

ANALYSIS OF TEACHING COMPETENCIES IN RELATION TO THE COSTS OF ADAPTATION TO THE ONLINE MODALITY

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Abstract

Teaching and learning in Higher Education is constant regardless of the time or space in which we find ourselves, since there will always be something to learn. The knowledge that a teacher possesses is very valuable for the development and subsistence of life. Each one of us wishes to leave our mark in history, a positive legacy, and this can be achieved in different ways. One of them is to pass on to others the knowledge acquired in life's journey. Teachers have been adapting their teaching methods to the technological evolution and using tools at their disposal, their main objective and goal is to provide teaching and understanding for their students. Each teacher has his or her own teaching-learning methodology depending on his or her skills, the equipment or implements he or she has and above all his or her attitude. The present research aims to investigate the knowledge, skills, and creativity that higher education teachers have in the technological field, as well as the strategies that teachers choose to stay updated, we will analyze the attitudes that teachers show in the face of this challenge and discover the drawbacks and cost benefits that teachers have to adapt to technological changes in the field of education presented by the COVID-19 pandemic.

Keywords: competencies, strategies, technological changes, costs.

Introduction

It is important to note that within the teaching-learning of online Higher Education, several competences are determined, such as basic, specific and transversal ones that allow the teacher to transmit knowledge, to develop a productive process that achieves the successful achievement of institutional objectives. Based on these competencies, we try to impart knowledge and skills to students for their socio-labor field.

Today, the pandemic has left entire families in desolation and grief; The lives of many citizens

changed in social, economic, and especially in the educational environment had to implement a new modality called "Virtual", to which more than two million Ecuadorians have chosen to continue their academic training, which leads to higher expenses on the Internet or modernize their technological equipment such as cell phones, computers and printers. Barbara Santos details that "virtual classes are a digital environment in which a process of exchange of information and knowledge is carried out that aims to provide learning among the users who participate in them" (p.1). It is of vital importance that the

corresponding bodies strengthen the HEIs in all the necessary areas so that future professionals do not present difficulties when getting involved in the workplace and with society; In addition, make a call of conscience to those who benefit from this wonderful resource such as education, to continue striving and supporting the great work that teachers do every day, in order to overcome the crisis that the country is going through and contribute to its progress and development.

It is important to note that access to higher education in Ecuador is part of the will and management of government strategies that seek to reduce poverty, but at the same time it is a substantial item of the budgets established for the HEIs, but they fail to meet the expectations or adequate needs of those who make use of them. . Students and teachers confirm this since the current situation has exposed the existing shortcomings, which have not improved to date.

At each beginning of the semester the family nucleus of many students faces a unique challenge in which not everyone can be involved either due to lack of resources or support. The new obstacle in terms of distance education or in the hybrid model of distance education is the uncertainty generated by the possibility of cancelling any type of face-to-face education, and this is due to the constant search for personal and work balance.

It is worth mentioning that many of the students cannot always carry their personal and professional challenges, taking into account the conditions and difficult daily decisions about the economy at home, their professional careers, their workload and at the same time their safety and state of health.

In Ecuador, various difficulties and limitations have been manifested in terms of education in media and digital platforms; Digital illiteracy is one of the widespread causes due to the lack of training among teachers and students. Technological adaptation has lagged behind for more than two decades and with it this delay had an even greater impact with the effects that the pandemic left on institutions. Aguilar mentions that "the little training in virtual platforms, draw large generational gaps between teachers who also present digital illiteracy and their students who in

turn have more expertise in technology." To continue with the teaching-learning process, device education was used for online classes, however, not everyone could implement it, so many postponed their classes and in regrettable cases withdrew from their studies. (Aguilar-Gordón, 2019)

As can be seen, the inefficiency in the use of resources to access technological sources for their use goes from physical access to digital resources, learning and training of users in technological areas; preventing overcoming gaps and reaching optimal levels in education at any level.

According to UNESCO, it mentions that by 2030, "it is intended to strengthen access to equitable conditions for all in their higher education, at the professional, technical and quality university education levels." Higher education in Ecuador is considered a strategic area, which provides its service to society, to the social, productive and environmental structure; training professionals with skills and knowledge that respond to the need to connect the educational world with the world of work. The assessment through systematic studies on the response of higher education to the needs of society still leaves the task of relevance pending. (UNESCO, 2019)(Rodríguez Oviedo, Medina León, & Carpio Vera, 2017)

Higher education, being the last step of the academic training of young people and adolescents in Ecuador, is an area that should have a competent functional system in different areas; furniture, technology, administrative and teaching staff among others; In order to meet the goals proposed by the government and thus provide the population with quality servants who contribute to the development of the country.

The skills that a person develops periodically throughout the educational process is what is known as competence, these are evaluated in stages and their objective is to certify that students comply with the development of their skills, order their impressions and understand the relationships between the facts of observing and acting. Academic Competencies are theories of language, such as an ability and disposition for performance and interpretation.

Competence in education is a set of social, affective behaviors and cognitive, psychological, sensory and motor skills that allow to adequately carry out a role, a performance, an activity or a task. In other words; Academic competence is the degree of knowledge that a person has to be able to see advanced classes on a subject, it is the approval of different levels of study that allow him to be competent to take a certain class, example: to be able to do a postgraduate of some career it is first necessary to approve the undergraduate of that profession, those who already approved the undergraduate would be academically competent to carry out the postgraduate degree.(Muñoz, Francisca, & Medina, 2017)

In this regard, academic competence today is considered as a constant quality in the evaluation of an individual, since it allows the person to obtain greater opportunities in terms of work; whose remuneration is high, due to the complexity of its execution since it requires individuals with logical thinking and who generate fresh knowledge with which a certain work can be exercised.

The term Specific Teaching Competences refers to all those attitudes, skills characteristic of each teacher and the knowledge of each one in their work. This set of activities reaches the path of excellence that make up the requirements or the minimum conditions necessary for the exercise of teaching, but, by themselves, they do not account for an outstanding performance or excellence. They are related to the knowledge of the subjects taught, the ability to express themselves and understand their ideas, theories and concepts, the ability to work together with other teachers, show responsibility and commitment to the work and ethics of the teaching work. They involve competences: (Villaruel, 2017)

- a) Cognitive associated with knowledge of the discipline
- b) Social associated with teamwork and collaboration with others
- c) Communicative refers to the ability to express and explain oneself adequately at an oral and written level

d) Technological linked to the management of information technologies

e) Personal as are commitment and professional ethics (Delgado, 2018)

These competencies refer to those that are a fundamental part of the teaching-learning process and distinguish a teacher whose teaching is focused on student learning, seeking to identify and understand what are the best teaching and evaluation strategies.(McCabe & O'Connor, 2014)

According to the learning outcomes you want to develop, the contents you learn and the characteristics of the students you teach. These involve competencies of:(Cid, Zabalza, & Doval, 2012)

a) Planning and Organization referred to how the teaching-learning process is designed, respecting what should be taught in a course, the learning results that students must achieve.

b) Didactics understood as the selection of teaching strategies and methodologies that will allow achieving the goals of the course, considering the characteristics and needs of the students

c) Design and Implementation of Evaluation Methodologies with which it is expected to measure and value student learning, using different strategies that evaluate the construction of knowledge and development of higher-order skills, giving feedback to students of their results.

On the other hand, the Transversal Teaching Competences are those that deliver an added value of the teaching and learning process. They function as a protective factor of the teacher's role, their interaction with students and the achievement of expected learning. It is related to the meta-cognitive, self-critical and reflective capacity of the teacher, which allows him to put himself in the place of others, to bond adequately with the students, to question and improve their teaching practices. These competencies influence the effectiveness and satisfaction of students and teachers with the teaching-learning process. They involve competences linked to: (Sanz de Acedo, 2016)

- a) Maintaining a positive classroom climate
- b) Research and reflect on their own pedagogical practices

Information and communication technologies today not only represent a new means of information worldwide, but are a very important instrument in the new generations both in social spaces and at the educational level. According to the aforementioned Delfín Ortega emphasizes that "education must execute actions that promote digital literacy, with which students can be motivated in their teaching-learning process".(Ortega Sánchez & Gómez Trigueros, 2017)

According to Estay-Niculcar, in (2015)his study on the differences between virtual education and face-to-face, he distinguishes the conventional means of modern education with the main focus of the digital situation, since it is the independence that students lose in the development of their learning process, since they are the ones who define their work rhythm. In addition, he mentions that for many students their educational goals are of a practical nature, because they carry out work activities related to their formal studies, thus strengthening the form of motivation.

Virtual education was a utopia for many, however over time they were established to break barriers and borders, generating lower mobilization costs, however the pandemic case managed to rebound this type or modality of education and be part of everyday life, where human resources are the same but, Materials do not, where a large investment is identified by tangible assets but there is no strengthening of resources or technological assets that make this reality possible. At least at the beginning of this type of education it was a remote pilot plan with which it was not possible at the beginning to collect the breaking point that would be seen in the future, when it is analyzed that it was achieved with this modality and that it can arise from all this, and not only in a positive way, since several countries have seen that their technological decline of access has put them in an even more position. lower where education is part of a privileged level (Gomez, 20219).

To reduce technological gaps it is important to define in each society its achievement, scope and real use that occurs the different digital technologies or online resources, a cost budget will not be the same in a society that already has the technological knowledge at least necessary than others where access has not been reached, And part of this premise assumes that an online or physical education costs more. In addition, it must be established if all resources can be produced according to the need of each study plan and if there is the knowledge, time and willingness to design on the part of the actors.

Engle (2014) determined that the main factors driving the costs of adaptation towards the online / virtual modality are the development and production of materials, since it is required to create the study material on digital platforms and in turn the necessary disposition of technological teams to perform tasks and connect to online classes. Another factor is the distribution of materials, this will depend on the number of students that exist by courses, in addition to the experience of a teaching technician working in the virtual environment, is one of the most important factors in this modality since every day appear ideas and support tools that improve educational quality; Teachers who develop technology-based materials, such as a video program, or a website, is a fixed cost, as it does not influence how students take the subject/subject. However, production costs can vary depending on the type and number of subjects established by students, an additional detail about the platforms is that they require payment per connection sometimes, monthly or annually. Depending on the video production method, development costs could vary by a more expensive production method factor that is six times higher than the teacher's method of making their own recordings on a laptop. In addition, the experience gained from using or working with a particular method or means of teaching distribution is also important.

The first time a teacher uses a certain medium takes much longer than in subsequent productions. However, learning to master some media or technologies requires much more effort than others. Therefore, the related cost component is whether the teacher works or works with media

professionals. The development of the materials made by the teachers themselves usually demands more time than when it is developed by professionals, but in turn this generates a dichotomy since an extra cost can be generated with a professional in the area for that design or supposedly save that budget by deleting the hours of classes that the teacher has.

The present research aims to analyze the teaching competences in relation to their adaptation to the new academic digital media, the costs of adaptation towards the online modality and their curricula according to the new schedules in virtuality.

MATERIALS AND METHODS

The present research established a qualitative-quantitative analysis or to understand the cause-effect relationships of online education and teacher adaptation in new digital platforms, this process allowed the collection of data, observation, inquiry, interpretation and analysis around which its study was focused.

An inferential descriptive statistic was applied since there was a total of 1120 teachers in the institution, but the 153 professors were chosen since they are representative of the seven faculties of Business Administration, Technology, Public Health, Sciences, Computer Science and

Electronics, Livestock Sciences and Natural Resources with which ESPOCH has; In addition, a non-probabilistic sample was applied by quotas since at the logical discretion of the researchers, the teachers with the greatest academic load were selected, thus fulfilling the characteristics of the population forming a representative stratum of each faculty, allowing an understanding of the facts and events in teaching-learning activities in times of pandemic and it was possible to infer in the behavior of the population based on the results obtained guaranteeing the Representativeness of the population.

For the collection of data, surveys were developed in the virtual channels provided by the institution as Forms of the Office 365 package; where 16 selection questions were posed covering the topic in question, later the information obtained was recorded for weighting.

RESULTS AND DISCUSSION

It can be seen that of the 153 teachers of the Polytechnic School of Chimborazo surveyed, it was obtained that 65% are male as well as 35% are female, of which 24% have an age of 37 to 42 years, thus being the range where most teachers are found as shown in graph 1.

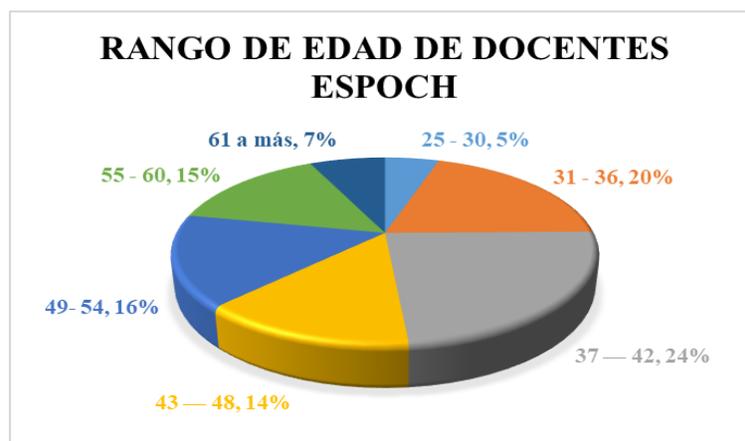


Figure 1. 1 Age ranges of ESPOCH teachers.

According to the results obtained, it was observed that 44% belong to the Faculty of Business

Administration, followed by 33% who are in the Faculty of Sciences, then 18% belong to the

Faculty of Mechanics, 15% correspond to the Faculty of Public Health, as well as 10% are to the Faculty of Computer Science and Electronics, 9%

is in the Faculty of Livestock Sciences and finally 1% corresponds to the Faculty of Natural Resources.

Table 1. Have you implemented pedagogical and teaching-learning strategies during the COVID-19 pandemic?

Options	Percentage
Completely agree	54%
I agree	33%
Neither in agreement nor in disagreement	9%
Disagree	3%
Strongly disagree	1%
TOTAL	100%

54% of teachers consider that the pedagogical and teaching strategies implemented by the institution were of total satisfaction, as well as 33% agree, however, 3% disagree with themselves 1% consider that it was not possible to complete with satisfaction since they are in total disagreement, in

addition there is 9% who neither agree nor disagree since they remain neutral.

Table 2. The trainings promoted by ESPOCH during the pandemic responded to the needs of teachers.

Options	Percentage
Completely agree	39%
I agree	46%
Neither in agreement nor in disagreement	11%
Disagree	3%
Strongly disagree	1%
TOTAL	100%

It was evident that with 46% the teachers of the ESPOCH agree that the trainings promoted during the pandemic responded to the needs of teachers, followed by 39% who completely agree, 11%

remain in a neutral state since they are neither in agreement nor in disagreement, then 3% disagree and only 1% are in complete disagreement.

Table 3. During the COVID-19 pandemic, how often does ESPOCH schedule work meetings between teachers to develop pedagogical tools?

Options	Percentage
Very frequently	34%
Often	35%
Occasionally	26%
Almost never	3%
Never	2%
TOTAL	100%

Consequently, 35% consider that, if meetings were held frequently, 34% believe that meetings were very frequent, 26% have indicated that meetings were held occasionally, while 3% indicate that meetings were almost never held and

finally 2% are those who indicated that such meetings were never held.

Table 4. Do you use the available resources such as: virtual library, virtual tools, ICT offered by the institution for the teaching-learning of students during the special academic period?

Options	Percentage
Completely agree	71%
I agree	24%
Neither in agreement nor in disagreement	3%
Disagree	1%
Strongly disagree	1%
TOTAL	100%

Teachers do use the available resources (virtual library, virtual tools, ICT) offered by the institution for the teaching-learning of students during the special academic period since 71% consider to be completely in agreement, as well as 24% agree, it was also obtained 3% who their

opinion is neutral since they express neither agreement nor disagreement and finally only 2% thought to disagree who is assumed not made use of virtual resources.

Table 5. He received specific strengthening courses that allow him to master the minimum contents of the subject.

Options	Percentage
Completely agree	28%
I agree	37%
Neither in agreement nor in disagreement	24%
Disagree	8%
Strongly disagree	4%
TOTAL	100%

The result was obtained as follows: 37% consider that the strengthening courses were indeed carried out satisfactorily since they think they agree, together with 28% considering being completely in agreement, while 8% think that there were no strengthening courses because their opinion was to disagree where followed by 4% since they

completely disagreed, In addition, 24% were those who remain with a neutral opinion because their response was neither in agreement nor in disagreement.

Table 6. How often did you carry out motivational academic accompaniment to students during the teaching-learning process?

Options	Percentage
Very frequently	57%
Often	31%
Occasionally	9%
Almost never	3%
Never	0%
TOTAL	100%

The teachers of the ESPOCH did carry out the motivational academic accompaniment to the students during the teaching-learning process since 57% carried it out very frequently, then 31% who did it frequently, there was 9% who did it

occasionally and finally 3% who almost never made accompaniment.

Table 7. From the following group of common skills, select those that you develop at the time of teaching your subject.

Options	Percentages
Cognitive	27%
Social	16%
Communication	22%
Technological	21%
Personal	13%
Other specify	0%
TOTAL	100%

In this case there is a question with more than one answer to select so a total of 493 answers were obtained, of which considering Table 10 it was observed that 27% of teachers developed cognitive competence, 16% social competence,

22% implemented communicative competence, 21% used a technological competence, 21% used a personal competence and finally 2% implemented other various skills.

Table 8. From the following group of specific skills, select those that you develop at the time of teaching your subject.

Options	Percentages
Planning and organization	37%
Didactic	36%
Design and implementation of evaluation methodologies	26%
Other specify	1%
TOTAL	100%

The groups of specific competences most selected by teachers were the following: planning and organization with 37%, didactics with 36%,

design and implementation of evaluation methodologies with 26% and others with 1%.

Table 9. How often do you experience changes in your emotions?

Options	Percentages
Very frequently	3%
Often	16%

Occasionally	53%
Almost never	28%
Never	1%
TOTAL	100%

53% of ESPOCH teachers who said they had had a change of emotions occasionally, 28% indicated that there was almost never a change of emotions, 16% stated that their change of emotions was

frequent, as well as 3% where their change of emotions was very frequent and only 1% said they had never had a change in their emotions.

Table 10. 1 Did you gain virtual educational work experience before Covid-19?

Options	Percentages
Always	42%
Sometimes	45%
The Never	12%
TOTAL	100%

42% said they had already had experience, 45% indicated that their experience was sometimes and finally 12% revealed never having had experience.

Table 11. What difficulty did you face when implementing a virtual educational model during the covid-19 pandemic?

Options	Percentages
Ignorance with the use of digital tools	31%
Inadequate training in the use of digital tools	24%
Not having physical digital tools such as digital pen or tablet	46%
TOTAL	100%

ESPOCH teachers did have difficulty implementing a virtual educational model during the covid-19 pandemic since they did not have digital physical tools such as digital pencil or

tablet as 46% indicated it, ignorance with the use of digital tools took 31% and inadequate training in the management of digital tools with 24%.

Table 12. What is your level of knowledge focused on digital tools?

Options	Percentages
Excellent (75%-100%)	44%
Good (50%-74%)	51%
Regular (25%-49%)	5%
Retail (0%-24%)	0%
TOTAL	100%

The following results: 44% had knowledge between 75% and 100% considered excellent, 51% were between 50% and 74% considered good, 5% were between 25% and 49% that would

be fair and finally between 0% and 24% considered bad there was no response.

Table 13. What activities do you propose to your students in asynchronous classes on a regular basis?

Options	Percentages
Digital document reading	25%
Consultations	22%
Individual activities	27%
Group activities	26%
TOTAL	100%

As shown in Table 13, ESPOCH teachers occupied all activities for asynchronous classes on a regular basis since 25% made use of digital document reading, 22% made consultations, 27% developed individual activities and finally 26% carried out group activities, leaving as evidence that the activities were executed with almost equal percentages in each of them.

Table 13.

After having analyzed the way of addressing knowledge by teachers and technological means, which were used for didactic purposes to teach learning online, where most teachers applied pedagogical strategies during the Covid-19 pandemic, this thanks to the trainings and courses promoted by ESPOCH where they advantageously responded to the needs of teachers

and in turn improved their teaching-learning. It is worth mentioning that the institution frequently promoted work meetings between teachers to develop better pedagogical instruments that strengthen institutional resources such as the virtual library, virtual tools and ICTs for the teaching-learning of students. Throughout the current health emergency, teachers continuously provided academic and motivational support to students, who in many cases did not have devices or internet service to receive their classes.

In relation to common skills, teachers mostly teach their subjects in a cognitive, communicative and technological way since they have implemented multimedia options with the aim of creating a dynamic environment with updated class content. Regarding the specific competences when teaching the subject, the teachers were guided

through the plans and organizations. The modality of online studies requires skills and competencies of teachers because they emit their knowledge, for this reason it is essential that teachers adapt to these new learning environments where the basic domains such as in the face-to-face modality are not enough, but they require the ability to increase teaching-learning strategies.

It is necessary to take into account the additional costs and especially the extra courses that each of the teachers and students present to adapt to the special virtual modality that was experienced during the pandemic; A clear example is the different Internet plans depending on their speed where their prices fluctuate between 25 to 80 dollars per month depending on the use and purchasing power of the user, the purchase of a new computer equipment that varies between costs of 500 to 1800 dollars, additional health expenses such as pills for physical pain or vitamins adding an expense of 100 to 200 dollars per month.

In the last ten years the cost of developing new technologies and their distribution has been reduced due to the rapid progress of consumer technologies, which allows knowledge sharing through informative texts, video blogs or instructional YouTube videos, thus reducing learning costs compared to a face-to-face conference. The COVID 19 pandemic forced education to advance in an accelerated way adapting to new technologies with the motivation that learning does not remain stagnant to traditional methods, but continues to look for new ways to arouse the interest of both the teacher and the student, the benefit is to be able to continue with education versus the cost of reinventing oneself of relearning new technologies; But it must be taken into account that during adaptability a greater cost was generated, which was the stress and deterioration of health directed to teachers due to the large amount of workload during long working hours, in some cases lives were also lost due to the pandemic.

The current digital media facilitate the transmission of information of great weight through the different compression algorithms, the reproduction of better quality videos without the use of much bandwidth, pages, teaching sites and

free access to information, open source forums, all this have represented a reduction of costs in teaching, It seeks only the guidance of a trained teacher but also the search for knowledge allows to find other tools that generate the same learning.

CONCLUSIONS

Teachers have acquired intellectual skills that are linked to "knowing", that is, they understand both the theory and the conceptual part of educational disciplines, especially in the areas of their specialty, while these are constantly updated and therefore, are trained in order to master them; They have also achieved inter- and intrapersonal competencies that are linked to the "being", which is the responsibility for their actions and the ability to live with changes; and on the other hand they have achieved social competences that are related to the ability to "coexist with others", which involves tolerance, effective dialogue relationships and respect for different thoughts; Finally, there are the professional skills that are connected to "doing", which consists of the planning and evaluation of significant learning situations, in addition to the management of group work techniques and application of evaluation methodologies that promote active learning.

Thanks to the intellect of teachers and the application of knowledge, skills and creativity, they can collaborate in the teaching of technological higher education to have a better performance; It should be emphasized that they have made it possible to forge a competence in the field of granting better quality of education and training competent professionals.

Research since the pandemic says some teachers have prescriptive national curricula, while others give teachers broad discretion in choosing program content. But it is also important to continue orienting student teaching towards the classroom curriculum and the assessments for which they are preparing, it is also vital to maintain students' interest in learning by giving them varied tasks.

The current pandemic has caused many teachers to reformulate and generate new teaching processes in their teaching-learning processes. In

this aspect, the importance of digital teacher skills that are a necessity on a day-to-day basis is mentioned, in this way the teaching staff can respond to the requirements and demands of learning.

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