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ICT tools as resources for the evaluation of curricular content in undergraduate students

Herramientas TIC como recursos de evaluación de contenidos curriculares en estudiantes de pregrado

Ferramentas TIC como recursos para a avaliação do conteúdo curricular em estudantes de graduação

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Abstract
Evaluation refers to a continuous process that is essential for teaching and learning. Throughout history, various strategies and techniques have been adopted based on evaluation standards and the objectives to be achieved. Currently, after the COVID-19 pandemic, ICTs have been an essential tool for educational institutions. In spite of the climate of distrust created by the use of these tools, the professors of the University of Guayaquil of the Information Technologies career, have been forced to use them as a method of teaching and evaluation of curricular contents in response to the needs of the educational community. Therefore, this study uses a descriptive documentary type approach of applied field and as an instrument the survey technique was applied, having as a sample of 28 teachers, this was done with the purpose of making a comparative analysis, use and importance of ICT as an essential tool for the evaluations of the curricular units aligning with the functional criteria of formative and summative evaluation during the online classes.
Key words: ICT tools, formative assessment, summative assessment, curricular content.

Resumen
La evaluación se refiere a un proceso continuo que es esencial para la enseñanza y el aprendizaje. En el transcurso de la la historia se han adoptado diversas estrategias y técnicas basadas en estándares de evaluación y los objetivos a alcanzar, en la actualidad tras la pandemia por el COVID-19, las TIC han sido una herramienta esencial para las instituciones educativas. A pesar del clima de

desconfianza creado por el uso de estas herramientas, los profesores de la Universidad de Guayaquil de la carrera Tecnologías de la Información, se han visto obligados a su uso como método de enseñanza y evaluación de los contenidos curriculares en respuesta a las necesidades de la comunidad educativa. Por lo tanto, este estudio utiliza un enfoque tipo documental descriptivo de campo aplicado y como instrumento se aplicó la técnica de la encuesta, teniendo como muestra de 28 docentes, esta se efectuó con propósito de realizar un análisis comparativo, uso e importancia de la TIC como herramienta esencial npara las evaluaciones de las unidades curriculares alineándose con los criterios funcionales de evaluación formativa y sumativa durante las clases en línea.
Palabras clave: Herramientas TIC, evaluación formativa, evaluación sumativa, contenidos curriculares.

Abstrato
A avaliação refere-se a um processo contínuo que é essencial para o ensino e a aprendizagem. Ao longo da história, várias estratégias e técnicas foram adoptadas com base em padrões de avaliação e nos objectivos a alcançar. Hoje em dia, após a pandemia da COVID-19, as TIC tornaram-se um instrumento essencial para as instituições educativas. Apesar do clima de desconfiança criado pela utilização destes instrumentos, os professores da Universidade de Guayaquil na carreira das Tecnologias de Informação, foram forçados a utilizá-los como método de ensino e avaliação dos conteúdos curriculares em resposta às necessidades da comunidade educativa. Portanto, este estudo utiliza uma abordagem documental descritiva tipo de campo aplicado e como instrumento foi aplicada a técnica de levantamento, tendo como amostra 28 professores, isto foi feito de modo a fazer uma análise comparativa, utilização e importância das TIC como instrumento essencial para as avaliações das unidades curriculares alinhadas com os critérios funcionais de avaliação formativa e sumativa durante as aulas em linha.
Palavras-chave: ferramentas TIC, avaliação formativa, avaliação sumativa, conteúdo curricular.

INTRODUCTION

The world is changing both inside and outside higher education, and social commitment must break away from traditional learning models. It is a matter of reinforcing in the minds of students and society in general that the use of ICT as a teaching tool must be a

renewable process, so that new trends in ICT development are observed every day. Regarding the link between the use of ICT as a teaching tool and student learning, Peñaherrera (2021) conducted a study that suggested that the Medusa project should be evaluated by integrating the use of ICT in the classroom, curriculum (contents, methods and evaluation), and the teaching profession (work and forms of cooperation) in order to identify, describe and analyze changes and innovations among teachers. From the latter perspective, it is worth noting how important or possible it is to investigate the relationship between the use of ICT as a teaching tool in higher education institutions and student learning. Part of the use of ICT is almost a natural acquisition or a social necessity simply because it is embedded in social development.

The conditions created by Covid-19 affected all areas of people's lives: social, psychological, labor and educational, and it is clear that educational systems, schools and universities must include technological resources for the formation of a modern citizenship. The integration of information and communication technologies (ICT) and current education is a transcendental problem from various perspectives and at all educational levels (Luz, 2018). Therefore, it is important to implement more strategies to equip schools with these technologies so that most students get them as soon as possible and can use them in the first place as a critical exercise of citizenship.

Among the reasons that support such choices and decisions are usually mentioned arguments related to the demands of today's society where it perceives a marked digital culture; in this way society is conceptualized among other things, by the relevance of information and knowledge, as well as by digital and the role of interconnected technologies as a tool for the construction of a knowledge society (Cobo, 2016).

It also discusses the characteristics and properties of the design of digital materials in the teaching and learning process, including the relevance and quality of the same in the educational praxis designed when ICTs enter the classroom, the teacher professionalization required to facilitate such practices and the management of educational centers to call their digital technological capital. Moreover, the evaluation of the effective use of ICT in institutions has been discussed and increasingly rigorous. That is, after many efforts of national social and educational centers to incorporate ICT is fundamental, from the psychoeducational field is concerned about the need to understand the ability to transform and improve education

through ICT, always from the basis of purpose and the effective use of these technologies in specific circumstances (Benítez, 2019).

In this sense, the knowledge society in which we are immersed has demonstrated the need for education and understanding of real situations; the development of skills and their implementation implies a progressive process that strives for improvement. According to González (2021)the word evaluation appeared for the first time in the General Education Law of 1970, since then, it has evolved a lot along with the term education. Previously, education was thought of as a way of accumulating knowledge, but now the concept has been extended to the development of the personality and the acquisition of knowledge, values and strategies in society.

The word test has a great limitation with regard to the concept of evaluation. As Piaget mentions (1973)assessments are not goals, first of all, because they are random and because they depend more on memorization than on the student's ability. In this way, evaluation becomes an essential tool for the teacher since it is his way of recognizing the learning that the student has achieved, while for the student it generates a lot of stress and difficulties in the teaching process.

On the other hand, Galarza (2021) recognized the process of knowledge acquisition, which requires an evaluation method that provides feedback on the knowledge, skills and achievements of the work done by the students. Since teachers seek improvements in the educational performance of students, specific criteria are required to determine the expected outcome and meet the established criteria. In addition, it is accompanied by a review of the work they do, and while it is very common to point out errors, strengths and areas for improvement.

The integration of ICT in higher education institutions has transformed the way of teaching and learning in the 21st century. These tools have created a pedagogical revolution for students and teachers who have had to adapt their methods to the new educational environment, therefore, there are many ways to incorporate ICT in the classroom, but the most important is to use technological tools to achieve the educational objectives you want to obtain, and not the other way around (Viera, 2020).

For a teacher to fulfill his role as mentor, advisor and academic, he must not only be updated in his area but in various fields, on the other hand, most of the technological careers taught by different teachers in higher educational institutions need ICT, such is the case of specialization in Information Technology which involves training

professionals with experience in programming technology, networks, human-computer interaction, databases and network systems; able to plan, develop, organize and maintain information securely using international methods and standards, positively influencing the social and productive communities. He/she has a high research awareness and sense of responsibility. However, in the Information Technologies career at the University of Guayaquil, problems commonly arise due to the lack of a technological tool to perform evaluations of curricular content in students, because the teacher by not performing evaluations fails to discover if the student has actually learned or assimilated with full accuracy the topics seen previously or if they present problems of deficiencies, weaknesses, deficiencies, errors in setting the learning of the student body. In addition, learning with reference to new topics that are linked to their training is limited and presents serious difficulties and prevents the student from progressing in learning and has immense possibilities of being affected at the end of the academic period, all this accompanied by the lack of implementation of technological tools.

Nowadays, young people are digital natives, and ICTs are configured as a communication, information and evaluation channel that opens the door to stimulate learning and increase class participation. Therefore, ICTs as evaluation tools make it possible to immediately recognize what students achieve in the learning process and to notice the learning problems that arise, that is, to make decisions that allow them to overcome the problems as they arise. Based on the previous approaches, this research study presents the types of evaluation of curricular contents, in addition to evaluation and ICT and a comparative analysis of ICT resources in the face of the transaction from face-to-face to virtuality due to COVID-19. The choice of this topic is given by the prominence of the evaluation of curricular content and ICT as an essential tool in the educational field, in addition to the concerns of teachers in its development, being the object of study the Information Technology career at the University of Guayaquil. Evaluations can be categorized in several ways, according to the criteria used, therefore, Arias. (2017) classifies them according to the following aspects:

Table 1. *Shows the types of evaluation according to Arias, 2017.*

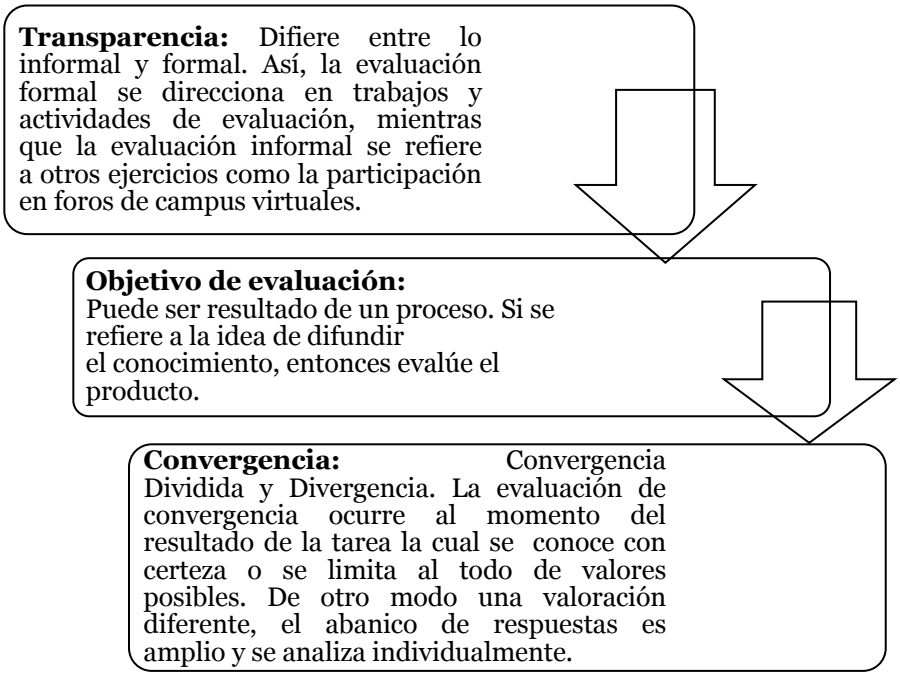
Types of Evaluation	**Source**

Function	It refers to the objectives of the evaluation, differentiating between formative and summative.	(Arias, D., 2017).
Extension	Holistic evaluation, which includes all elements of the teaching-learning process and is analyzed as a whole; and partial evaluation, which encompasses the evaluation of individual components.	(Yepez, Borja, & Tovar, 2017)..
Evaluating agents	External and internal. External evaluations occur when the process is carried out by an agent that is not affiliated to the Educational Center. The best known is the expert evaluation, whose professionals are usually coordinators, researchers, inspectors, administrators, etc. In internal evaluation, the members of the institution themselves are responsible for its development, which again offers several possibilities in relation to the agents involved: • **Self-assessment:** Self-assesses own work. • **Heteroevaluation:** A work performed by another person is evaluated. • **Co-evaluation:** Peer or mutual evaluation.	(Reyes & Diaz, 2020).
Time of application or chronology	For this standard, mention should be made of the initial, procedural and final evaluation. The initial evaluation is the one that involves the collection of data to analyze the baseline situation. The process evaluation is a continuous collection of time that allows decisions on improvements to be made.	(González, 2021)

Comparison criteria	The evaluation compares the results of the achievement of the established goals. There are two situations in this sense: self-referential and heteroreferential. In the first case, unlike the second, the relation is the subject itself or the evaluated object itself. - Benchmark or Metric: A goal established in advance is compared with the result. - Normative references or classifications: comparisons are made with the general levels of specific normative groups.	(González, 2021)

While in this classification, Garcia et al. (2020) determine dimensions of transparency, object and convergence:

Figure 1. Shows the dimensions of transparency, object and convergence of evaluation according to Garcia, 2017.



In today's society, technology has a great impact on almost all areas of our daily lives, technologies are characterized by rapid development and change: they develop more and more capabilities, apps, updates and greater interaction, they become complex and are designed for different purposes. This author also points out that the truth is that we must also be aware of the limitations that exist, the digital divide that occurs between people with very different ICT access and capabilities. However, despite these obstacles, the inclusion of ICT in education has had such transformative and innovative effects that its use is considered an indispensable skill for new generations (Martínez, 2015).

Chinchin and Jair (2021) argue that the virtual learning environment or EVEA arises from the massive use of the Internet and its power as a tool for the dissemination of knowledge. These environments provide efficient tools for managing, distributing and processing materials and resources for educational purposes. ICTs enable a dynamic and constant learning process established as a tool in a pedagogical context. In this way, space and time inconveniences are eliminated, new possibilities are born and collaborative structures, communication and learning environments are propitiated according to changing times and rhythms. (Hernández, et al., 2019).

In this sense, Martínez (2015) agrees that ICTs also open new spaces for the development of education. Their use is found especially in higher education and to modernize the field of distance education. Thus, the term "distance education" refers to a form in which students and teachers are spatially separated, and sometimes, time and educational processes are developed through the management of learning systems (LMS) or Learning Management System, content and Internet. These structures integrate virtual, online, e-learning and web-based education.

According to Yurcic (2022) mentions that when the definition of ICT and assessment are approached together, there is a tendency to believe that they refer to tests, exams that attempt to measure the accumulation of knowledge, instead of applying that knowledge to solve real-world problems. On the other hand, Gonzales (2021) clarifies that neologisms with different nuances regarding assessment and ICTs have emerged, such as computer-assisted assessment and computer-based assessment.

Figure 2. It presents the nuances of evaluation and ICT, according to Gonzáles (20219).

Evaluación asistidad por computadora (Computer Assisted Assessment CAA)

- Esto implica el uso de una computadora en alguna etapa del proceso de evaluación. Como es con el uso de procedimientos para evaluaciones objetivas o el uso de procedimientos estadísticos para analizar puntajes y calificaciones de pruebas.

Evaluación basada en computadora (Computer Based Assessment CBA)

- Se refiere a la automatización completa del procedimiento de evaluación del aprendizaje.

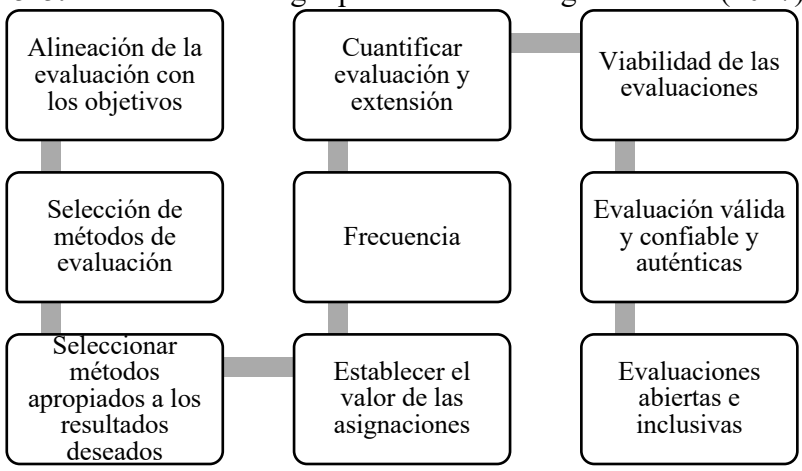
According to Perurena et al. (2020) they mention that both assessment models seek to optimize the application, to correct and analyze the results of the test, both individually and collectively. In the case of Augmentative and Alternative Communication (AAC), evaluations can be given in two steps: the evaluation is administered on paper and corrected automatically using optical reading paper, or the test questions are socialized in physical form and answered on a computer for identification, interpretation and analysis performed by means of various software.

Gonzales (2021)pointed out that, in some learning environments, testing is channeled solely into assessments. But if you think about constructivism and its provenance, learning is projected beyond, including the collection of information to evaluate different areas of knowledge. In addition, criteria such as the properties and dimensions of the module and the objectives of the educational program must also be considered when gathering information for further evaluation.

Arias (2017) expresses that there are difficulties when designing evaluations, considering previous assumptions about types or models of evaluation. First, because it is often relegated to the context in the instructional design process, and second, because it is an online model, and because it presents new challenges added to the existing ones, so an evaluation must be comprehensive, reliable and must be according to its function.

This same author provides a description of what the evaluation design process should be like:

Figure 3. Evaluation design process according to Arias (2017).



Arias emphasizes that most of the evaluation techniques can also be carried out in traditional environments, highlighting the possibility of transferring the evaluation strategies and tools used. The same that can be translated into the exploitation of the benefits provided by technology facilitated by the use of ICT, therefore, a comparative analysis of ICT resources for evaluation is shown in continuity:

Table 2. *Comparative analysis of ICT resources for evaluation, according to Arias 2017.*

COMPARISON OF ICT RESOURCES FOR EVALUATION												
FUNCTIONALITIES	**Nearpod**	**Flipgrid**	**Kahoot**	**Corubrics**	**Google Forms**	**Quizizz**	**Loom**	**Jitsi**	**Genially**	**Drawexpress**	**Additio**	**Educaplay**
Evaluations can be shared or only available to teachers.	Yes	NO	NO	NO	Yes	NO	Yes	NO	NO	NO	NO	NO
Works on computers and mobile devices.	Yes	YES	YES	NO	Yes	NO	Yes	Yes	NO	NO	Yes	NO
It allows analysis to unfold and encourages reflection while reflecting the student's perspective.	Yes	NO	NO	YES	NO	NO	NO	NO	NO	NO	Yes	NO
Questionnaires can be created collaboratively.	Yes	NO	NO	YES	YES	YES	NO	NO	NO	NO	NO	NO
Increases student interest, motivation and participation in the classroom	Yes	Yes	Yes	NO	Yes	Yes	NO	NO	NO	NO	NO	NO
It has multiple possibilities.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Videos can be uploaded and can be viewed by your peers.	Yes	YES	YES	NO	NO	NO	YES	NO	NO	NO	NO	NO
It allows students to follow different itineraries.	Yes	Yes	Yes	NO	YES	NO	NO	NO	NO	NO	YES	NO
They find it challenging, exciting and engaging.	Yes	Yes	Yes	NO	YES	YES	NO	NO	NO	NO	NO	NO
It makes it easier for students to evidence their learning and for teachers to monitor the teaching process.	YES	NO	Yes	NO	Yes	NO	NO	NO	NO	NO	NO	Yes
In an online environment, you can quickly respond to the traditional rules that take place in the classroom.	Yes	NO	NO	Yes	Yes	NO	NO	NO	NO	NO	Yes	NO
Improve the classroom environment.	Yes	Yes	NO	NO	Yes	Yes	NO	NO	NO	NO	NO	NO
Help develop quality materials and share	Yes	Yes	NO	NO	Yes	NO	NO	Yes	NO	NO	Yes	Yes

them with teachers and students.

MATERIALS AND METHODS

To achieve the objectives of this study regarding the comparative analysis between the tools that have been used by teachers in the academic period 2021-2022 CI and CII, a descriptive documentary study was conducted through the literature related to the use of ICT as evaluation tools; and an applied field study, using as the unit of analysis teachers of the Information Technologies career at the University of Guayaquil, where 56 teachers were identified, of which a non-probabilistic sampling by convenience was applied for the implementation of the information collection tool, resulting in a sample of 28 teachers who contributed through an online survey with information on the use and importance of ICT as an essential tool for the evaluation of curricular content in students, since the evaluation is very useful not only for teachers but also for students, under circumstances such as the pandemic caused by the virus SarsCov-2019, but that significantly affect the modality from the very conception of the career. To collect the information, the survey was conducted through Google Forms, and the link was shared via email to teachers. For the analysis of the information, the results of each question were tabulated for better interpretation.

RESULTS

Table 3. *Problems in the teaching-learning process. This table shows the results of question 1 of the survey conducted by teachers in the academic period 2021-2022 CI and CII.*

Detail	Frequency	Percentage
Very much in agreement		41%
Agreed		59%
Neutral	0	0%
Disagree	0	0%
Strongly disagree	0	0%
Total		**100%**

The educational institutions presented inconveniences in the teaching-learning process after the pandemic, due to the confinement determined by the Ecuadorian state to prevent the spread of the virus,

before these all higher education institutions had to adapt their employees and students to a new method of teaching and learning, through means that allow them to work together. Therefore, the survey conducted determined that 59% of teachers agree and 41% strongly agree that there were problems in the teaching-learning process, therefore, everything had an extreme change in education.

Table 4. *Tools used. This table shows the results of question 2, of the survey conducted by teachers in the academic period 2021-2022 CI and CII.*

Detail	Frequency	Percentage
Online ICT tools		86%
moodle platform resources		14%
Total		**100%**

The resources used by teachers were online tools (86%) and 14% used didactic resources as teaching aids; the pandemic meant that higher education institutions had to implement essentially and in depth digital methods in order to provide curricular content to students in online mode.

Table 5. *ICT tools. This table shows the results of question 3, of the survey conducted by teachers in the academic period 2021-2022 CI and CII.*

Detail	Frequency	Percentage
Very much in agreement		100%
Agreed	0	0%
Neutral	0	0%
Disagree	0	0%
Strongly disagree	0	0%
Total		**100%**

It is important to highlight that ICT is an essential tool nowadays, since it can be used to teach and evaluate students, in such a way that the teacher can know through the evaluation the students' deficit in relation to what has been taught in class and measure their level of learning. From these results, 100% of the teachers strongly agree that it is important to use ICT for the general evaluation of students.

Table 6. *Knowledge of the evaluation process and types of evaluations. This table shows the results of question 4, of the survey conducted by teachers in the academic period 2021-2022 CI and CII.*

Detail	Frequency	Percentage
Very much in agreement	0	0%
Agreed		27%
Neutral		50%
Disagree		23%
Strongly disagree	0	0%
Total		**100%**

The survey determined that 50% of the respondents have a neutral knowledge regarding the evaluation process and the types of evaluation that exist, while 27% consider that they agree, concluding that they have a little knowledge of the mentioned, however, 23% disagree, which allows concluding that the majority does not have an essential or fundamental knowledge of the types of evaluation that can be performed through ICTs to measure student performance and learning.

Table 7. *ICT essential tools to evaluate contents. This table shows the results of question 5 of the survey conducted by teachers in the academic period 2021-2022 CI and CII.*

Detail	Frequency	Percentage
Very much in agreement		55%
Agreed		45%
Neutral	0	0%
Disagree	0	0%
Strongly disagree	0	0%
Total		**100%**

As an analysis of the survey it is determined that Information and Communication Technologies are a tool of great importance in the curricular evaluation of the students of the Information Technologies career, given that 55% strongly agree with what was stated, and 45% agree, concluding that ICT are relevant in the educational field.

The implementation of ICT in the evaluation of the curricular contents of the Information Technology course at the University of Guayaquil, offers the possibility of immediately understanding the results and identifying the shortcomings identified during the teaching process. Therefore, as mentioned Arias (2017) previously,

when exposing the types of evaluation, the purpose of developing this process is to obtain a global perception of the student's previous knowledge, that is, to understand the state of learning of the students of the Information Technology career, in addition to facilitating the process and measures of formative evaluation of learning stated in the degree of acquisition of summative evaluations on topics of maintenance, control and installation of computer equipment, Arias expressed that there are difficulties when designing evaluations, therefore, ICT resources or models for evaluation should be considered in this study.

The survey evidenced that 86 % of the teachers of the Information Technology career used ICT as a tool for the teaching and learning process due to the different circumstances that arose after the pandemic, which is related to what Hernández et al. mentions (2019) that ICTs offer the possibility of continuous, dynamic and indivisible learning process serving as an essential tool in educational scenarios in the face of any global situation. Fifty percent of teachers have a neutral knowledge of the curricular evaluation process, therefore, the authors Freire et al. (2021) determine that the curricular evaluation process must begin by considering the objective to be achieved, then the student must be able to obtain the levels

CONCLUSIONS

This study allowed to deepen and understand the importance of this process and its improvement in the teaching field. In this way, evaluation is convenient for both teachers and students, because the learning process can be improved from two aspects. On the one hand, students are aware of their self-learning and, on the other hand, teachers recognize the effectiveness of their teaching methods and strategies and make the necessary adjustments, It is worth mentioning the importance of the evaluation function (formative and summative), since evaluations aim to verify the achievement of certain objectives. Therefore, when designing an evaluation, these two functions must be addressed and adapted to the needs of the environment and the individual.

Thanks to the research on ICT tools, one can be sure that their use is reasonable and logical in the context of real-world oriented learning, despite the reticence after the pandemic presented by the COVID-19 virus. Likewise, the usefulness of ICTs has not only been presented in distance education scenarios, such as in the context of a pandemic, but they are also a special tool in the classroom, because they allow the change of traditional teaching models, with a more appropriate

direction to a constantly changing reality driven by technology. It is clear that adaptability is a very relevant factor in education, therefore, for the evolution and improvement of teaching and learning processes, ICT must be available. Moreover, this adaptability will require the development of new materials to overcome the difficulties posed by new tools, such as electronic monitoring systems that ensure the quality of evaluations.

In short, the methodological and pedagogical components of this work are attractive and can be applied in the study of the evaluation of the curricular content of the Information Technology course within the framework of the teaching process. Likewise, precisely because it also focuses on ICT tools, which are characterized by increasingly accelerated changes and evolution, it is correct to suggest that new tools, technological resources, solutions to problems may emerge in a short period of time as it appears in the present work, while giving rise to future research.

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