



Study of ICT when Learning the English Language at Universidad Tecnológica de Tecamachalco (UTTECAM)

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ABSTRACT

In recent years, the Information and Communications Technologies (ICT) in learning English has been an innovative tool in Mexico at different educational levels. For this reason, this project aims to study the usefulness of ICT when learning English at Universidad Tecnológica of Tecamachalco. The steps to carry out this study take into account the application of a questionnaire under the Likert scale to six hundred and sixty-six students and an analysis of the data obtained through multifactorial statistical methods proposed by Dr. Manuel González Pérez to validate the results of the students' statements on this subject. Concerning the last step, it was noticed that the students' thoughts were non-linear in agreement with chi-square, and the actions of the variables are linear to confirm Pearson correlation analysis as long as they have a good internet service and a platform as a contributor to learning English independently. In conclusion, the students affirm that the use of the platform to learn English is helpful and that it is significant that UTTECAM offers a good internet service to carry out their practices on the book platform since they are aware of the benefits that they can have by achieving a good level of English in the work sector.

Keywords: ICT (Information Communication Technology); EFL (English as Foreign Language); learning; UTTECAM

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Estudio de las TIC en el Aprendizaje del Idioma Inglés en la Universidad Tecnológica de Tecamachalco (UTTECAM)

RESUMEN

En los últimos años el uso de las Tecnologías de la Información y las Comunicaciones (TIC) en

el aprendizaje del idioma inglés es una herramienta innovadora en México en los distintos niveles

educativos. Por tal motivo, este proyecto tiene como objetivo estudiar la utilidad del uso de las

TIC en el aprendizaje del inglés como lengua extranjera (EFL) en la Universidad Tecnológica de

Tecamachalco. Se encuestó a seiscientos sesenta y seis estudiantes. El cuestionario fue diseñado

y validado por expertos en el área. La validación del cuestionario se realizó mediante la

metodología del Dr. Manuel González Pérez, la cual consiste en aplicar dos métodos estadísticos

multifactoriales por medio de la correlación de Pearson para las correlaciones lineales y chi-

cuadrado para las correlaciones no lineales con el propósito de validar los resultados de las

afirmaciones de los estudiantes en la materia de inglés. Se notó que los pensamientos de los

estudiantes no fueron lineales de acuerdo con chi-cuadrado y las acciones de las variables son lineales confirmando el análisis de correlación de Pearson siempre y cuando cuenten con un buen

servicio de internet y una plataforma como colaborador para aprender inglés de forma

independiente. Se concluyó que los estudiantes afirman que el uso de la plataforma digital para aprender inglés es útil, y que es importante que la UTTECAM ofrezca un buen servicio de internet

para realizar sus prácticas en la plataforma del libro ya que están conscientes de los beneficios

que pueden tener al conseguir un buen nivel de inglés en el sector laboral.

Palabras Clave: TIC (Tecnologías de la Información y las Comunicaciones); EFL (inglés como

lengua extranjera); aprendizaje; UTTECAM

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pág. 2952

INTRODUCTION

In recent days, the use of Information and Communication Technologies (ICT) in different levels of education in Mexico has become a tool used to transmit information in terms of innovation. In Mexico, education programs are not out of this innovation since ICT assists users in handling information and improves users' literacy. English as a Foreign Language (EFL) learning is not the exception to this process. Not only do teachers use ICT to develop practices to promote students learning, but also students to learn independently. As today's world becomes a networked society, ICT has become a contributor towards the acquisition of a foreign language Fernández, S. H. et all (2019:1). The previous statement presupposes that when using ICT in terms of efficiency and efficacy there would be an optimization of their operation, since the learning achieved, is the result of the effective use of ICT and the level of proficiency that users have.

According to Hernández, L. et all (2014: 18), it is required that teachers need to be trained technically and receive training to use them as pedagogical tools to use them from a more constructivist approach rather than just as rein forcers of the information provided. The frequency of ICT use determines the promotion of collaborative and autonomous work in students. As mentioned in the previous paragraph Roman, Cardemil, and Carrasco, (2011) Hernández, L. et all (2014:8) emphasize that the teacher must design learning situations with ICT focused on students and ensure that they use the most appropriate resources in their learning process.

McAnally, L. et all (2015) suggest that institutions, to make teaching and learning processes more efficient, need to know how the technological appropriation process is taking place in people. However, Hernández, L. et all (2014:19) mention that the incorporation and use of ICT in the school environment requires time. In this regard, Salinas, J. (2004):9 emphasizes that "No innovation can ignore the context in which it will be developed." Under this perspective, the new instructional models for achieving meaningful learning require contexts that involve the student. In this regard, the author states that the student needs to be involved in four phases of learning: The first phase is the activation of previous experience, followed by the demonstration, the application, and the integration of their skills in the real world as shown in Figure 1 Phases of instruction (Merrill, M. 2002:17).

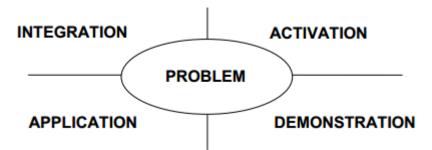


Figure 1 Phases for Effective Instruction

Unless the needs are contextualized, the teaching and learning process will not lead to meaningful learning.

In this regard, it is known that the integration of this type of program takes place in a triple context:

1) the Socio-affective context that the student finds in the academic environment, the classroom environment, the role that the teacher represents within this environment, the perception of the role that the student plays. 2) Context of the other pedagogical elements involved in the general teaching-learning process 3) Context of life outside the classroom. Here, it is not only the family or the social or environmental surroundings; the student lives immersed in a consumer society, in a society characterized by new communications, in a global information society. (Salinas, J. 2004:9).

Thus, ICT use allows those connections to generate knowledge based on the technological appropriation level that the users possess. In terms of appropriation, the authors McAnally, L. et all (2015) have identified two main currents that explain the concept of appropriation, the sociocultural and the psychosocial.

As regarded before the factors that benefit the technological appropriation level the users might have Säljö suggests:

Some reflections on the relationships between digital technologies and learning. The technologies do not merely support learning; they transform how we learn and how we come to interpret learning. He concluded that at a theoretical and practical level, this implies that the interdependences between human agency, minds, bodies, and technologies have to serve as foundations when attempting to understand and improve learning. (Säljö, 2010, pp 53-64)

On the other hand, the psychosocial is related to people's psychological phenomena which are socially constructed. It is argued that the social and the psychological have an interdependence therefore, individual reality and social reality are not the same but are inseparable. McAnally, L. et all (2015).

On this matter,

The Pearson product-moment correlation coefficient in particular, are utilized in the majority of studies in educational and psychological research, either as a primary mode of analysis in which major hypotheses are tested, or as part of a secondary analysis, providing background information regarding relationships among variables of interest prior to or following a more complex statistical analysis. (Onwuegbuzie, Anthony J. et all, 1999)

That is why the methodology used to describe the data obtained in this study comes from the Pearson's validation shown in the figure 2 below:

Interval coefficient	Relationship level
0.80-1.000	Very strong
0.60 - 0.799	Strong
0.40 - 0.599	Moderate
0.20 - 0.399	Weak
0.00 - 0.199	Very weak

Figure 2. Pearson Correlation Coefficient Values

On the opposite, a Chi-square non-linear correlation analysis of the same variables is suggested in this research. As Waller, J. L., & Johnson, M. (2013) interpret the output, where to look for the association or difference based on the hypothesis being tested and propose next steps for further analysis using example data. They concluded that basic inferential statistical tests such as chi-square and t-tests to assess unadjusted associations help to guide the direction of the more rigorous analysis.

To interpret the data obtained in terms of Chi-square method proposed by Karl Pearson, Dr. Manuel Gonzalez Perez created a simulator to get the results of the data collected easily based on

the Chi-square formula as it is shown in figure 3 below. (Juárez-Hernández ML et al, 2021); (López-Trejo, HJ et al, 2018); (Gómez-Márquez M. et al 2018)

The Formula for Chi-Square Is

$$\chi_c^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

where:

c =Degrees of freedom

O = Observed value(s)

E = Expected value(s)

Figure.3 Chi-square formula

Hayes, A. (2023) A χ 2 test for independence can tell us how likely it is that random chance can explain any observed difference between the actual frequencies in the data and these theoretical expectations. McHugh ML (2013) permits evaluation of both dichotomous independent variables, and of multiple group studies.

On the other hand, there is a significant relationship matrix between the two variables accordingly to Pearson Correlation values.

METHODOLOGY

This part explains the methods to gather data and analysis relevant to this research. The methodology includes areas such as the subject and location of the study, sampling design, collection method, types of data, and its management.

The questionnaire was designed and validated by experts. The sample size used in the study was 666 respondents. It includes students from different programs at UTTECAM from the municipality of Tecamachalco, Puebla, Mexico. It involves 21 questions responded in a period of 20 days from the 20th of January to the 10th of February of 2023. The sample was random. It was designed through a 5-point Likert scale method for lineal validation and dichotomized to validate the non-linear hypotheses.

The questionnaire validation was made by applying a multiple correlation among the items combining Pearson and Chi-squared approaches when analyzing the data collected. The research was qualitative and parametric.

Experts made the validated hypotheses selection, but some were excluded due to formatting limitations. It should be noted that only the hypotheses considered the most relevant for this article, were published.

The questionnaire design came out from an operationalization matrix shown in Table 1. Table 1 comprises three columns. The first column shows the variables, the second column has the indicators, and the third column contains the written items.

Table 1. Operationalization Matrix						
Variables	Indicator	Items				
TIC	Digital tool	Is the use of a digital tool helpful in learning English? Do you consider that the use of the EID 1, EID3 /RICHMOND) AMERICAN ENGLISH FILE 1 AMERICAN ENGLISH FILE 2) book platform helps you learn English? Do you find it efficient to have the automatic translator change web pages or platforms into Spanish? How often do you listen to audios on your own on the Oxford or Richmond book platform? How often do you do practices that require recording your voice (individual), a partner's voice (interview/pairs) or several voices (conversation)? How often do you do practices that require recording a video (individual), a partner's (interview/pairs) or multiple voices (conversation)?				
Universidad Tecnológica de Tecamachalco (UTTECAM)		Do you support the use of a self-access lab to learn English? Do you have internet service on at least one mobile device cellphone /laptop? How efficient is the internet service provided by UTTECAM? Do you know about UTTECAM's international mobility scholarships? Do you think that UTTECAM should offer a good internet service to do your internship in the book platform through your mobile device cellphone/laptop? Do you know the benefits of having a good level of English in the work place?				

		Do you know your English level?
		If, yes, what percentage of English level do you have?
		According to your course sheet, what level of English
		should you have at the end of your TSU?
		According to your subject sheet, what level of English
		should you have at the end of your engineering /
		bachelor's degree?
	Knowledge of the	Do you know what certification is required by your
	language	career to validate your English level at the end of your
English	when students start	t studies?
	and graduate from	How important is it for you to learn English?
	university.	How important do you consider the use of Spanish
		during your classes?
		How often do you speak English during your class?
		Do you consider your participation to be active and
		coherent when you respond in English during class?
		What do you know about the KET (Key English Test)
		and PET (Preliminary English Test) courses offered by
		UTTECAM?

Validation of the Questionnaire

The validation of the questionnaire was carried out using the Dr. Manuel Gonzalez Pérez methodology which consists of applying a questionnaire to get data. To the data collected multifactorial statistical methods are applied. A) Pearson's correlation for linear correlations. B) Chi-squared for non-linear correlations.

Validated Postulates

As shown below, the validation of the items includes 5 postulates analysis:

Postulate 1 Items are repeated. False. There was not error of copy paste.

Postulate 2 Items are paraphrased. False. It was not found items paraphrased. There was no error in paraphrasing ideas.

Postulate 3 Items are repeated or paraphrased on purpose. False. This postulate is used to detect a contradiction about the study.

Postulate 4 Items are correlated by chance. False. The experts did not detect this phenomenon. A correlation by chance.

Postulate 5 Items are correlated by their very nature. True. There is a correlation. It was verified that the dichotomic hypotheses formed have a logic sense, common or coherent and relevant to the objectives.

RESULTS AND DISCUSSION

Table 2 shows a Pearson multiple correlation to validate the questionnaire. As can be seen, all the items were contrasted and taken as an independent variable. In this way, a multifactorial analysis was made to a lineal contrast.

Table 2. Pearson's Multiple Correlation

	Item1	Item2	Item3	Item4	Item5	Item6	Item7	Item8	Item9	Item10	Item11	Item12	Item13	Item14	Item15	Item16	Item17	Item18	Item19	Item20	Item21
Item1	1.00																				
Item2	0.58	1.00																			
Item3	0.49	0.39	1.00																		
Item4	0.26	0.42	0.24	1.00																	
Item5	0.26	0.37	0.23	0.49	1.00																
Item6	0.21	0.27	0.23	0.48	0.69	1.00															
Item7	0.22	0.31	0.22	0.31	0.28	0.31	1.00														
Item8	0.15	0.23	0.12	0.20	0.17	0.17	0.39	1.00													
Item9	0.06	0.18	0.06	0.27	0.22	0.24	0.40	0.68	1.00												
Item10	0.04	0.17	0.07	0.34	0.26	0.30	0.38	0.33	0.48	1.00											
Item11	0.39	0.29	0.30	0.11	0.16	0.07	0.10	0.09	-0.03	-0.01	1.00										
Item12	0.38	0.32	0.28	0.27	0.24	0.16	0.29	0.20	0.14	0.22	0.51	1.00									
Item13	0.32	0.27	0.16	0.15	0.16	0.10	0.14	0.14	-0.01	0.06	0.37	0.32	1.00								
Item14	0.21	0.16	0.25	0.10	0.13	0.11	0.11	0.10	0.02	0.06	0.22	0.18	0.32	1.00							
Item15	0.12	0.13	0.07	0.28	0.26	0.28	0.16	0.14	0.21	0.23	0.07	0.19	0.24	0.10	1.00						
Item16	0.20	0.20	0.11	0.27	0.25	0.23	0.19	0.19	0.18	0.18	0.13	0.27	0.33	0.17	0.56	1.00					
Item17	0.09	0.09	0.06	0.27	0.21	0.25	0.29	0.20	0.24	0.30	-0.02	0.19	0.09	0.06	0.28	0.32	1.00				
Item18	-0.03	-0.03	0.03	0.00	0.00	0.07	0.10	-0.05	0.05	0.05	-0.01	-0.05	-0.07	0.10	0.03	-0.03	0.04	1.00			
Item19	0.26	0.35	0.15	0.30	0.28	0.27	0.26	0.21	0.18	0.18	0.23	0.33	0.33	0.17	0.42	0.43	0.23	-0.04	1.00		
Item20	0.31	0.25	0.16	0.17	0.13	0.07	0.14	0.13	0.04	0.11	0.36	0.40	0.52	0.26	0.21	0.30	0.05	-0.01	0.42	1.00	
Item21	0.23	0.27	0.15	0.32	0.28	0.25	0.28	0.16	0.16	0.27	0.18	0.37	0.25	0.19	0.20	0.29	0.24	0.03	0.36	0.38	1.00

Table 3 shows the validated hypotheses by the multiple correlation of Pearson. Column one shows ordered pairs concerning the number of pairs in the questionnaire; columns two and three present the correlated items and column four shows the inferences of the correlated ones. Column five shows the Pearson correlation coefficients ranging from 0.58 in the moderate to 0.68 in the strongest correlation. Finally, column six indicates the testable hypotheses or thesis. The sequence of inferences has logic to generate the testable hypotheses that match the operationalization matrix and the research hypotheses.

Table 3	Table 3. Validated hypotheses by Pearson multiple correlation							
Pair	Item A	Item B	Inference	Pearson Correlation Coefficient	Testable Hypothesis			
(1,2)	Is the use of a digital tool helpful in learning English?	Do you find that using the EID 1, EID3 RICHMOND or AMERICAN ENGLISH FILE 1 AMERICAN ENGLISH FILE 2 platform helps you learn English?	helpful in learning English, then using the book platform EID 1, EID3 RICHMOND/ ENGLISH FILE 1		The use of the English book platform (EID 1, EID3 RICHMOND / ENGLISH FILE 1 and 2) as a digital tool is helpful in learning English.			

(2,1)	Do you find that using the EID 1, EID3 RICHMOND or AMERICAN ENGLISH FILE 1 AMERICAN ENGLISH FILE 2 platform helps you learn English?	Is the use of a digital tool helpful in learning English?	If using the book platform EID 1, EID3 /RICHMOND) ENGLISH FILE 1 ENGLISH FILE 2 helps you learn English then the use of a digital tool is helpful in learning English.	0.5819	The use of the book platform EID 1, EID3 /RICHMOND AND ENGLISH FILE 1 ENGLISH FILE 2 helps you learn English as a digital tool.
(5,6)		recording a video	If you do practices that require recording your voice then you do practices that require recording a video (individual), a partner's voice (interview/peers) or several voices (conversation).	0.6893	Doing practices that require recording your voice promotes doing practices that require recording a video (individual), a partner's voice (interview/peers) or several voices (conversation).
(6,5)	How often do you do practices that require recording a video (individual), with a partner (interview/pairs) or several partners (conversation)?	you do practices that require recording your voice (individual), a partner's voice	If you do practices that require recording a video (individual), a partner's voice (interview/peers) or several voices (conversation) then you do practices that require recording your voice.	0.6893	Doing practices that require recording a video (individual), a partner's voice (interview/peers) or several voices (conversation) promote that you do practices recording your voice.
(8,9)	Do you have Internet service on at least one mobile device (cell phone/laptop) at the UTTECAM?	Do you consider your participation to be active and coherent when you respond in English during classes?	If you have Internet service on at least one mobile device (cell phone/laptop) at the UTTECAM then you consider your participation to be active and coherent when you respond in English during classes.	0.6772	Having Internet service on at least one mobile device (cell phone/laptop) at the UTTECAM permits your participation to be active and coherent when you respond in English during classes.

				T	
(9,8)	Do you consider your participation to be active and coherent when you respond in English during classes?	on at least one mobile device (cell		0.6772	Participating actively and coherently when responding in English during classes requires to have Internet service on at least one mobile device (cell phone/laptop) at the UTTECAM.
(11,12)	Do you consider that the UTTECAM should offer a good internet service to carry out your internship on the book platform?	having a good	If the UTTECAM offers a good internet service to carry out your practices on the book platform, then you know the benefits of having a good level of English in the workplace.	0.514	The importance of UTTECAM offering a good internet service to carry out your practices on the book platform helps to know the benefits of having a good level of English in the workplace.
(12,11)	Do you know the benefits of having a good level of English in the workplace?	that the UTTECAM should offer a	If you know the benefits of having a good level of English in the workplace, then the UTTECAM offers a good internet service to	0.514	Knowing the benefits of having a good level of English in the workplace restates the importance of the UTTECAM in offering a good internet service to carry out your practices on the book platform.
(13,20)	How important is it for you to learn English?	Do you consider that having a good level of English contributes to your achievements?	If learning English is important to you then having a	0.5159	The importance of learning English contributes to your achievements to have a good level of English.
(20,13)	English	How important is it for you to learn English?	If having a good level of English contributes to your achievements, then learning English is important to you.	0.5159	Learning English is important to have a good level of English that contributes to your achievements.

(15,16) yo	How often do you speak	your participation to	If you speak in English during your class, then you consider your participation to be		Speaking in English during your class requires active and
	English during your class?	coherent when you respond in		0.5644	coherent participation when responding in English.
(16,15)	Do you consider your participation to be active and coherent when you respond in English during classes?	English during	If you consider your participation to be active and coherent when you respond in English during class, then you speak in English during your class.		Participating actively and coherently when responding in English requires speaking in English during class.

Table 4 shows some testable hypotheses with one degree of freedom of 3.84 as the inflexion point based on the chi-square. Table 4 has a similar description of Table 3. The difference resides in column 5 where the calculated value is about chi-square, and the interpretation can be as follows: Hypothesis null H =The variables are not associated.

Hypothesis H =The variables are associated.

The reference of chi-square value for a dichotomized contrast with one degree of freedom and significance of 0.05 is 3.84. This value comes from Chi-square theorical /practical.

CONCLUSION INFERENCE

- 1. If the Chi-square calculated value is greater than the Chi-square critical value, then the null hypothesis is rejected, and the calculated hypothesis is accepted; therefore, the variables are associated.
- 2. If the Chi-square calculated value is less than the Chi-square critical. Then, the null hypothesis is accepted, and concludes that the variables are not associated.

Table 4 shows six hypotheses greater than 3.84. Column five presents the testable hypothesis by Chi-square.

These hypotheses were selected since the variables are validated with the Pearson correlation higher values exhibited in Table 3 and the Chi-square correlation values in Table 4. The validated

hypotheses show that the observed and expected answers have a strong correlation, which means that the validation has a greater degree of confidence, as well as Chi-square and Pearson relationship between two variables. An example of this is the hypothesis obtained from pair (8,9), which has a value of 139.70 in Chi-square, which means that the validation has a greater degree of confidence in the association of the two variables and 0.67 in Pearson linear correlation of the two variables.

For that reason, the operationalization matrix of variables and the expected answers from the questionnaire led this study to find out the needs of the UTTECAM delimited in this research in pairs (1,2). This pair has a value of 119.33 in Chi-square and 0.58 in Pearson linear correlation. It can be concluded that this hypothesis is accepted because the variables are associated with a strong degree of confidence and strong correlation in Pearson.

Table 4	Table 4. Validated hypotheses by Chi-Square							
Pair	Item A	Item	Inference	Chi- Square	Testable Hypothesis			
(8,9)	Do you have Internet service on at least one mobile device (cell phone/laptop) at the UTTECAM?	Do you consider your participation to be active and coherent when you respond in English during classes?	If you have Internet service on at least one mobile device (cell phone/laptop) at the UTTECAM then you consider your participation to be active and coherent when you respond in English during classes.	139.7	Having Internet service on at least one mobile device (cell phone/laptop) at the UTTECAM permits your participation to be active and coherent when you respond in English during classes.			
(1,2)	Is the use of a digital tool helpful in learning English?	Do you find that using the EID 1, EID3 RICHMOND or AMERICAN ENGLISH FILE 1 AMERICAN ENGLISH FILE 2 platform helps you learn English?	If the use of a digital tool is helpful in learning English, then using the book platform EID 1, EID3 RICHMOND/ENGLISH FILE 1 ENGLISH FILE 2 helps you learn English.	119.33	The use of the English book platform (RICHMOND ENGLISH FILE 1/2) as a digital tool is helpful in learning English.			
(15,16)	How often do you speak English during your class?	Do you consider your participation to be active and coherent when you respond in English during classes?	English during your class then you consider your	111.97	Speaking in English during your class requires active and coherent participation when responding in English.			

			when you respond in English during class.		
(13, 20)	-	Do you consider that having a good level of English contributes to your achievements?	If learning English is important to you then having a good level of English contributes to your achievements.	89.96	The importance of learning English contributes to your achievements to have a good level of English.
(11,12)	Do you consider that the UTTECAM should offer a good internet service to carry out your internship on the book platform?	•	your practices on the book platform, then	44.9	The importance of UTTECAM offers a good internet service to carry out your practices on the book platform helps to know the benefits of having a good level of English in the workplace.

Figure 4 is the representation of hypothesis (1,2) from Table 4. This graph was designed as an example of all other nonlinear chi-square hypotheses. The red line represents the experimental chi-square value (119.33). The thin black line represents the value of 3.84 (the limit for significance of 0.05). With this graph, we can see that the confidence is almost 100%. "The null hypothesis is rejected. The alternative hypothesis is accepted." The variables are associated.

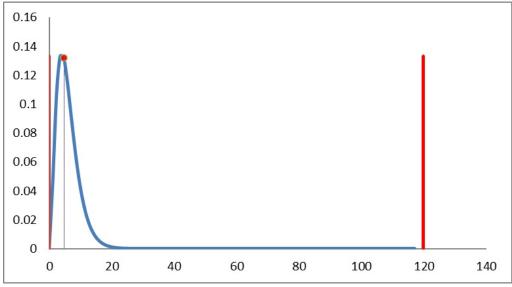


Figure 4. Example of hypothesis (1,2) with a 119.33 experimental or observed chi-square value.

CONCLUSIONS

In conclusion, this research focuses on examining the importance of a digital tool to learn English. This research leads to the bivariate hypotheses validation of the observed and expected answers in the applied questionnaire to the students of UTTECAM to make the students aware of their learning through platforms. The subject of study is demonstrated in (1,2) pair with Chi-square association variables and Pearson correlation since the students confirmed that the use of the English book platform is helpful. Besides, students answered that it is important that UTTECAM offers a good internet service to carry out their practices on the Book platform to help them find out the benefits of having a good level of English in the workplace.

It is demonstrated that the use of platforms is helpful when doing practices that require recording their voice and promotes speaking English with better intonation and pronunciation through recording a video (individual), a partner's voice (interview/peers), or several voices (conversation). We also conclude that the students require active and coherent participation when responding in English during their classes. By Chi-square in the association of variables and Pearson correlation in the variables as a testable hypothesis, it is concluded that the subjects' thoughts are nonlinear in agreement with Chi-square and the actions of the variables are linear confirming Pearson correlation analysis. Therefore, the students think that having a good internet service and the platform use contributes to students having a good level of English.

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