

Comparative study in the progress of the level of English in the BIS generations at the Technological University of Altamira

Estudio comparativo en el avance del nivel de inglés de las generaciones BIS de la Universidad Tecnológica de Altamira

González-Barrón, María Teresa ^a, Alvarado-Medellín, Marisela ^b, Barrios-Rodríguez, Lilia Gabriela ^c and Pedraza-Vázquez, Ingryt Karely ^d

^a Universidad Tecnológica de Altamira • LIG-4383-2024 • 0009-0006-1118-373X • 1352335

^b Universidad Tecnológica de Altamira • LIG-5115-2024 • 0009-0003-3292-5489 • 2025473

^c Universidad Tecnológica de Altamira • LIG-4690-2024 • 0009-0002-5615-700X • 2025586

^d Universidad Tecnológica de Altamira • LJM-0713-2024 • 0009-0007-8239-9041 • 1268504

CONAHCYT classification:

Area: Humanities and Behavioral Sciences

Field: Linguistics

Discipline: Applied Linguistics

Subdiscipline: Bilingualism

<https://doi.org/10.35429/JUM.2024.8.19.1.11>

History of the article:

Received: January 07, 2024

Accepted: December 30, 2024



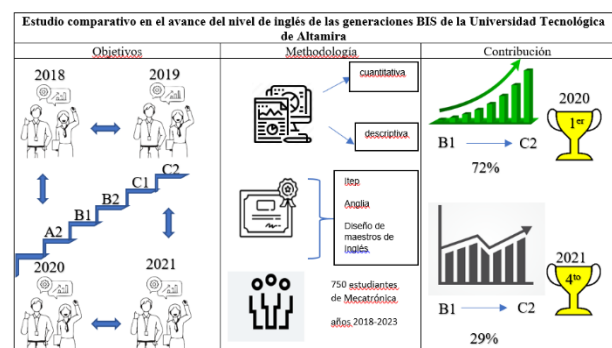
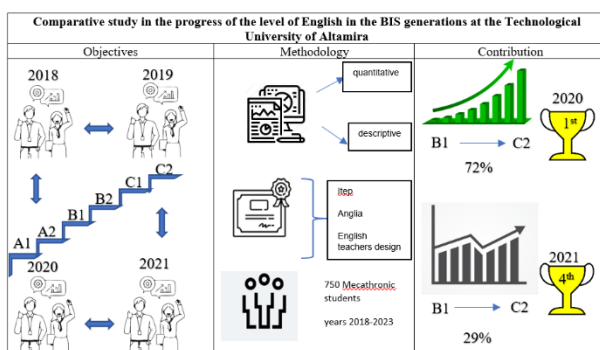
* [mgonzalez@utaltamira.edu.mx]

Abstract

The objective of this research work was to determine the BIS generation that has made the most progress in English proficiency to analyze the causes. Progress in English proficiency was compared among all BIS generations, from the beginning of their academic journey until the completion of the Técnico Superior Universitario (TSU) level, with the main difference being the modality in which their classes were taught. The research was quantitative and descriptive. The instruments used to collect data were the iTEP, The Anglia, and another exam designed by English teachers. The study population consisted of 750 individuals who were students of Mechatronics from the years 2018 to 2023. According to the results, it can be concluded that there is greater progress in the third BIS generation. These findings contribute to the study and implementation of future improvement actions for the BIS model, as one of its main challenges is achieving a competent level of English proficiency by the end of the engineering program. Therefore, the more knowledge acquired about the issue, the greater the likelihood of finding solutions.

Resumen

El objetivo de este trabajo de investigación fue determinar la generación BIS que más avance en el nivel de inglés ha alcanzado para analizar las causas. Se comparó entre todas las generaciones BIS el avance en el nivel de inglés alcanzados, desde el inicio de la carrera hasta terminar el Técnico Superior Universitario (TSU), las cuales presentaban como diferencia principal la modalidad en la que se les impartieron sus clases. La investigación fue de tipo cuantitativa, descriptiva. Los instrumentos utilizados para obtener los datos fueron el iTEP, el Anglia y otro examen diseñado por maestros del área de inglés. La población estudiada consistió en 750 personas que fueron estudiantes de la carrera de Mecatrónica, durante los años 2018 hasta el 2023. De acuerdo con los resultados, se puede concluir que existe un mayor progreso en la tercera generación BIS. Estos resultados contribuyen al estudio e implementación de futuras acciones de mejora para el modelo BIS, ya que una de las principales dificultades de este modelo es el reto de alcanzar un nivel de inglés competente al término de la ingeniería. Por lo que mientras más conocimiento se adquiera de la problemática, mayor probabilidad se tendrá de encontrar soluciones.



BIS, English language Learning, iTEP

BIS, Aprendizaje del inglés, iTEP

Citation: González-Barrón, María Teresa, Alvarado-Medellín, Marisela, Barrios-Rodríguez, Lilia Gabriela and Pedraza-Vázquez, Ingryt Karely. [2024]. Comparative study in the progress of the level of English in the BIS generations at the Technological University of Altamira. Journal University Management. 8[19]1-11: e3819111.



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Introduction

The Technological University, abbreviated as UT, is a decentralized public institution that provides higher education services in careers dedicated to technology and science. It was in September of the year 2018 when the UT of Altamira implemented the Bilingual, International, and Sustainable model, also known as the BIS model by its initials, exclusively in the Mechatronics career ([Universidad Tecnológica de Altamira, 2023](#)).

Since then, English proficiency certifications have been conducted periodically to monitor students' progress and achieve the goal of "bilingualism" set by the BIS model, regarding the expected English proficiency upon completion of the degree, which is level C1 (competent user, effective operational command) according to the Common European Framework of Reference for Languages ([CGUTyP, 2018](#)).

To carry out the above, new students begin with an additional semester, known as the zero semester. In this semester, they are provided with a 525-hour Introduction to the English Language Course. The course consists of a five-hour English class daily and five two-hour workshops per week ([CGUTyP, 2019](#)).

This intensive immersion in the English language during the zero semester improves their English proficiency, as well as helps them to work better with subjects that will be taught in English in the following semesters ([Palomares & Domínguez, 2021](#)).

However, a problem identified by all teaching staff was the significant difficulty faced by students who started studying under the BIS model with online classes in understanding and speaking English in their regular classes when the pandemic ended, compared to the generations that started their classes in face-to-face mode.

Understanding this problem is very important because, according to a study by Palomares et al. (2017), the BIS model has had a high rate of failure and dropout since its inception caused mainly by the essential requirement of achieving an intermediate level of English upon completing the degree.

Therefore, a study comparing the progress achieved in English proficiency of all generations from when they enter university until the end of the TSU level, considering especially the modality in which they received their classes, it is of utmost importance as it could assist the educational and administrative staff in identifying the possible causes of this delay, thus preventing or addressing this issue with future generations.

This involves establishing strategies to mitigate the factors involved in online classes and thereby reduce dropout rates or school failure.

Firstly, several concepts related to teaching within the BIS Model are explained, followed by the challenges of teaching English during the pandemic, as well as the presentation of the Methodology, report of results, and conclusions.

BIS Model

Universities face increasingly greater challenges every day due to the constant changes in today's society. One way in which Higher Education Institutions seek to address these challenges is through the BIS ([Palomares et al., 2017](#)) modality.

The BIS modality began in the state of Aguascalientes because there was a need for experts within the automotive sector to have a high proficiency in the English language for software development purposes. The first BIS university in the country was the Universidad Tecnológica El Retoño, which began operating in August 2012 ([CGUTyP, 2018](#)).

The model retains everything from the previous program to train higher university technicians and then continue with engineering, under professional competencies and practical training ([Palomares & Domínguez, 2021](#)).

The BIS model began at UT Altamira in September 2018. The word BIS is composed of the initials of the words Bilingual, International, and Sustainable. This study will focus on the Bilingual axis.

Bilingual

The first axis of the BIS model is the Bilingual aspect, which implies that the school operates using two languages, primarily within the pedagogical area, where didactic material, used bibliography (CGUTyP, 2019), and subjects taught in English are included (Palomares et al., 2017).

However, it also involves administrative staff communicating with BIS students in English and even having signage in English, Spanish, and a third language chosen by the campus (CGUTyP, 2019).

The role of the student within this learning process is of utmost importance, as they should not be passive participants but rather, on the contrary, they should be committed to their education and assume their role as the protagonist of the educational act.

The student becomes the constructor of their knowledge and seeks to maintain intrinsic motivation to learn a second language (CGUTyP, 2018).

The learning of this second language is aimed to be provided simultaneously with the professional development of the student, and this is done under a transitional bilingualism scheme; which means that the English language will be gradually incorporated into the curriculum until it eventually becomes the main language of their education (CGUTyP, 2018).

The goal for the Technological University of Altamira, which was categorized, until September 2018, as a BIS Training University, is that, upon completion of the zero semester, 55% of the students reach at least level A2 according to the CEFR, Common European Framework of Reference for Languages (CGUTyP, 2019), which is a basic level (Suárez, 2022).

The CEFR provides levels of language proficiency, allowing for defining the knowledge that a language student should learn or develop to communicate, as well as enabling the assessment of students' progress throughout their language learning journey. The levels range from basic to mastery or proficient in ascending order as follows: A1, A2, B1, B2, C1, C2 (Ministerio de Educación, Cultura y Deporte, 2002), see annex 1.

After the zero semester, this model indicates that two subjects must be taught in a foreign language (CGUTyP, 2018); in the case of UT Altamira, the subjects taught in English have been Productive Processes and Electricity and Magnetism.

In the second semester, the student receives four subjects in English (CGUTyP, 2018); at UT Altamira, the subjects taught are Chemistry, Electrical Circuits, Motor Control, and Hydraulic and Pneumatic Systems.

Finally, starting from the third semester, all BIS mode teachers must teach their subjects in English (CGUTyP, 2018). With some exceptions considered, such as French and Oral and Written Expression II courses (CGUTyP, 2019). However, UT Altamira has taught all subjects in English from that semester onwards.

Upon completing studies as a Higher University Technician, the established goal regarding English proficiency level is B1, and when the student finishes the engineering program, it is expected that they reach a level of B2 or C1 (CGUTyP, 2019).

This axis has become the one that receives the most effort and attention within the BIS modality because non-compliance with the English proficiency level directly impacts the student's possibility of graduating (CGUTyP, 2018 and 2019).

In fact, in a survey conducted at the Polytechnic University of Santa Rosa Jauregui, it was found that 53% of the graduates from 2022 have not been able to graduate because they did not reach the B2 level of English (Suárez, 2022).

Internationalization

Internationalization arises from creating institutional cooperation networks with the aim to develop educational or research projects, as well as sharing information, and involves the mobility of students, professors, or university staff. Mobility provides BIS students with the opportunity to strengthen their educational and professional formation (CGUTyP, 2018).

Within the internationalization axis, both national mobility between BIS institutions and international mobility are considered.

Therefore, the university must engage in cultural understanding actions and increase its ties with foreign companies and institutions to belong to the model (CGUTyP, 2019). Some examples of actions that can be taken include organizing cultural fairs, undertaking internships abroad, hosting foreign individuals, international forums and conferences, accreditation of educational programs before international associations, etc. (CGUTyP, 2018).

On its part, the Technological University of Altamira has the MEXPROTEC Mexico-France Cooperation Program, a cooperation program with Centennial College in Canada, the Technical Education Vocational and Training in the United Kingdom, with the German Academic Exchange Service, Community Colleges in the United States of America, and the University of Arizona. It is worth mentioning that, in 2022, 9 students were enrolled in one of these programs ([Universidad Tecnológica de Altamira, 2021](#)).

Sustainability

It is the third pillar of the model; a sustainable university seeks to promote a culture of sustainability among its members and stakeholders ([Heath et al., 2015](#)), where ecological, social, economic, and institutional balance is gradually achieved. It requires a change in the university lifestyle. The aspects that compose this axis in the BIS model are: Education for sustainability, Sustainable University Management, and Culture of Sustainability ([CGUTyP, 2019 and 2018](#)).

Learning English in Virtual Environments

Since the confinement caused by the pandemic, students were forced to carry out their educational process through virtual environments, which presented opportunities but also limitations and challenges. During the pandemic, university students needed to acquire and consolidate new skills that would allow them to be the protagonists of their learning ([Trujillo & Martínez, 2021](#)), and in fact, this is particularly important for success in the BIS model ([CGUTyP, 2018](#)). According to Carranza et al. (2018) Social networks, videos and videogames are the most useful tools students use when acquiring in an autonomous way a second language, since it influences positively in their motivation.

At UT Altamira, synchronous online classes were conducted in April 2020, using Google Classroom, Google Meet and WhatsApp as the main means of communication. Google Meet offers simultaneous subtitles for online classes, which is an advantage students use a lot.

According to Mendez & Morales (2023), subtitles help students efficiently reach a better and less complicated comprehension of visual authentic and semi-authentic material.

The first difficulty students faced in their online learning was accessing internet services from their homes, as many of them did not have access ([Basantes et al., 2021](#)), and if they did, it was of poor quality ([Echauri et al., 2021](#)), or they lacked the necessary resources for their virtual classes such as a computer, suitable cell phone, headphones, etc. ([Basantes et al., 2021](#)).

However, the most significant difficulty found in a study conducted with a Mexican population was the students' attitude towards the virtual modality, as the majority preferred to obtain their learning through face-to-face classes ([Garduza & Toledo, 2021; Trujillo & Martínez, 2021](#)).

Additionally, virtual teaching generates less motivation in them, probably due to concentration problems in their new learning environments ([Echauri et al., 2021](#)).

Other difficulties concerning the teacher were mainly the lack of training or technological illiteracy of the teacher ([Trujillo & Martínez, 2021](#)), and the fact that a large portion of the teachers taught their classes the same as if they were in face-to-face classes, missing out on and ignoring the opportunities and limitations of the online modality ([Basantes et al., 2021](#)).

However, other studies claim that virtual environments allow teachers to implement new tools for education and thus improve language proficiency ([Cano et al., 2019 and Llano, 2022](#)).

Nevertheless, it is important to remember that the BIS model not only involves learning English itself but also entails the professional training of the student in English, in which all subjects are taught in the second language ([CGUTyP, 2018](#)).

Therefore, studies or research analyzing the differences in the progress of BIS students' English proficiency and the pandemic's impact on the virtual modality are practically nonexistent.

In February 2022, the Technological University of Altamira returned to its face-to-face modality, presenting a hybrid or mixed modality for practices and workshops in 2021.

Methodology

This research is quantitative and descriptive as it collects numerical quantifiable data on the progress in English level achieved up to the TSU (Technical University Degree) among the BIS (Bilingual, International, and Sustainable) generations, to compare them and to describe in which generation there was greater progress and analyze possible causes for the observed results. For the evaluation, the primary instrument used was the International Test of English Proficiency, or iTEP ([Universidad Tecnológica de Altamira, 2020](#)). This test is an online assessment tool developed by the Boston Educational Service. It has the advantage of being easily accessible, affordable, and providing quick results ([Suárez, 2022](#)).

It lasts between 50-80 minutes and assesses five skills: grammar, reading, listening, speaking, and writing ([International Test of English Proficiency, 2016](#)).

Additionally, the Anglia Placement Test was used.

This is a free online diagnostic test. In this exam, students choose the level at which they would like to start being assessed, ranging from A1 for those who consider their English to be basic, up to C2 for advanced levels.

Depending on the chosen level, students answer between 15 to 35 questions, and the duration of the test also depends on the selected level ([Anglia Examinations Syndicate, 2023](#)). Finally, an exam designed in Google Forms by expert members of the English academy was used. The studied population consisted of 750 Mechatronics students who pursued the TSU degree during the period from September to December, from 2018 to 2023. Of the students, 85.7% were male and 14.2% female.

For the first BIS generation, which began its zero semester in 2018, 194 students enrolled and 102 graduated. The diagnostic test was conducted at the university. The completion exam was conducted remotely, which means each student took it at home.

The exams conducted at the university were collectively administered in language laboratories adapted for the BIS model, being the iTEP the only applied test.

The second BIS Generation in 2019 had an initial enrollment of 184 students and 163 graduates. The iTEP exam was administered in the same manner as for the first generation.

For the third BIS Generation in 2020, 136 pupils graduated from the 194 enrolled. This generation was the first to take the zero semester online, so the enrollment exam administered was The Anglia placement test. The completion exam was the iTEP conducted remotely.

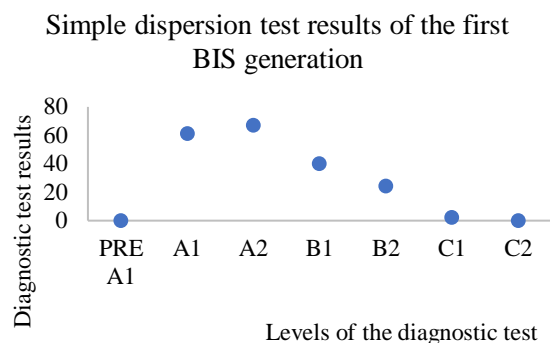
Lastly, the fourth Generation in 2021 had an initial enrollment of 178 students and 115 graduates. Both exams were administered remotely since this cohort continued in virtual education. This generation took a placement test used in the CIUT, the Technological University Language Center, created by expert English teachers.

The completion test was the iTEP, administered in person in the university laboratories.

Results

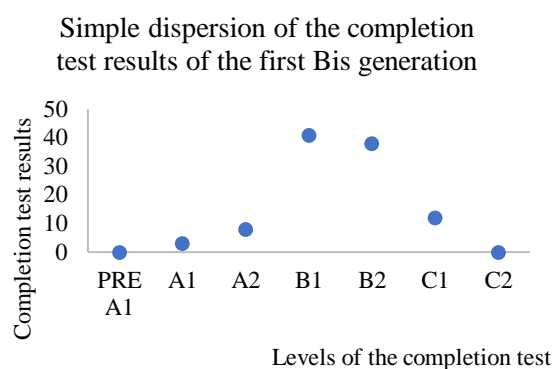
According to the results of the iTEP exam, for the 2018 cohort, the following data were obtained: 61 students at level A1; 67 students at level A2; 40 at B1; 24 at B2; and 2 at C1. Upon completing the TSU program, the following data were obtained: 3 students at level A1; 8 at A2; 41 at B1; 38 at B2; and 12 at C1.

This cohort demonstrated an enrollment mode of level A2, as it appears most frequently according to the number of students who took the diagnostic exam, see Box 1.

Box 1**Figure 1**

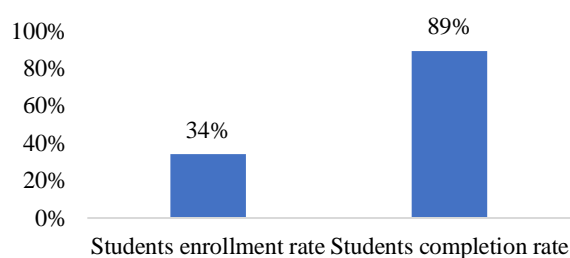
Enrollment levels of the first generation

And the majority graduated with a level of B1. Comparing both graphs, it can be observed that the overall progress was by one level, see Box 2.

Box 2**Figure 2**

Levels of completion test of the first generation

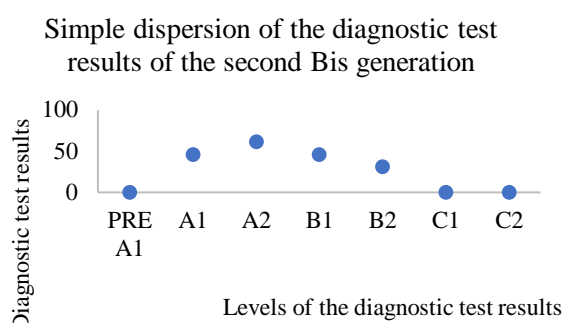
At the beginning, the rate of students with a satisfactory level, which is from B1 to C2, was 34%; by the end of the TSU program, it increased to 89%. Thus, the difference in the rate of students with this level was 55%, see Box 3.

Box 3**Figure 3**

Rate of students with satisfactory level of English in the first generation

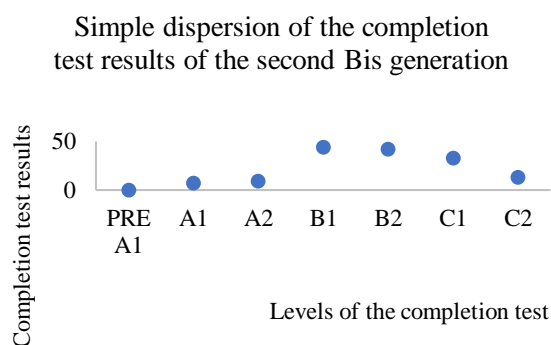
In the second cohort, in the first exam administered, the results were as follows: 46 students achieved level A1; 61 got A2; 46 obtained B1, and 31 with B2. The completion test showed the following results: 7 students achieved level A1; 9 with A2; 44 obtained B1; 42 got B2; 33 resulted with C1; and 13 students concluded with C2.

The enrollment level was on average A2, as it appears most frequently according to the number of students who took the diagnostic exam, see Box 4.

Box 4**Figure 4**

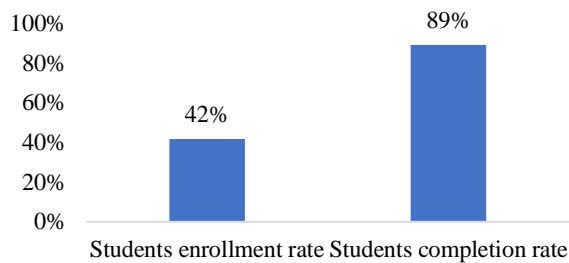
Enrollment levels of the second generation

The graduation level was B1, and comparing both graphs, it can be observed that the overall progress was by one level, see Box 5.

Box 5**Figure 5**

Completion levels of the second generation

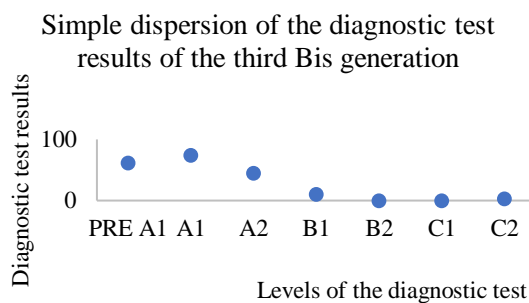
At the beginning, the rate of students with a satisfactory level, that is, from B1 to C2, was 42%; by the end of the TSU program, it increased to 89%. Thus, the difference in the rate of students with this level was 47%, see Box 6.

Box 6**Figure 6**

Rate of students with satisfactory level of English in the second generation

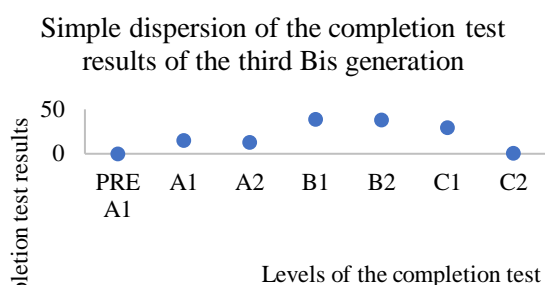
In the third cohort, 62 students achieved Pre-A1 level, 74 got A1, 45 obtained A2, 10 with B1, and 3 resulted with C2 level. At the end of the semester, the results were 15 students at level A1, 13 at A2, 39 at B1, 38 at B2, 30 at C1, and 1 at C2.

The enrollment of this cohort showed a mode of A1 level, as it appears most frequently according to the number of students who took the diagnostic exam, see Box 7.

Box 7**Figure 7**

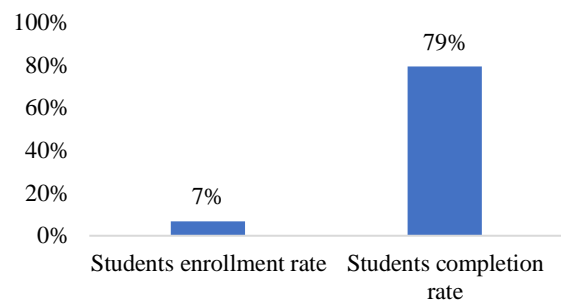
Enrollment levels of the third generation

The mode at graduation was B1, and comparing both graphs, it can be observed that the overall progress was by two levels, see Box 8.

Box 8**Figure 8**

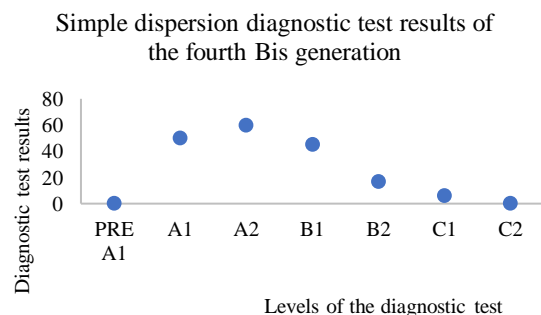
Completion levels of the third generation

At the beginning, the rate of students with a satisfactory level, that is, from B1 to C2, was 7%; by the end of the TSU program, it increased to 79%. Thus, the difference in the rate of students with this level was 72%, see Box 9.

Box 9**Figure 9**

Rate of students with satisfactory level of English in the third generation

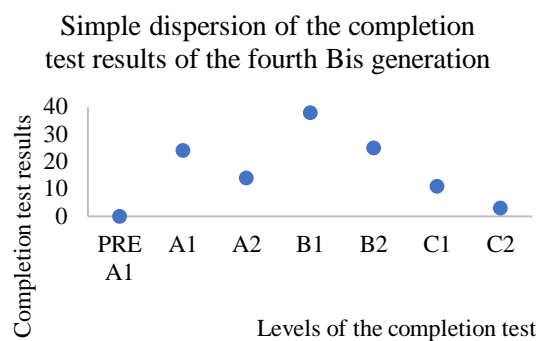
The last cohort consisted of 50 students at level A1, 60 at A2, 45 at B1, 17 at B2, and 6 students at level C1. On average, the enrollment level was A2, as it appears most frequently according to the number of students who took the diagnostic exam, see Box 10.

Box 10**Figure 10**

Enrollment levels of the fourth generation

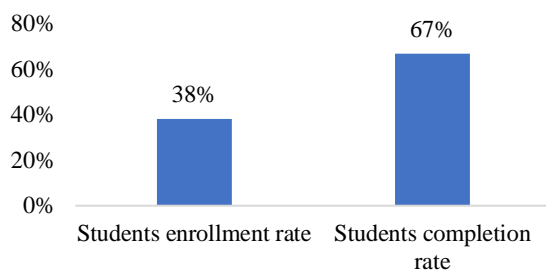
The completion test shows the following data: 24 students achieved level A1; 14 obtained A2; 38 got B1; 25 with B2, 11 resulted with C1, and 3 led to C2.

The average graduation level was B1, and comparing both graphs, it can be observed that the overall progress was by one level, see Box 11.

Box 11**Figure 11**

Completion levels of the fourth generation

At the beginning, the rate of students with a satisfactory level, which is, from B1 to C2, was 38%; by the end of the TSU program, it increased to 67%. Thus, the difference in the rate of students with this level was 29%, see Box 12.

Box 12**Figure 12**

Rate of students with satisfactory level of English in the fourth generation

Conclusions

According to the data, the progress made by the 2018, 2019, and 2021 cohorts was of just one level, achieving most of the students a maximum level of B1. In contrast to the 2020 cohort which showed a progress of two levels.

If we analyze the difference in the number of students who reached the acceptable levels of English at the end of the TSU degree which are B1 to C2, the highest rate was achieved by the 2020 cohort (72%).

In contrast to what some authors imply (Basantes et al., 2021; Echauri et al., 2021; Garduza & Toledo, 2021 and Trujillo & Martínez, 2021), the best progress was obtained by the generation whose most of their TSU classes were fully online.

Some of the possible reasons for these results would be that students had more opportunities to simultaneously use digital resources which allow them to be exposed to English materials and apps (Cano et al., 2019 and Llano, 2022).

Furthermore, it was observed that most of them were using subtitles when teachers were explaining their classes fully in English. This way, students benefited from a better comprehension of the second language (Mendez & Morales, 2023).

Another good reason could be that students' free time when confined was dedicated to playing online, even with people of other nationalities using English as their means of communication, provoking a better exposition and acquisition of the language. (Carranza et al., 2018).

In addition to this, during the pandemic, some social networks were highly used to create digital content. This was better monetized if it was in English to better spread all around the world which meant more money. Being this a good motivation for them.

Another possible reason for the obtained results has been mentioned by some authors who state that virtual environments, besides challenging students, provide them with new opportunities to apply tools that allow them to have better communication and practice of the language (Cano et al., 2019 and Llano 2022).

On the other hand, a different diagnostic test called The Anglia placement test was used with this generation, unfortunately its reliability is unknown. Moreover, there was found very atypical data, regarding the rate of new enrolled students with a very low level of English.

Therefore, the validity of these results of the third generation could be a matter of question.

It is recommended to expand the study to search other factors that might be involved, such as the dropout rate, failure, English proficiency level of professors who taught them.

Annexes

Annex 1. *Common Reference Levels: global scale*

Proficient User	C2	Can understand with ease virtually everything heard or read. Can summarise information from different spoken and written sources, reconstructing arguments and accounts in a coherent presentation. Can express him/herself spontaneously, very fluently and precisely, differentiating finer shades of meaning even in more complex situations.
	C1	Can understand a wide range of demanding, longer texts, and recognize implicit meaning. Can express him/herself fluently and spontaneously without much obvious searching for expressions. Can use language flexibly and effectively for social, academic and professional purposes. Can produce clear, well-structured, detailed text on complex subjects, showing controlled use of organisational patterns, connectors and cohesive devices.
Independent User	B2	Can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialisation. Can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party. Can produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options.
	B1	Can understand the main points of clear standard input on familiar matters regularly encountered in work, school, leisure, etc. Can deal with most situations likely to arise whilst travelling in an area where the language is spoken. Can produce simple connected text on topics which are familiar or of personal interest. Can describe experiences and events, dreams, hopes and ambitions and briefly give reasons and explanations for opinions and plans.
Basic User	A2	Can understand sentences and frequently used expressions related to areas of most immediate relevance (e.g., very basic personal and family information, shopping, local geography, employment). Can communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters. Can describe in simple terms aspects of his/her background, immediate environment and matters in areas of immediate need.
	A1	Can understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type. Can introduce him/herself and others and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has. Can interact in a simple way provided the other person talks slowly and clearly and is prepared to help.

Source: Council of Europe (2001)

Declarations

Conflict of interest

The authors declare no interest conflict. They have no known competing financial interests or personal relationships that could have appeared to influence the article reported in this article.

Author contribution

González-Barrón, María Teresa: Contributed to the Project idea, methodology, investigation, project administration, writing-and editing original draft, data analysis.

Alvarado-Medellín, Marisela: investigation, gathering and comparing resources ensuring facts, sharing findings with the whole research team.

Barrios-Rodríguez, Lilia Gabriela: Contributed to conceptualization, review original-draft, sharing findings with the whole research team, provide feedback.

Vazquez-Pedraza, Ingryt Karely: data analysis, translation of original-draft, sharing findings with the whole research team.

Availability of data and materials

The information used in this draft was collected based on the results of the certifications applied to students of the Associate Degree in Mechatronics, in accordance with the guidelines requested by the Coordination of Technological and Polytechnic Universities.

These results were handled by the author and co-authors, respecting confidentiality at all times, as well as the university's privacy agreement. Microsoft Office Excel was used for the analysis.

Funding

The research is not funded through any source.

Acknowledgements

We would like to express our deepest appreciation to God who has let us get to know each other, work together, and start with the research odyssey.

We are deeply indebted to Sergio Vazquez Castaño who has helped us throughout this research.

We would also like to extend our deepest gratitude to our families who have patiently shared our family time with this research.

We would like to acknowledge the assistance of the Universidad Tecnológica de Altamira, for providing us with valuable information throughout this project.

Abbreviations

BIS	Bilingual International and Sustainable
CEFR	Common European Framework of Reference for Languages
CGUTyP	General Coordination of Technological and Polytechnic Universities
CIUT	Technological University Language Center
iTEP	International Test of English Proficiency
MEXPROTEC	Mexico-France Cooperation Program
TSU	Technical University Degree
UT	Technological University

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