Article

Learning and Knowledge Technologies as Strategies in the Training of Public Accountants

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Abstract: this article presents the results of implementing existing software tools in the accounting field. The teaching processes regarding the use of Learning and Knowledge Technologies (TAC) in the university environment, and very specifically, in what has to do with the pedagogical integration of the same in the curriculum is deficient and disjointed with the current technological development. Thus, in the different curricula of professional programs of Public Accounting and related, the courses related to computer automation processes are oriented only towards the management of computer science and accounting software and the great diversity of existing applications that would undoubtedly directly benefit the student to know the potential of these in their future accounting practice is not taken into account. Strengthen the various skills of a Public Accountant in training through Learning and Knowledge Technologies (TAC), under the hypothesis of developing skills in the accounting field through TACs. The research was developed using a quantitative approach, an empirical-analytical method, with a type of descriptive research under an experimental design based on G1 x O1 and G2–O2, three phases were defined. In the first phase, the characterization of the existing software tools in the accounting field was carried out. In the second phase, their relevance was determined. In the third phase, performance was evaluated and then classified in a repository. The data obtained were analyzed with parametric analysis techniques through which it was found that the difference in quantitative results in the academic process between the experimental and control groups was statistically significant, which concluded the success of the experimental treatment. The use of CT scans in the classroom by the experimental group resulted in an improvement in their academic performance compared to the control group, strengthening their self-learning processes and facilitating the development of cognitive functions and skills necessary in the exercise of their accounting profession. This research supports and strengthens the work skills developed in the classroom for public accounting students. The tools TAC is developed from the request made by the radiometry laboratory as a first phase and a second phase is necessary for validation with experts.

Keywords: public accountant; accounting training; accounting software; abilities; Learning and knowledge technologies

1. Introduction

The applicability of software in the environment, as a management tool, in many fields and tasks of the human being, is undoubtedly a fundamental activity in the training and professional action of many disciplines, which helped with the automation of processes defend the results of disciplinary performance.

It is imperative to explore new methodological tools in the training of professionals, according to the current learning scenario, supplying new elements that involve more participatory and collaborative methods for students, the integration of new teaching methodologies in universities is a topic as useful as necessary to train professionals in tune with a current world[1].

Thus, new technologies and innovation in learning allow a significant increase in the amount of communication between the teacher and his students regardless of time and space [2].

In this way, technologies in education are tools that support teaching-learning processes and help the growth of knowledge, the strengthening of the training of professionals in teaching and the improvement of the quality of education [3].

The use of active methodologies can favor the learning process through constructive thoughts, such as an action-reflection-action procedure, in which the student actively positions himself in relation to his learning, noticing the practice through the resolution of a problem, inciting the search for possible solutions [4].

The use of technology in the classroom could promote active learning (for example, exercises and/or simulations can be performed in which the student actively participates), and even more so the student can continue with the learning task in a striking and sometimes lively way outside the classroom [5].

One of the most relevant findings of the research is the impact of CT scans on student motivation and concentration, joining the dynamic and interactive possibilities to teach concepts that CT scans have (such as using animations, performing simulations, etc.), so they go beyond the treatment of digital skills for the functional management of ICT [6].

In this sense, knowing how to appreciate oneself and take advantage of the passing of the world, is an important axis since, this universe is full of experiences that over time can change in very useful learning during different contexts [8].

In the same way, an era is expected in which they are digitally literate and thus expand competences, such as lifelong learning, and hence the urgency that universities are responsible for containing in their curriculum and in their educational practice active teachings that allow students to achieve skills that are necessary in their lives [9].

Today the application of software, as a service tool in various fields of human action, is perhaps an important task in the training and professional practice of several disciplines that, assisted in the automation of processes, strengthen the results of disciplinary performance [9].

Therefore, the development of Learning and Knowledge Technologies (TAC) play an important role in the training of many professionals, including the public accountant, who for his accounting practice requires existing software tools in the accounting field, in order to strengthen the various skills.

In recent years, the importance of developing research skills and abilities in the training of public accounting professionals has been seen, so that they can face various situations that allow them to acquire specific skills such as: identifying and solving problems [10].

The teaching processes regarding the use of Learning and Knowledge Technologies (TAC) in the university environment, and very specifically, in what has to do with the pedagogical integration of the same in the curriculum is deficient and disjointed with the current technological development.

Thus, in the different curricula of professional programs of Public Accounting and related, the courses related to computerized automation processes are oriented only towards the management of computer science and accounting software (usually one or two in all university training) and does not take into account the great diversity of existing applications that would undoubtedly directly benefit the student to know the potential of these in their future accounting practice. that is why, in the face of the vertiginous social changes such as those currently being experienced and in the face of the challenges that the global context poses, educational practices cannot remain static [11], for this reason, that in the face of the vertiginous social changes such as those currently being experienced and in the face of the challenges that the global context poses,   educational practices cannot remain static. Therefore, the purpose of this study is to develop skills in accounting training, based on Learning and Knowledge Technologies.

In addition, being an accounting activity to manage the financial information of natural or legal persons in a systematized, centralized and simplified way, many of its professionals are unaware of the benefits and applications built with support in Cloud Computing, Bigdata, Datamining, Apps, ecommerce, Machine Learning, Artificial Intelligence, among others, missing out on Information and Communications Technologies (ICT) at the service of learning and   knowledge acquisition (TAC).

In turn, learning and knowledge technologies are tools for the realization of activities for learning and the analysis of the surrounding reality by the student is to direct towards formative uses for both teachers and students in order to learn effectively [12].

Therefore, an area of interest in the training of all public accounting professionals are TACs, especially software tools, due to their importance in optimizing the control and productivity elements that involve analysis and interpretation of information generated by the computerized procedures carried out in the company [13].

One of the main theoretical foundations necessary to support this research revolves around pedagogical strategies in the teaching and learning process. To this end, a review of several scientific studies is made, especially those related to higher education educational environments, giving a perspective from the TAC.

This establishes a new association between technology and pedagogy, forging a new educational paradigm, where, among other aspects, distance, time and presence are not obstacles to participate in the teaching-learning process. In the same way, the role of the teacher considered as the only source of knowledge, changes radically, since access to information through other means opens the possibility for the student to approach knowledge, to promote habits of autonomous learning and collaborative work, generating new actions, both for the teacher, as for the student and the new demands on institutions in terms of the provision of infrastructure and access to new educational resources [15], this forces to design environments and teaching and learning materials that move away from the transitive model of teaching and that give sufficient importance to the constructive processes on the part of the learner so that he reaches a significant learning [15] .

If we learn to properly use TACs to motivate students, enhance their creativity and increase their multitasking skills, as well as to take advantage of the synergies between teachers and students, we will form an increased learning.   In this increased learning, students, proactively, autonomously, guided by their curiosity towards lifelong learning, learn to take advantage of the extraordinary power of the Internet as a source of information, select and filter resources, become the protagonists of didactic methodologies and receive permanent stimuli [16].

The purpose of this study is to reinforce the skills inherent in the accounting training process of students through the use of TACs in order to propose new interaction scenarios that allow them to continue learning effectively with automated tools through which it is possible to validate their learning and at the same time facilitate the development of cognitive functions, skills and abilities necessary in the exercise of their accounting profession.

Likewise, Technological Innovation plays an increasingly important role both in the educational field and in the business field. The new knowledge economy, the information society and the globalization of markets require an important innovative effort from companies, which must be supported not only from public administrations, but from all organizations and entities that jointly participate and make up the Regional Innovation System [17].

This article is structured in five parts: 1) the introduction, which includes elements of the theoretical framework, problem and importance of the research process; 2) the technological component in education, where the theories of Learning and Knowledge Technologies (TAC) are conceptualized, and the importance of the technological component 3) the methodology, which describes the phases used in the development of this study; 4) the results, which show the research methodology proposed with the results achieved in

the control and experimental group, and, 5) the conclusions and future work, which evidence the findings obtained and the next studies derived.

1.1. Related Works

Teaching is given at the formal and informal level by observing activities in the course of the environment and at any stage of the individual's life cycle. These learnings are understood through knowledge, experiences, positive and / or negative experiences [18].

That is why, that the experience itself is the best way to learn, otherwise, it would not be our learning, but the one that other people who lived similar experiences have developed, we are protagonists of our history, only through our experiences we accept the errors or failures, we draw conclusions and move on, which means, that learning is to advance and grow in oneself, weighing the circumstances, obstacles and reflecting on each act we perform, in this way, we discover and experience the essence of curiosity, and consequently, of life [7].

Currently, the way of imparting knowledge has been analyzed and that is why new technological developments have emerged, focused on knowledge management, exploring expanding coverage to the public interested in learning, granting not only technical knowledge but also knowledge in the way of advertising and imparting it to new thoughts [19].

Thus, this means that teachers, in their training process, must not only handle technologies for novelty but understand that they will provide them to yude them to think, to explore what they are interested in learning; thus, it can voluntarily reject what it considers of little benefit so that its formation is established in a conscious learning that arises from the inquiry and use of collaborative, dynamic and metacognitive technological tools [20].

Likewise, there are various computational tools according to home profession, so that Learning and Knowledge Technologies (TAC) present a large number of interesting elements, some of them very useful but mostly unknown by the user in general and that could help even more the automation of several processes, so managers give these tools Zoho books is, without a doubt a good alternative for users, its environment groups, among other possibilities, the facilities of ordering, management that are very useful in the stages of information capture, editing and its implementation.

In any training process, methodology is of vital importance for the achievement of the objectives of the programs; the design of innovative methodological strategies are essential in the transformation of learning and training processes, since it contributes to ensuring the understanding of students of the world in which they live [21], such strategies must be adjusted to the learning needs of future public accountants, as educational tools to reach optimal learning. On the other hand, TACs are the product of the use of ICT, with the aim of learning in an effective way, through dynamics raised in digital technology, thanks to their attributes of interactivity, which makes the learner the protagonist of the construction of their own knowledge [22].

Therefore, the TACs in the teaching-learning process exposes a series of issues to take into account: a continuous updating of knowledge, skills, processes, and strategies on educational content; a new conceptualization of teaching as a complex process in continuous change and lasting a lifetime; and finally, the generation of virtual learning environments. All this in order to transform learning in students [23].

Likewise, the application of the TAC with pedagogical tools relevant to the training needs, contribute to students being able to solve problems in complex and changing situations [6], through innovation training projects, in this sense we must talk about the incorporation of the TAC not only in the classroom, since this would be a technical process, but in learning methodologies [24], public accounting, like many other disciplines, has the viability to develop interesting projects for classes making productive use of these resources.

In this way these technologies applied to teaching and more specifically in the accounting area become innovative environments, with sufficient material endowment and a methodologically correct digital literacy and oriented to basic skills [25], they are a good resource for data processing and immediate interactiveness in the search for information.

Learning and knowledge technologies focused on the teaching-learning process have become the main axis for the development of activities in university institutions [26], these technologies must be carried hand in hand with other accompaniment processes, in order to generate feedback environments for teachers and students. Learning with open educational resources allows students to unite with the use of technologies, these resources encourage opportunities of constant learning and encourage critical, creative and independent thinking, always centered on the student [27].

Of the above, it is necessary to include TACs in the teaching processes of public accounting students with the purpose of improving their learning, helping them to acquire specific skills that contribute to them being digitally competent [28], that is, that they learn to acquire knowledge, skills and attitudes that allow them to solve problems in an optimal and innovative way.

Pérez Zúñiga, Mercado Lozano, Martínez García, Mena Hernández, and Partida Ibarra. In his article, the knowledge society and the information society as the cornerstone in educational technological innovation, he emphasizes that it is indispensable, from the teaching perspective, to exploit these technological tools focused on learning and teaching both in the classroom and in virtual teaching, since THE TAC have opened a new horizon towards a formative use that affects the teaching-learning process. This study aims to learn more and better through the appropriate use of technology, which facilitates information management and access to knowledge [30].

Similarly , Gutiérrez   in your article NTICx y TAC y gestión de la complejidad. It exposes the need for the presentation of Learning and Knowledge Technologies as a pedagogical mono-strategy where they are not reduced to the practical and unique domain of a series of software tools, but rather to their integration into the development of knowledge [32].

Finally, Según Trigo cited por Verdulla, presents the importance of digital educational tools in a society where they are increasingly immersed in ICT and TAC, creating an attractive element that places the student in their closest context and adapts to human evolution. Since it is indisputable that the teacher plays an important role in the success of the teaching and learning processes, it is his job to be continuously updated, since adequate initial and ongoing training can be decisive for the smooth running of the education system [33] [34].

2. Materials and Methods

The research process was carried out under the positivist paradigm, because it was directed from a nomothetic vision of the research, with a quantitative approach, because statistical techniques were implemented that allowed to demonstrate the hypotheses exposed, through an analytical empirical method since the data will be treated with statistical procedures and with an experimental design based on G1 x O1 and G2 - O2,   which contemplated two groups of students: an experimental group (G1), made up of sixth semester students of the Public Accounting Program of the CESMAG University (Colombia), belonging to the second academic period of 2020, to whom the experimental treatment (x) was applied, which consisted of the methodological proposal of the use of software tools in the accounting field based on Learning and Knowledge Technologies (TAC), and then apply a post-test (O2) in order to determine the incidence of treatment. Where

G1 X O1

G2 – O2

Where:

G1:   Experimental Group

G2:   Control Group

O1:   Post evaluation to the experimental group

O2:   Methodological proposal

Likewise, there was a control group (G2), made up of sixth-semester students of the same program and university, corresponding to the first academic period of 2020, to whom the experimental treatment was not applied and, subsequently, an O2 posttest was applied. The data obtained were analyzed with the parametric analysis technique using the Student's T distribution.

The study will initially be carried out from the Advanced Excel subject with students of 6 semesters of the Accounting program, day day of the CESAMG University, who will be direct actors of the research process since the proposed experimental treatment will consist of the characterization, evaluation and validation of tools of different types of software such as online applications, desktop software, demos, triales, apps, cloud service, among others, that allow to support accounting administration and management processes in an automated way in accordance with both current technological development and trends in accounting training, thus forming a TAC repository that will have a permanent update policy and will become a reference that will keep its users informed of the various computational solutions that will be of great help both for students, teachers, professionals in the accounting area as well as for people and companies that require them.

This research, according to the definition of [35], which proposes to decompose a whole into its parts to intensively analyze each of its components, as well as the relationships between themselves and with the whole, proposes the following phases: preparation, collection of information or characterization, analysis and evaluation and generation of results that are described below:

a. Preparation phase

This stage shaped the organization of the research project around the designed objectives. In this phase, the proposed and approved schedule of activities was carefully studied and adjusted according to the initial conditions of initialization of the project, taking into account the following activities:

- General planning.
- Software tools for the accounting profession.
- Validation.
- Result.

b. Information collection or characterization phase

The characterization of the existing software tools in the accounting field was carried out by structuring appropriate search strings that include main tokens, synonyms, optional criteria, etc., with the purpose of making extended and deep searches in various general and specialized purpose engines. As a result of this phase, a classification of the tools will be obtained by various criteria such as type, function, cost, advantages, origin, support, help, among others.

c. Analysis and evaluation phase of TACs

Once the tools have been characterized, inclusion and exemption criteria will be used according to the characteristics proposed by the TACs and thus determine their relevance as a support for the development of skills of the accounting training processes. In this phase, the tools considered as TAC support will also be evaluated with a group of stu-

dents belonging to the sixth semester of Public Accounting daytime of the CESMAG University in order to determine their applicability. Finally, the best performing tools will be published in a TAC repository which will be designed under management policies and constant updating.

3. Results

Once the tools with TAC support were evaluated, they were validated with students of the Public Accounting program of the CESMAG University (Colombia), using a control group and an experimental one with the purpose of making a quantitative measurement according to the grades obtained. The latter were analyzed with statistical models that allowed to determine the correlation between them. The activities proposed for this purpose were:

- Validation with experimental group and control:
    a. Application of existing software tools in the accounting field
    b. Application of post-tests to experimental groups and control
- Results:
    a. Tabulation
    b. Analysis
    c. Discussion of results

The research was carried out with two groups: control and experimental. The first group was made up of 28 students of the sixth semester of the Public Accounting program of the CESMAG University of the daytime, corresponding to the first academic period of 2020, and the second group was made up of 23 students of the sixth semester of the same professional program, university and day, corresponding to the second academic period of 2020.

Initially, a characterization was made of both the control and the experimental group and whose data are shown in Table 1.

Table 1. Characterization of both the control and experimental groups.

	Control Group		Experimental group	
Gender	Male	62%	Male	41%
	Female	38%	Female	59%
Average age (years)	23 years		21 years	
Average who take the subject for the first time	97%		99%	
Application of software tools (%)	4%		5%	

Table 1 shows that both the control and experimental groups have similar qualities both in terms of gender and in the number of students studying the academic space for the first time and also in the frequency of applications of software tools. In addition, it can be seen that there is a slight difference in the average ages of the groups, with the experimental being relatively younger than the control group.

Next, the search for the TAC tools (Learning and Knowledge Technologies) was carried out, in table 2 you can see the categorization of some of them:

Table 2. TAC Tools.

| Tool	Free	Paid	App-Line-Pc	Definition
World Office		✖	Software PC	It automatically posts according to current regulations.

Simple count	✖	Software PC	Designed to facilitate billing processes.
Zoho books	✖	Cloud Software	Controls the accounting of small and medium-sized companies.
Enneto	✖	Cloud Software	It allows the issuance and modification of budgets, ordinary invoices.
SAP Business One	✖	Cloud and PC Software	Among its functions is, the management of accounting, finance, sales, customer relations.
PGCONTA	✖	Software PC	Supports the registration of single and multiple accounting entries.
EBP	✖	Software PC	It allows the drafting of invoices and budgets.
Visionwin management	✖	Software PC	Make quotes, orders, invoices, deductions, returns.
Mgest	✖	Cloud Software	Facilitates administrative management.
Kubbos	✖	App	Electronic invoicing program
Keme	✖	App	Accounting application compatible with different types of databases
Count	✖	App	Allows you to remember the key dates of the tax calendar

In table II you can see the search for some learning and knowledge tools, where the name of the tool, type of license, type of software and a small definition are specified.

Then after the characterization of the groups and search for the tools, the research process was applied, which was the implementation of existing software tools in the accounting field, taking into account Figure 1, the control group did not apply experimental treatment and worked with the traditional teaching methodology and with the same teacher who directed the experimental process.

While the application of the research process was carried out, both the experimental group and the control group carried out four group workshops and four individual follow-ups (for a total of eight evaluative tests) that finally formed part of the post-test questionnaire designed for this research.

The results for this evaluation process are shown in Figure 1 which evidencesthe number of correct answers obtained.
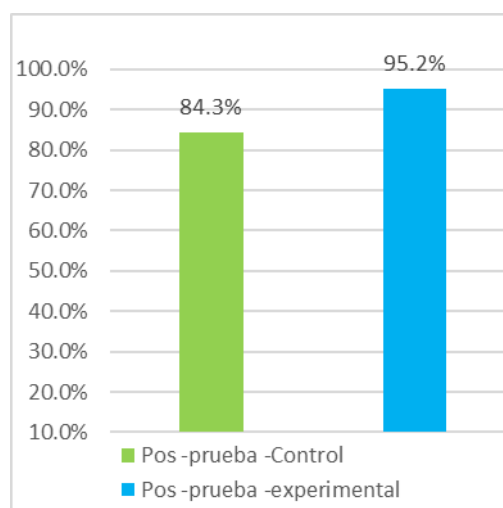
Figure 1. Correct Post-Test Questions.

Figure 1 shows that the experimental group obtained a large number of correct answers than the control group in the development of the different evaluation activities proposed in this study (workshops – individual follow-ups).

To itself, a parametric analysis technique was applied through the probability distribution T of Student with which it is possible to verify a hypothesis examined the differences between two independent and small samples, which in research processes come from the data obtained by the control group compared to the experimental group and that for the present study was parameterized with a level of significance of 6% and whose results obtained by the Experimental group G1 has a statistical value T (3.452567434) greater than both the critical T value of a tail (1.9134761225) and the critical value for two tails (2.238145851) and the p value (for one and two tails) is less than 5%.

This leads to the conclusion that the difference in correct answers between the two groups for each unit of study is statistically significant for T = 5% (Table 2).

Table II. Student T-Test.

Items	Experimental group	Control Group
Stocking	4,4732	3,4674
Variance	0,3834	1,6820
Remarks	29,0000	24,0000
Grouped variance	1,0574	
Hypothetical difference of means	0,0000	
Degrees of libertas	43,0000	
Statistic T	3,43247	
P(T<t) a queue		
Critical value of T (one tail)	1,8124	
P(T<t) two queues	0,0012	
Critical value of T (two queues)	2,2283	

4. Discussion

The implementation of the software tools in the accounting field allowed students to focus on the understanding and solution of the proposed exercises from a procedural and non-instrumental point of view.

The didactic process, by conceiving learning and knowledge technologies as management tools, allowed students to have a vision of problem solving under a systemic approach.

As future work, the inclusion of these software tools in other courses of the Public Accounting program is contemplated, such as in accounting seminars, systematized accounting, among others.

5. Conclusions

The parametric analysis carried out shows that statistically there is a difference between the evaluative records obtained in this study; therefore, it was possible to demonstrate the incidence of the proposed research treatment, which was supported by software tool processes carried out in the experimental group compared to the classic didactics of teaching the computer component, carried out in a control group.

The number of erroneous procedures of both the control and experimental groups found in the post-test are minimal, which determines the interest of the students in the topics proposed in the present study.

According to the results obtained and the process developed with each proposed exercise, it can be affirmed that algorithmic thinking is not exclusive to the computational field and can become a didactic strategy of both teaching and learning for all fields of education.

As a result of this study, currently the microcurritic of the subject of Advanced Excel has as its first unit "Software tools in the accounting field through TAC", which thus turn it into a teaching/learning strategy that allows the professional of this field to have an additional tool to face probability situations of their object of study.

References

1. M. Luengo, J. Castro, and L. Troncoso, "APRENDIZAJE BASADO EN EL DISEÑO EN LA FORMACIÓN UNIVERSITARIA," *Interciencia*, vol. 46, no. 6, pp. 248–255, 2021, [Online]. Available: https://www.redalyc.org/articulo.oa?id=33968022003. [1]

2. G. M. Romero Medina, "Calidad educativa: engranaje entre la gestión del conocimiento, la gestión educativa, la innovación y los ambientes de aprendizaje," *Rev. Estud. y Exp. en Educ.*, vol. 17, no. 35, pp. 91–103, 2018, doi: 10.21703/rexe.20181735romero6. [2]

3. M. Luengo, J. Castro, and L. Troncoso, "APRENDIZAJE BASADO EN EL DISEÑO EN LA FORMACIÓN UNIVERSITARIA," *Interciencia*, vol. 46, no. 6, pp. 248–255, 2021, [Online]. Available: https://www.redalyc.org/articulo.oa?id=33968022003 [3].

4. G. M. Romero Medina, "Calidad educativa: engranaje entre la gestión del conocimiento, la gestión educativa, la innovación y los ambientes de aprendizaje," *Rev. Estud. y Exp. en Educ.*, vol. 17, no. 35, pp. 91–103, 2018, doi: 10.21703/rexe.20181735romero6 [4] .

5. J. H. L. Pereira and J. W. V. Castro, "El aprendizaje, la era del conocimiento y las TIC ante la realidad Universitaria Ecuatoriana," *Atenas Rev. Científica Pedagógica*, vol. 2 Num 38, no. 1682–2749, pp. 51–65, 2017, [Online]. Available: https://atenas.reduniv.edu.cu/index.php/atenas/article/view/290/482 [5].

6. M. Urrutia-Heinz, A. Costa-Quintana, and A. P. Capuano-Da Cruz, "The use of problem-based learning in the construction of knowledge in accounting," *Rev. Electron. Educ.*, vol. 24, no. 2, p. 22, 2020, doi: 10.15359/ree.24-2.19 [6].

7. J. Rodríguez Arce and J. P. C. Juárez Pegueros, "Impacto del m-learning en el proceso de aprendizaje: habilidades y conocimiento / The Impact Of m-learning On The Learning Process: Skills and Knowledge," *RIDE Rev. Iberoam. para la Investig. y el Desarro. Educ.*, vol. 8, no. 15, pp. 363–386, 2017, doi: 10.23913/ride.v8i15.303 [7].

8. H. Parra Acosta, J. López Loya, E. González Carrillo, L. Moriel Corral, A. D. Vázquez Aguirre, and N. C. González Zambada, "Las tecnologías del aprendizaje y del conocimiento (TAC) y la formación integral y humanista del médico," *Investig. en Educ. Médica*, vol. 8, no. 31, pp. 72–81, 2019, doi: 10.22201/facmed.20075057e.2019.31.18128 [8].

9. E. Issn, "Reflexiones De La Experiencia Docente Como Aprendizaje," *Educere*, vol. 25, no. 81, pp. 657–667, 2021 [9].

10. T. Ordaz Guzmán and J. González Martínez, "Valoración de estrategias de construcción del conocimiento en los entornos personales de aprendizaje," *Apertura*, vol. 11, no. 2, pp. 6–21, 2019, [Online]. Available: file:///C:/Users/Tuptc/Downloads/1598-8632-1-PB.pdf[10].

11. D. X. Ramos Rivadeneira and J. A. Jiménez Toledo, "Incorporación del pensamiento algorítmico en la formación contable," *Av. Investig. en Ing.*, vol. 16, no. 2, pp. 107–120, 2019, doi: 10.18041/1794-4953/avances.2.5445 [11].

12. M. Inés, M. Medel, N. Ligia, and H. Viveros, "contable y administrativo Interdisciplinarity of research in accounting and administrative contexts Introducción En el recorrido de la ruta del concepto contable sobre la línea de tiempo que soporta que las principales evoluciones que ha tenido el concept," *Rev. Colomb. Contab.*, vol. 7, no. 14, pp. 93–102, 2019 [12].

13. B. Martín Fernández, M. Sánchez Paniagua, J. P. Hervás Pérez, and E. Rodríguez Rodríguez, "Uso De Nuevas Tecnologías En Las Enseñanzas Universitarias De Química Analítica," vol. 20, no. 2, pp. 140–154, 2016 [13].

14. B. C. Panta, "Tecnologías del aprendizaje y conocimiento (TAC) en el aprendizaje significado de los estudiantes del octavo año de educación general básica jornada matutina de la unidad educativa 'Provincia de Cotopaxi'. Diseño de software de educativo.," universidad de Guayaquil, 2018 [14].

15. G. E. Cano-Pita and M. J. García-Mendoza, "Las TICs en las empresas: evolución de la tecnología y cambio estructural en las organizaciones," *Dominio las Ciencias*, vol. 4, no. 1, p. 499, 2018, doi: 10.23857/dc.v4i1.762 [15].

16. A. Muñoz, J. Jiménez, and J. Muñoz, *"Colossus. Metodología Para La Elaboración De Ambientes Virtuales De Aprendizaje,"* Centro de. Colombia, 2013 [16].

17. Z. López, "El diseño de materiales didácticos sobre TIC para una enseñanza universitaria inclusiva y online The design of instructional materials about ICT to an inclusive and on," no. December, 2018, doi: 10.15304/ricd.2.9.5499 [17].

18. S. Com, "Infancia, Educación y Aprendizaje," *LAS TAC Y LOS Recur. PARA GENERAR Aprendiz.*, vol. 3, no. 2, pp. 162–177, 2018, [Online]. Available: http://revistas.uv.cl/index.php/IEYA/index [18].

19. A. Lagos and E. Al, *Entorno para eel emprendimiento y la innovación Primera edición*. 2020 [19].

20. M. S. Abril, "Proceso De Aprendizaje En La Pandemia," *Panorama*, vol. 15, no. 28, p. 17, 2021, [Online]. Available: https://www.redalyc.org/articulo.oa?id=343965146010 [20].

21. J. F. M. Carvajal, "Transformacion del conocimiento o evolucion del aprendizaje?," *Rev. Lasallista Investig.*, vol. 16, no. 1, pp. 35–36, 2019 [21].

22. L. Y. Díaz Guecha and R. A. Márquez Delgado, "Tecnologías del Aprendizaje y el Conocimiento como estrategias en la formación de los docentes de la Escuela Normal Superior de Cúcuta, Colombia," *Ánfora*, vol. 27, pp. 17–40, 2020, doi: 10.30854/anf.v27.n48.2020.667 [22].

23. J. V. Matos, R. Y., & Sánchez, "Procederes metodo- lógicos: vía para implementar las estrategias curriculares.," *Educ. y Soc.*, vol. 14, no. 1, pp. 52–61, 2016, [Online]. Available: http://revistas.unica.cu/index.php/edusoc/article/ view/149 [23].

24. O. C. Velarezco castro, Jorge Washigton Santos Jiménez, "Las tecnologías del aprendizaje y el conocimiento en la formación.," *Rev. Conrado , 15(68), 180-186.*, vol. 15, no. 68, pp. 0–6, 2019, [Online]. Available: http://conrado.ucf.edu.cu/index.php/conrado [24].

25. M. Cortés, "La Integracion De Las Tac En Educación," *Rev. Española Investig. en Mark. ESIC*, vol. 1, no. 2014, pp. 1–56, 2013, [Online]. Available: http://dx.doi.org/10.1016/S1138-1442(14)60003-6%0Ahttps://reunir.unir.net/bitstream/handle/123456789/1846/2013_06_07_TFM_ESTUDIO_DEL_TRABAJO.pdf?sequence=1 [25].

26. C. Mariana and A. Rodríguez, "Las TIC y las TAC dentro de la educación para comunicadores sociales y periodistas: el nuevo reto del perfil profesional," *XXIII Cátedra UNESCO Comun.*, pp. 1–8, 2017 [26].

27. Q. Prat Ambrós and O. Camerino Foguet, "Las tecnologías del aprendizaje y el conocimiento (TAC) en la educación física, la WebQuest como recurso didáctico," *Apunt. Educ. Física i Esports*, no. 109, pp. 44–53, 2012, doi: 10.5672/apunts.2014-0983.es.(2012/3).109.04 [27].

28. J. M. Guerrero Jirón, J. R., Vite Cevallos, H., & Feijoo Valarezo, "Uso de la tecnología de Uso de la Tecnología de Información y Comunicación y las Tecnologías de Aprendizaje y Conocimiento en tiempos de Covid-19 en la educación superior.," *Rev. Conrado*, vol. 16, no. 77, pp. 338–345, 2020 [28].

29. E. Descriptiva and P. De, "Producto de investigación," vol. 0341, pp. 1–20, 2020 [29].

30. R. Cózar-Gutiérrez, M. V. de Moya-Martínez, J. A. Hernández-Bravo, and J. R. Hernández-Bravo, "Conocimiento y uso de las tecnologías de la información y las comunicaciones (tic) segùn el estilo de aprendizaje de los futuros maestros," *Form. Univ.*, vol. 9, no. 6, pp. 105–118, 2016, doi: 10.4067/S0718-50062016000600010 [30].

31. R. Pérez Zúñiga, P. Mercado Lozano, M. Martínez García, E. Mena Hernández, and J. Á. Partida Ibarra, "La sociedad del conocimiento y la sociedad de la información como la piedra angular en la innovación tecnológica educativa / The Knowledge Society and the Information Society as the cornerstone in educational technology innovation," *RIDE Rev. Iberoam. para la Investig. y el Desarro. Educ.*, vol. 8, no. 16, pp. 847–870, 2018, doi: 10.23913/ride.v8i16.371 [31].

32. R. Zuñiga, P. Lozano, M. Martinez, and P. Ibarra, "La sociedad del conocimiento y la sociedad de la información como la piedra angular en la innovación tecnológica educativa / The Knowledge Society and the Information Society as the cornerstone in educational technology innovation.," *RIDE Rev. Iberoam. Para La Investig. y El Desarro. Educ.*, vol. 8, no. 16, pp. 847–870., 2018, doi: https://doi.org/10.23913/ride.v8i16.371 [32].

33. F. P. Gutiérrez, "NTICx y TAC y gestión de la complejidad . Proceso de enseñanza-aprendizaje de la investigación uni- versitaria en enfermería," *Transform. ACTUALES Y DESAFÍOS PARA LOS PROCESOS Form. | SAA*, pp. 1692–1701, 2013 [33].

34. F. Gutiérrez, "NTICx y TAC y gestión de la complejidad . Proceso de enseñanza-aprendizaje de la investigación uni- versitaria en enfermería.," *Transform. ACTUALES Y DESAFÍOS PARA LOS PROCESOS Form.*, pp. 1692–1701, 2106 [34].

35. E. Trigo, "El papel de la formación inicial y permanente del profesorado para forjar lectores. RESED," *Rev. Estud. Socioeducativos*, vol. 14, pp. 66–84, 2016 [35].

36. P. Verdulla, "Las TIC y las TAC al servicio de la educación : una introducción a los mapas conceptuales y la toma de apuntes.," *January, (December)*, 2017, doi: https://doi.org/10.25267/Rev [36].

37. R. Ruiz, *El método científico y sus etapas, México: Biblioteca Las Casas*. 2007 [37].