management, IT and Social Sciences*, *5*(6), 71-79. https://doi.org/10.21744/irjmis.v5n6.375

[54] Suryasa, W., Mendoza, J.R.Z., Mera, J.T.M., Martinez, M.E.M., Gamez, M.R. (2020). Mobile devices on teaching-learning process for high school level. *International Journal of Psychosocial Rehabilitation, 20*(4), 331-340. https://doi.org/10.37200/ijpr/v24i4/pr201012

[55] Tinajero, M., & Pérez, E. (2019). *Study of the use of Free Software in the Central Government with respect to Decree 1014.* (http://repositorio.puce.edu.ec/handle/22000/17066), PUCE-Quito.

[56] Torvalds, L. (1994). *Linux kernel implementation.* Paper presented at the Proceedings of Open Systems. Looking into the future. AUUG'94.

[57] Valencia, M. (2016). *Free software in computer learning for students in the technical area of Colegio De Bachillerato "16 De Octubre*. (doi: https://n9.cl/mabelyadirapdf), Ecuador-PUCESE-Master in Technologies for Management and Teaching Practice. Retrieved from https://n9.cl/mabelyadirapdf

[58] Vasquez, J. M. C., Quiroz, P. M. Z., & Martinez, M. E. M. (2019). Dyslexia: ways to identify and address it. *International Research Journal of Engineering, IT & Scientific Research*, *5*(4), 68-74. https://doi.org/10.21744/irjeis.v5n4.717

[59] Widyantara, I. N. P., & Sukaatmadja, I. G. P. (2019). Formulation of chicken egg marketing strategy. *International Research Journal of Management, IT and Social Sciences*, *6*(5), 285-302. https://doi.org/10.21744/irjmis.v6n5.771

[60] Wijaya, M., Giri, M., Wahyuni, N. P., & Setiawan, K. (2018). Premarital sex behaviors of teenagers: a case in Bali, Indonesia. *International Journal of Health Sciences*, *2*(3), 11-21. https://doi.org/10.29332/ijhs.v2n3.211

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