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English linguistics + de Google Classroom

A constructivist learning tool experience from the University of Panamá

Elias De leon

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English Linguistics + Google Classroom

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English linguistics + Google Classroom: A constructivist learning tool experience from the University of Panama

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Dedication

This work is dedicated to all the university students who have passed through the classrooms where the author has had the privilege to teach and, above all, where meaningful learning took place. It is likewise dedicated to the future professionals of Panama, whose perseverance, intellectual curiosity, and dedication will shape the educational and social transformation of the nation, wherever their career paths may lead them.

Acknowledgments

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Abstract

The implementation of virtual learning environments (VLEs) represents a natural progression driven by the expansion of computer networks and digital connectivity. The disruption of face-to-face instruction during the global health crisis at the beginning of the second decade of the twenty-first century accelerated the transition of higher education institutions toward digital platforms, a reality that profoundly affected Panama. Within the framework of academic freedom at the University of Panama, educators adopted diverse technological tools to fulfill their pedagogical mission. Among these tools, Google Classroom stood out by providing a structured framework capable of emulating a comprehensive VLE.

This research evaluates whether the implementation of Google Classroom as a virtual learning environment enhanced English language acquisition among third-year undergraduate students enrolled in the Introduction to English Linguistics course at the Octavio Méndez Pereira Campus during 2021. Employing a quantitative approach, a modified Constructivist On-Line Learning Environment Survey (COLLES) was administered as the primary measurement instrument. Due to the limited sample size, statistical analysis incorporated an independent samples Student's t-test to assess pretest and posttest learning outcomes, alongside Kendall's tau-b correlation coefficient to analyze perception variables and mean scores.

The findings demonstrate that although student perception of knowledge acquisition was not directly dependent on Google Classroom, its systematic use as a virtual environment significantly favored English language learning. These results underscore the viability of accessible VLEs in higher education, highlighting the importance of structured digital environments in supporting academic continuity and language instruction in post-pandemic contexts.

Keywords: English, Linguistics, virtual learning environment, Google Classroom, virtual learning

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Prologue

It is of utmost importance that every English language professional fully achieves mastery of the language. Therefore, future graduates in humanities with a specialization in English already have previous knowledge of the language at the beginning of the career path; nonetheless, taking into account virtual instruction, in this case, in the wake of the global COVID-19 emergency. It is necessary to check on students how much positive effect online instruction has on English learning. Therefore, the present work consists of five chapters and aims to assess the effectiveness of the Google Classroom tool as a virtual learning environment to improve the constructivist learning of English in third-year students of the Introduction to English Linguistics course at the University of Panama, Octavio Méndez Pereira Campus, 2021.

The first chapter presents the frame of reference, the background of the problem, its approach, and its definition. The objectives are set, and the relevance of this thesis is clarified. Likewise, the coverage is delimited, and the limitations encountered during its development are discussed before mentioning the importance and contributions. The second chapter refers to the theoretical framework, in which important aspects about the institution where the study was carried out are detailed. Next, the factors that influence the learning of the English language are mentioned and explained, as well as the definitions of the legal grounds, which support the decisions that disturbed and gave effect to the course of this investigation.

The third chapter defines the type of research, the sources and instruments of measurement, and the population and sample with which we worked in this research, in addition to the procedure and instruments used for the collection of information, as well as the validity of the instruments and their mode of analysis. The fourth chapter details the results obtained after the application of the measurement instruments, and in the fifth and last chapter, the conclusions after completing this research are shown. In this way, the annexes also show part of the relevant documents generated during the development of this work. Without adding more, the use of Google Classroom as a virtual environment to improve constructivist learning of English linguistics.

Chapter 1

Research Approach

Chapter 1: Research Approach

Context of the Problem

Data published by *Educational Testing Service* (ETS, 2020), company that manages the application of the *Test of English as a Foreign Language* (TOEFL), show Panama with an average score of 84/120, which is low in contrast to the range of 86 to 90 minimum score according to English language proficiency. Moreover, most universities that admit foreign students in the United States consider the said ETS minimum as an admission requirement for applicants to study undergraduate careers.

According to *Education First, an* international company specializing in language teaching, Panama got an average of 483 points, obtaining the 56th position, out of 100 countries studied in its *EF English Proficiency Index* (EF EPI) during 2020; which shows that Panama is among the "countries with a low level of English language proficiency" (EF Education First, 2020).

In the same report, Panama is compared along with other peers in the region, where it ranks 12th among the 19 Latin American countries where EF has a presence. As for the contesting countries within the Latin American list, compared to the world positions, are the averages of Argentina with 566 points, and position 25; Costa Rica, with 530 points, with 36th position; and Chile, which has 523 points, ranking 37th.

When comparing EPI EF numbers (EF Education First, 2020), Panama is seen against the leaders of the region; however, it should be noted that, like EF's findings, state investments in English, as well as the reduction in the extreme poverty rate and the increase in literacy rates within the region, have increased English proficiency in at least 12 of the countries studied. According to the Economic Commission for Latin America and the Caribbean (CEPAL, for its Spanish acronym) (Hanni, 2019), the average investment in education should be 5% of GDP in each country. Therefore, Panama establishes a commitment to invest 6% of the GDP of the previous year in the area; however, we have seen a constant over the last 10 years that does not exceed 4% (INCEFI, 2016).

In line with CEPAL's conclusions, the Science, Technology, and Innovation Policy Review of Panama (UNCTAD, 2019) shows that the increase in national investment in R+D (Research + Development) targeting the elements to achieve positive results in the global scores and indices to which Panama appears. Under the National Strategic Plan for Science, Technology, and Innovation (PENCYT, for its Spanish acronym), it was

considered a goal to increase the investment of 1% of the country's GDP in this educational area by the end of the effective five-year period 2019-2024 (SENACYT, 2019).

All indicators of academic achievement are aimed at improving education. However, imposing virtual education (Universidad de Panamá, 2020) represents a new paradigm in higher education. This change, from face-to-face to virtual, opens the compass for the application of new digital tools to facilitate teaching. However, teaching English has its own challenges, and virtuality requires the application of specialized didactic strategies for the subject; especially when imbuing students with the ability to be builders of their own knowledge, literally and virtually.

If the certainty of virtual education in a course could be measured, the research question would be urged: What is the effectiveness of Google Classroom in English learning for English students at the University of Panama, Octavio Méndez Pereira Campus?

Problem Statement

Implementing Google Classroom as a virtual learning environment has a definition in its own context. However, the use of this tool as a virtual classroom in formal education generates inconsistent concepts of virtuality. For this reason, it is necessary to assess the efficiency of Google Classroom as a virtual classroom in enhancing English learnings.

The process of weighing the effectiveness of virtual environments is directed based on the students' previous knowledge and programmatic content. Then, this strategy must be implemented through a virtual platform, and thus measure the perception of the study subjects regarding their learning.

Based on the research problem, emphasizing the effectiveness of Google Classroom in the teaching of English, the following questions arise:

- What is the perception of the students of the Introduction to English Linguistics course about their constructivist learning after the use of Google Classroom as a virtual learning environment in the course?
- Will the sociodemographic characteristics of the unit of analysis affect the perception of learning to use Google Classroom as a virtual learning environment?

General Assumptions

This investigation addresses a descriptive analysis of the relationship between measurable learning outcomes and students perceived engagement with constructivist pedagogical frameworks in a particular virtual learning context. With a singular emphasis on the third-year cohort of students enrolled in the Introduction to Linguistics (ING 300) course at the University of Panama's Octavio Méndez Pereira Campus, Faculty of Humanities, Department of English. The study examines the correlation between the subjective perceptions of constructivist learning processes held by students and their actual acquisition of English linguistic knowledge during the first semester of the academic year. 2021.

The research specifically investigates the role of Google Classroom, which is the primary Virtual Learning Environment (VLE) deployed, as the medium that enables this constructivist approach to English language instruction. The goal is to determine and quantify the relationship between the self-reported experiences of students within this constructivist framework and their demonstrable proficiency in English language structures and usage, as evaluated by standardized pre- and post-course metrics.

To reach this main analytical goal, the study uses a multidimensional approach based on descriptive methodology. Its primary goal is to determine how sociodemographic traits—like academic background, past schooling, and socioeconomic background—stratify the student body within the cohort and relate to their perceived involvement as active participants in creating knowledge during the English linguistics course. Second, the study aims to interpret the nuanced students' perceptions of their learning trajectory in the integration's aftermath when Google Classroom became the VLE. Specifically, it will examine how the platform's features and interactions influence their comprehension of the constructivist learning process. Crucially, the research further targets the identification of a statistically significant correlation coefficient between the students objectively measured English language knowledge acquisition (quantified in pre- and post-test assessments) and their self-reported perceptions of constructivist learning efficacy within the Google Classroom environment. A clear delineation of scope is necessary for this analysis, which is limited to Group 2 of the Bachelor of English program, and is only carried out during the first half of the 2021 academic year. It stresses that the study does not look at any other courses, student groups, or school years. This way, the results are only relevant to the teaching method and group of students that were studied.

As such, the study offers a targeted descriptive account of the relationship between perceived constructivist learning dynamics and quantifiable linguistic outcomes in this limited but representative virtual learning environment. This helps to clarify the

effectiveness of *Google Classroom* as a platform for constructivist methods in the University of Panama English linguistics instruction.

Methodological Relevance

This study encountered several methodological constraints that warrant explicit acknowledgment. Initially, seven (7) students attempted to enroll in the subject without successfully completing the necessary academic prerequisites. Two (2) students were unable to withdraw from the subject and remained on the official roster until the end of the semester. This partial alteration of the participant pool and associated measurements necessitates careful interpretation of the findings. Second, students' participation in synchronous, real-time activities was severely limited by their poor connectivity.

The third issue is that the use of Google Classroom inherently impedes controlled access through teacher invitations, which complicates efforts to manage student enrollment in the event of unsubscribing. Finally, students had to combine their institutional accounts—the @up.ac.pa domain belonging to the Microsoft account realm—for real-time virtual meetings via Google Meet with a personal ad hoc account for classroom access. It was not possible to enroll institutional accounts within the University of Panama's Google G Suite Institutional Classroom.

These limitations are a result of the unique pedagogical context in which the teaching of English linguistics at the University of Panama is conducted. Coincidentally, English is acknowledged as a second language in Panama under Law No. 2 of January 14, 2003. Due to the global COVID-19 pandemic, the university's transition to virtual instruction necessitated the professors' evaluation of the degree to which Google Classroom, a virtual learning environment (VLE), could effectively support constructivist learning in the undergraduate course Introduction to English Linguistics. Therefore, the specific question of whether this platform achieves significant constructivist learning outcomes in future English bachelor's degree graduates is addressed in this study.

The study's relevance attempts to transcend pedagogical inquiry to align with national strategic priorities, as it endeavors to evaluate student perceptions of Google Classroom's efficacy as a virtual learning environment (VLE) for constructivist English learning. The objective is to cultivate the competencies required for students to achieve advanced language proficiency by the conclusion of an English major core course, such as Introduction to English Linguistics. This objective is directly aligned with the initial line of action within the execution axis for the promotion of Science, Society, Economy, and

Public Policies, as delineated in the National Strategic Plan for Science, Technology, and Innovation 2019–2024 (SENACYT, 2019).

The transversality of education serves as the foundational principle for this work. Additionally, the proposal to consolidate Panama's National Research System (SNI, for its Spanish acronym), which is run by SENACYT, creates distinct thematic categories for researchers, such as Area IV—Social, Humanistic, Administrative, and Economic Sciences (Gaceta Official, 2007). Within this framework, English language research is a specialized area within the Humanities, and there are currently programs in Panama that actively support this kind of research.

It makes three main contributions: (1) it creates a framework for future research in this area; (2) it presents its findings in formal publications to the Linguistics Commission of the Department of English; and (3) it makes digital teaching resources created during the study available to everyone on a publicly available website. These contributions collectively facilitate the integration of constructivist pedagogical practices within Panama's English language education ecosystem, while simultaneously achieving national strategic objectives for scientific and educational development.

Chapter 2

Theoretical Framework

Chapter 2: Theoretical Framework

English Language Education in Panama: Historical Trajectories and Digital Adaptations

A substantial convergence of technological advancements, such as artificial intelligence, biotechnologies, and nanomaterials, was facilitated by the Fourth Industrial Revolution's emergence in the first two decades of the twenty-first century (Penprase, 2018). This transformative period caused urgent responses within higher education to maintain global competitiveness. A critical variable in this context is the evolving nature of student skill development, where learners increasingly gain competencies in knowledge domains that emerge after their initial academic focus (Penprase, 2018). Panama, strategically positioned as a republic spanning two continents and two oceans, serves as a vital transit hub for global trade. Its enduring cultural and linguistic ties with the United States—polarizing the adoption of English as the primary commercial language—further underscore its unique role in the contemporary globalized academic landscape.

The historical trajectory of English instruction in Panama extends far beyond the nation’s founding; as a retrospective analysis, it identifies the construction of the Trans-Isthmian Railway (1849–1855) as a pivotal moment (Correa, 2014), establishing early American influence on the isthmus; something that De Leon (2022) considered that the nascent Panamanian government experienced positive economic benefits from American influence. As a result of this influence, the interest was later shifted towards establishing a waterway connecting the two oceans through Central America (Conniff, 2012). Despite persistent exclusionary policies, such as "defensive nationalism" and the slogan "speak Spanish and count in Balboas" (Serrano, 2020), English has persisted as the language of instruction and communication in Panama for more than 150 years. This prolonged presence has fostered a complex societal relationship with the Anglo-Saxon language, particularly among populations lacking substantial linguistic proficiency.

Recognizing this context, Panama implemented significant legislative and programmatic measures to institutionalize English education. Law No. 2 of January 14, 2003, mandated the compulsory teaching of English in both official and private educational institutions at the primary and secondary levels. Furthermore, Article 6 of this law required universities to establish mechanisms ensuring prospective students possess English proficiency alongside Spanish for degree completion (Serrano, 2020). Subsequent initiatives have further solidified this commitment. The Panama Bilingue program, implemented in four phases through Law No. 18 of March 10, 2017, exemplifies this trajectory: the first phase focused on intensive English teacher training in Panamanian universities; the second phase involved immersive training in English-speaking countries to develop leadership and pedagogical skills; the third phase

expanded class hours for foundational education under the Kids Program; and the fourth phase introduced an extended language immersion program for public high school students (known as the *After School Program*) (Serrano, 2020).

Recent technological advancements have further integrated English language education into Panama's academic ecosystem. The *Technology for All* project (MEDUCA, 2013) distributed over 89,000 computers to 9th and 10th grade students, establishing the foundation for middle school e-learning environments. Concurrently, the Entre Pares program provided teacher training to leverage digital resources within these new learning environments. The global COVID-19 pandemic presented a critical juncture, compelling a rapid shift to non-face-to-face instruction during the 2020 academic year. This transition initially generated uncertainty regarding the disruption of standardized assessments and competitive processes. However, by early 2021, institutions like the University of Panama's School of English (Octavio Méndez Pereira Campus) had refined virtual learning practices. For instance, the *Introduction to Linguistics* course (ING 300), a third-year requirement with three credits (equivalent to three theoretical hours per week), mandates completion of prerequisite courses including *Phonetics I* and *II* (ING 192A, 192B) and *Integrated Language Skills I–IV* (ING 292A, 292B).

Blended instruction or the substitution of face-to-face learning with immersive digital modalities have been made feasible by the advances in ITC and virtual learning environments (VLEs). Three main channels are used by VLEs to support cognitive processes: computer-mediated communication and interaction, natural settings, and didactic materials. In Panama, the spread of non-face-to-face higher education delivery has been especially noticeable, aided by global health measures brought on by the pandemic. The Ministry of Education formally suspended the school year during this period (Yu-Feng & Nguyen, 2007; Cucinotta & Vanelli, 2020). Interactions within VLEs can be divided into four different types of relationships: learner-interface, learner-content, learner-instructor, and learner-learner (Moore, 1989; Hillman et al., 1994; Moore & Kearsley, 1996). Moreover, VLEs are highly effective in standardized testing; however, the validity and reliability of such assessments have been called into question as a result of the inconsistent results observed across various cohorts (Kumeh, 2004), particularly in language education and testing.

Because of their deindividualized nature and inconsistent applications while mastering learning, standardized tests are often criticized. Some authors assert that even students' self-evaluation perceptions—the way students think about themselves and what role they play in self-evaluation—are sometimes looked at in line with the techniques teachers use and the formative methods from systemic approaches (Black & Wiliam, 2006; Fletcher & Shaw, 2012). To bridge the gap between instructional design and assessment, rubrics represent the gold standard for evaluation. These instruments combine qualitative criteria with quantifiable scales, assigning numerical values to

descriptive data in ascending or descending order (Brookhart, 2015). While rubrics are subject to perceived subjectivity, they reveal strong efficacy when accompanied by clear, unambiguous guidelines, and sufficient quality information (Brookhart, 2015). Research conducted by Anglin et al. (2008) further confirms that computer-aided rubrics can enhance the effectiveness and efficiency of assessment processes by up to 350% without negatively impacting student perceptions.

Theories and concepts of the problem

The term cognition, from its semantic definition, has been characterized by knowledge in general, which is applied to concrete objects and abstractions of perception (Muller, 2017). The learning process was theorized from the observation of common traits, from there learning models are theorized based on the observed processes; These patterns have stood the test of time and have established themselves as the foundations of cognitive development.

Historically, psychologist Jean Piaget's *Model of Cognitive Development* (1936; 1952) has been recognized, as a route for the generation of knowledge with a relationship directly proportional to age. This important specialist highlighted four stages in cognitive progress, in which the first includes from birth (called Sensory-Motor); the second that begins at 2 years (Preoperational); the third from the age of 7 (Concrete Operations); and the fourth from the age of 12, entering adult life (Formal Operations). Piaget's contribution has been widely debated by the scientific and educational community, to the point of being considered a transversal axis in curricular planning based on basic education (Jácome & Moreno, 2015), to higher levels, including in instances of military education (Flores-Tomalá y otros, 2025).

Lev Vygotsky's reflections on human learning saw the light (1967), they clarified the difference between *elementary mental functions* (sensation, reactive attention and associative or spontaneous memory) and their evolution, until the development of *mental functions of order*; thus, explaining the process of acquiring knowledge.

Subsequently, it is considered a contribution of the intersection of the theories of Piaget and Vygotsky, in relation to education, within the framework of the new virtual teaching environments (VLE), in the learning and cognition of individuals -indifferent to age- based on the assimilation and accommodation of knowledge within their proximate zone of development.

By unfolding the statements and applying the Piaget et al. (1973) concept, *intelligence* would consist of the possibility of maintaining a constant adaptation of the subject's schemas to the world that surrounds him and with which he interacts; it is impossible to deny the contribution of Arancibia et al. (2008), by affirming that assimilation becomes a process that develops from three sub-processes:

- Assimilation: That which provides a framework of pre-existing actions in novel situations.
- Accommodation: The incorporation of information in the face of new paradigms.
- Equilibrium: The modification of one's own schemes to understand – give coherence – to the immediate environment.

After clarifying the concept of cognition as the acquisition of knowledge that Gagne (1962) popularized, the segregation of the widely accepted construct of multiple intelligences is imposed, where Gardner (2011) considers the existence of specific cognitive profiles for each individual. In which the individual is the possessor of different knowledge (called intelligences), including: linguistic, musical, logical-mathematical, spatial-visual, kinesthetic, natural, inter and intrapersonal, and existential (Gardner, 2000).

The conceptual framework of individualized learning encompasses not only variations in multiple intelligences but also distinct learning styles, which are inherently defined at the personal level. This understanding derives from psychological theory, wherein learning styles refer to "the characteristic way in which people are oriented towards problem solving, but also to the affective, cognitive, and physiological behavior characteristic of the being, which serves as a stable indicator of how learners perceive, interact and respond to the learning environment" (Terrádez, 2007).

Recognizing learners' preferred learning styles constitutes a critical prerequisite for educators, as the pedagogical approaches teachers employ often reflect their own historical learning experiences (Kolb, 1984). Consequently, this study delineates the Typologies of learning styles as defined by Terrádez (2007), building upon earlier salient categories such as preferences in learning perception, reality orientation, and overall learning styles (Witkin et al., 1989; Rojas y otros, 2006). Alonso et al. (2007) further emphasize that individuals predominantly externalize a specific learning modality despite possessing comprehensive elements of internationalized knowledge acquisition.

This analytical foundation necessitates consideration of Honey and Mumford's (1986) four distinct learning styles—activist, reflective, theoretical, and pragmatic—while acknowledging the extensive diversity of frameworks used to categorize learner characteristics, including intelligence models and learning typologies (Alonso et al., 2007). Within the context of Virtual Learning Environments (VLEs), constructivist learning theory is implemented through digital platforms such as Google Classroom; this approach highlights the interplay between motivational and cognitive factors influencing students' preferences for online or blended learning, particularly through new information and communication technologies (ICT) (Keskin & Yurdugül, 2019). Three key elements significantly impact student preferences in such settings: limited awareness of effective

learning strategies (Littlejohn et al., 2016; Adam et al., 2017; Broadbent, 2017; Sahin et al., 2017), proficiency in digital tool utilization (Park et al., 2010; Ramli et al., 2018; Yurdugül & Demir, 2017), and motivational drivers that sustain engagement (Cull et al., 2010; Nayafi et al., 2018). Constructivist learning thus emerges from its theoretical roots as a model where students function as active knowledge constructors, aligning with principles established by Skinner (1953), Piaget (1980), and Dewey (1929).

Self-regulatory learning capacities further underpin this constructivist framework. Pintrich et al. (Pintrich et al., 1991) indicate that students developing self-regulatory learning skills (SRLs) exhibit heightened cognitive effort and motivation while also demonstrating the ability to autonomously manage their learning processes. Similarly, Keskin and Yurdugül (2019) affirm that individuals with robust self-regulatory capacities can organize, plan, and apply prior knowledge to novel contexts through critical thinking and self-evaluation.

Qualitative research like Shroff et al. (2008) shows that technology-based learning activities affect curiosity, self-motivation, and certain aspects of self-determination. This means that intrinsic motivation is a key factor in determining student achievement, persistence, and long-term success in VLEs.

The application of constructivist principles in VLEs requires contextual relevance, as Oliver (2000) emphasizes that authentic learning experiences must involve scenarios familiar or empathetic to students. This is further supported by Schunk (1989), who points out that students' ability to ask questions and challenge ideas directly improves intellectual growth. Individual readiness for online learning environments is critically mediated by learner characteristics, which function as inputs influencing the system’s outputs (Keskin & Yurdugül, 2019).

Electronic didactics, as defined by Borotis and Poulymenakou (2004), encompasses the knowledge, skills, social, psychological, affective, and physical resources students require to effectively engage with digital instruction. This framework inherently centers the student as the active agent of knowledge acquisition, thereby transforming the teacher’s role from knowledge provider to facilitator—a principle consistent with the foundational design of all VLEs.

Legal context

A since the enactment of Law No. 2 of January 14, 2003, which establishes the compulsory teaching of English in the national territory, dictates in its Article No. 6 that: Panamanian universities shall ensure that applicants for university degrees have

knowledge of an international language in addition to Spanish. Based on this enactment, it is considered that graduates of undergraduate careers who entered the University of Panama as of 2007, meet the requirement of presenting a proficiency exam in the target language before their promotion. (Approved at Extraordinary Assembly of the *Consejo General Universitario* [General University Council, in English] No. 9-08 held on April 23, 2008).

The process of the State of Emergency in Panama and its impact on teaching can be summarized as follows:

On March 9, 2020, Panama, registers the first case of Coronavirus (OPS, 2020).

On March 11, 2020, the World Health Organization (WHO) declared the Coronavirus outbreak a Pandemic (Cucinotta & Vanelli, 2020).

The Cabinet Council in its Resolution No. 11 of March 13, 2020 declared a State of National Emergency and provisions were issued to face the COVID-19 pandemic.

On April 2, 2020, Law No. 139 was enacted, where measures were taken to deal with the health crisis that the country was experiencing during the enactment of the Law, and until May 30, 2020, when its validity would expire.

Once the validity of Law No. 139 expires, Bill No. 375 is enacted to continue addressing the health emergency of the COVID-19 pandemic.

The Ministry of Education formalizes the new school calendar through Executive Decree No. 564 of July 2, 2020, with the approval of the Prioritized Curricular Strategy.

The Academic Council of the University of Panama, through Agreement No. 320 of March 11, 2020, determines the application of non-face-to-face classes and the suspension of all academic activity that means congregation of people. After the implementation of this agreement, instruction was completely devoted to the virtual modality and, after a year of virtuality in classes, prejudices against VLE have changed on the part of those involved in a similar way to what Davis (1989) proposed in his archetypal, *A technology acceptance model for empirically testing new end-user information systems : theory and results* (in Spanish, A model of acceptance of technology for the testing of new information systems for the end user: theory and results).

Chapter 3

Methodological aspects

Chapter 3: Methodological aspects

Type of research: Definition

This research employs a *quantitative methodology* utilizing a non-experimental design, as defined by Hernández-Sampieri and Mendoza (2018), an independent variable is not manipulated, and it is a single group that represents a case study.

which characterizes the study through the absence of independent variable manipulation and a single-group case study configuration. The data collection strategy adopts a retrospective approach, necessitating the application of measurement instruments before the study period's conclusion; specifically, it utilizes a cross-sectional design with a single data collection point (the COLLES survey) administered at the terminus of the study duration. Concurrently, the EF Quick Test—applied at both the study's start and end—serves as the instrument for quantifying actual learning progression, thereby establishing a foundation for measuring genuine learning outcomes.

The analytical framework operates at a correlational level, as delineated by Arias (1997), wherein this level signifies the depth of investigation into a particular object or case. This correlational approach is explicitly adopted because the study seeks to elucidate "the relationship or degree of association between two or more concepts, categories, or variables in a particular sample or context" (Hernández-Sampieri y otros, 2014). This is likely why Palella & Martins (2006) consider that such an approach extends beyond contextualization to enable the measurement of variables within their relational degrees. Ultimately, this study examines the degree to which constructivist learning perception—derived from the COLLES survey—correlates with measurable real learning gains, as indexed by the longitudinal variation captured through the *EF Quick Test*.

Justification

This work attempts to set a milestone in the validation of the development of language skills in the Department of English of the University of Panama, since only empirical measurements and appraisals have led to the development of analytical subject programs far from the constructivist approach. However, this research will provide valuable results with replicable instruments that can be developed as future standards, as well as bases for measures of quality perception in virtual teaching inside and outside the subject of this study.

Population: Sample

The universe studied consists of 22 individuals, all from Group 2, belonging *to the Introduction to Linguistics* course. Voluntary participation was commended to all individuals in the population.

Sample Type

There is an intentional population; and is considered non-probability sampling for this study. In the current work universe, there were a total of twenty-two (22) individuals.

Selection of sample elements

Intentional discrimination (convenience sampling) is taken into account for the selection of sample elements, as Otzen and Manterola (2017) take into account the subjects' proximity and ease of access to the researcher. Additionally, Scharager and Reyes (2001) speculate that “subject types” exist, provided that the test subjects share similar sociodemographic characteristics (e.g., generational group, level of education, and level of linguistic competence). For the small universe, it was determined to address the entire population of individuals as a case study and with their voluntary participation.

Types of variables

The present work includes the overarching variable: Measurement of constructivist learning achieved through the use of Google Classroom as VLE in students.

Consistency Matrix

The consistency matrix, originally developed by De Leon (2022), is presented in Table 1

Table 1

Consistency matrix

Variables	Dimensions	Indicators	Items	Scale
Perception of constructivist learning of English after the implementation of Google Classroom	Relevance	Attachment to students' professional development	My learning focuses on issues that interest me. What I learn is important for my professional practice. I learn how to improve my professional practice. what I learn is related to my professional practice.	Consistent items for all indicators 5 - Almost always 4 – Often 3 – Sometimes 2 – Seldom 1 – Almost never
	Reflection	Learning in virtual environments facilitates reflection and critical thinking	I think critically about how I learn. I think critically about my own ideas. I think critically about the ideas of other students. I think critically about the ideas I read.	
	Interactivity	Incidence of EVA allowing interaction between users	I explain my ideas to other students. I ask other students to explain their ideas to me. Other students ask me to explain my ideas. Other students respond to my ideas.	

	Teamwork	Reciprocal interest between students in their learning	Other students encourage me to participate. The other students praise my contribution. Other students value my contribution The other students empathize with my efforts to learn.	
	Interpretation	Degree of understanding reached between tutors and students in the VLE	I understand the messages of other students well. The other students understand my messages well. I understand the tutor's messages well. The tutor understands my messages well.	
Real English learning	Integrated language skills	Reading / Listening	Supervised EF SET Quick Test (15 min)	10 Listening Questions 10 Reading Questions

Note: The evidence submission (timed screenshots) component of the supervised English learning test (pretest-posttest) was implemented to reduce the number of retries. Source: De Leon (2022)

Data collection and techniques

Within the quantitative approach of this work, data collection represents the moment of recovery of the quantitative inputs with which to develop the research. These are represented between nominal values that, according to Torres et al. (2019), they are obtained from primary sources since they are directly provided from the study population;

and they are collected by *indirect observation* because the data to be analyzed are compiled through data collection instruments.

Collection instruments

This research employed two electronic data collection instruments: the *Constructivist Online Learning Environment Survey* (COLLES) and the *EF SET Quick Check*. Both instruments were embedded within the VLE at the while timely applied in their respective instances. The COLLES survey, designated as Instrument 1, constitutes a closed questionnaire administered with external tools—albeit within the Google Classroom—following the edition from its original Moodle-based distribution package. More specifically, the modified COLLES incorporates 24 items measured on a 5-point Likert scale (Table 2), organized across six dimensions; it includes a conditional informed consent at the outset; then, four non-binding and fully anonymized sociodemographic data questions were also included.

The COLLES was selected for this study because it measures the relationship between social constructivist epistemology and web-based teaching by enabling students—despite physical isolation for health/safety reasons—to critically evaluate their active participation in learning processes Taylor and Maor (2000), comparing their pre- and post-exposure experiences with Google Classroom as a virtual learning environment. The adoption of Google Classroom as the virtual learning environment (VLE) for this research follows a 2021 analysis of digital resources utilized by the English School faculty (Tinoco et al., 2022), which identified it as the most integrative tool for teachers' realities; institutional management subsequently mandated its use across official university platforms, including Moodle (UP Virtual) and E-educative.

Once the guidelines for the platform implementations were cleared, the COLLES survey was administered through MS Forms® using institutional accounts (@up.ac.pa) to ensure data integrity, compilation, and analysis. The modified survey employs an informed consent conditional (Figure 1), requiring acceptance to proceed; non-acceptance triggers a negative response and fast-forwarding the survey to the farewell statement. Informed consent, as defined by Cañete et al. (2012), functions as "a tool for mediating between the interests of researchers, funders and individuals included in scientific research," and in this study it serves to inform participants regarding data use, storage, compilation, and publication.

The implementation also adheres to the principles established by Ortiz and Burdiles (2010), ensuring participants receive and explicitly agree to the research protocol. For this investigation, particular emphasis was placed on information management throughout and following instrument application, identifying the responsible

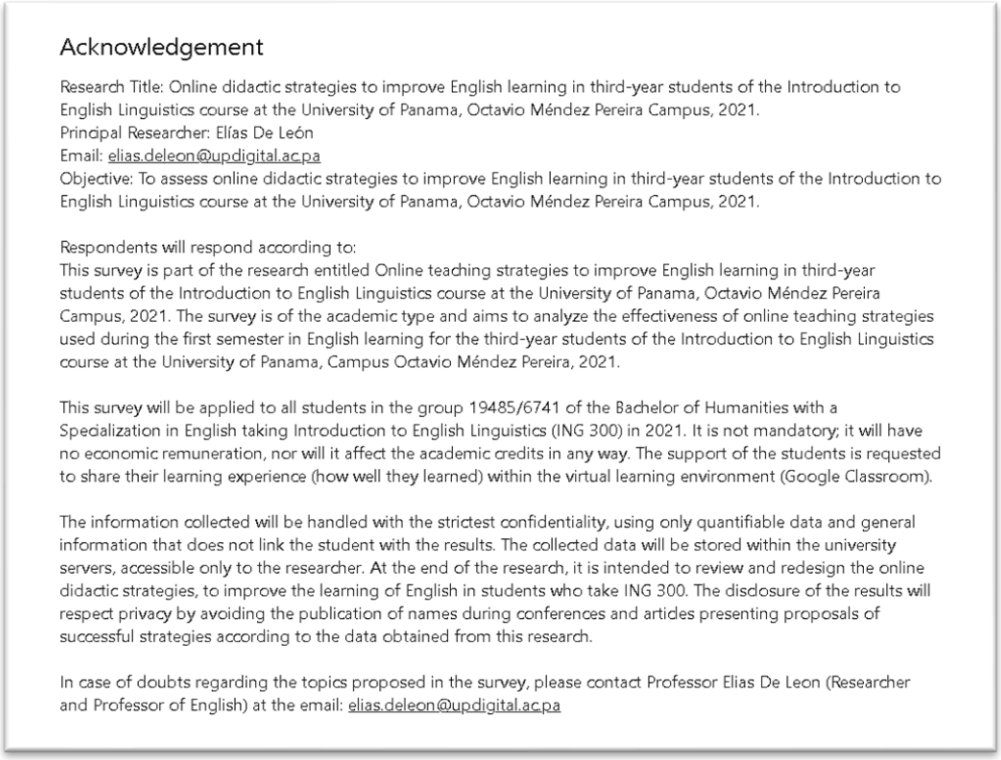
personnel and their contact mechanisms, as well as the anonymization of responses and the non-obligatory nature of survey participation.

Once the guidelines for the platform implementations were cleared, the COLLES survey was administered through MS Forms® using institutional accounts (@up.ac.pa) to ensure data integrity, compilation, and analysis. The modified survey employs an informed consent conditional Figure 1, requiring acceptance to proceed; non-acceptance triggers a negative response and fast-forwarding the survey to the farewell statement. Informed consent (IC) helps balance the needs of researchers, funders, and people who take part in scientific research (Cañete y otros, 2012; Nijhawan et al., 2013). In this study, it tells participants how their data will be used, stored, compiled, and shared.

The implementation also complies with the general guidelines of the IC, guaranteeing that participants are informed of and expressly consent to the research protocol (Nijhawan et al., 2013; Ferreira & Serpa, 2018). Particular emphasis was placed on information management during and after the application of the instrument, as well as the identification of responsible personnel, their contact mechanisms, the anonymization of responses, and the non-obligatory nature of survey participation, all which were paramount in the current research.

Figure 1

Informed Consent



Acknowledgement

Research Title: Online didactic strategies to improve English learning in third-year students of the Introduction to English Linguistics course at the University of Panama, Octavio Méndez Pereira Campus, 2021.
Principal Researcher: Elías De León
Email: elias.deleon@updigital.ac.pa
Objective: To assess online didactic strategies to improve English learning in third-year students of the Introduction to English Linguistics course at the University of Panama, Octavio Méndez Pereira Campus, 2021.

Respondents will respond according to:
This survey is part of the research entitled Online teaching strategies to improve English learning in third-year students of the Introduction to English Linguistics course at the University of Panama, Octavio Méndez Pereira Campus, 2021. The survey is of the academic type and aims to analyze the effectiveness of online teaching strategies used during the first semester in English learning for the third-year students of the Introduction to English Linguistics course at the University of Panama, Campus Octavio Méndez Pereira, 2021.

This survey will be applied to all students in the group 19485/6741 of the Bachelor of Humanities with a Specialization in English taking Introduction to English Linguistics (ING 300) in 2021. It is not mandatory; it will have no economic remuneration, nor will it affect the academic credits in any way. The support of the students is requested to share their learning experience (how well they learned) within the virtual learning environment (Google Classroom).

The information collected will be handled with the strictest confidentiality, using only quantifiable data and general information that does not link the student with the results. The collected data will be stored within the university servers, accessible only to the researcher. At the end of the research, it is intended to review and redesign the online didactic strategies, to improve the learning of English in students who take ING 300. The disclosure of the results will respect privacy by avoiding the publication of names during conferences and articles presenting proposals of successful strategies according to the data obtained from this research.

In case of doubts regarding the topics proposed in the survey, please contact Professor Elias De Leon (Researcher and Professor of English) at the email: elias.deleon@updigital.ac.pa

The survey was conducted with its twenty-four items categorized into six dimensions, in addition to the cleared IC item that must have been accepted beforehand. Due to its extensive distribution and numerous internal and external validations, the COLLES survey was considered. It is a visible representation of the abstract concepts using a five-point Likert scale, as Hernández-Sampieri and Mendoza (2018) mention, to the interest being placed in the underlying unobservable concept. Table 2 illustrates how the statistical analysis took into account the conversion of nominal variables (words) to ordinals (numbers).

Table 2

Likert scale representation of the COLLES survey.

Ordinal Value	English	Spanish
5	Almost always	Casi siempre
4	Often	Con frecuencia
3	Sometimes	Algunas veces
2	Seldom	Rara vez
1	Almost never	Casi nunca

Note 1. The Spanish equivalents corresponded to the source. Source: De Leon (2022).

The instrument 2 of the current study was the *EF SET Quick Check* test, which was implemented to generate confirmable evidence of students improving their proficiency in the language of study by finishing the *Introduction to Linguistics* course in the Bachelor's Degree in English program. The nominal significance threshold employed in this analysis, as noted by Lavrakas (2008), could result from either random factors or a Type I statistical error, suggesting a potential false rejection of a true null hypothesis. The test actually consisted of 20 multiple-choice questions that had to be answered in 15 minutes, starting with the first question.

Students had to answer narrated scenarios in the first ten questions, which tested their English listening comprehension; the next ten questions tested their reading comprehension, which included both implicit interpretation and explicit memory components. Since the test was online, results were shown on the screen as soon as it was finished—either when the allotted time had passed or when students opted to stop taking it. After logging in, participants could then receive email notifications of their results. The *EF SET Quick Check* scores were included in the study's interpretation of the actual English learning outcomes.

However, an exhaustive analysis of these results was deemed impractical because of the constraints of accessing partial data, specifically score breakdowns by individual language skills. These are intentionally withheld from public dissemination to maintain the

validity and legitimacy of the test. Because of this, the analysis could not look at differences in individual grades between the four language skills or between the first and last tests taken during the semester. Furthermore, the study found that student enrollment decreased from the start of the semester to its end, which had a direct impact on the quantity of *EF SET Quick Check* applications.

This variation made it necessary to use different statistical methods to calculate the mean differences in learning outcomes between the beginning and ending periods because different sample sizes necessitated specific approaches for a reliable comparison; these will be covered in more detail in the data analysis section. Other types of data, like objective and subjective course grades and evaluations, were not included in the main data collection tools because they were not thought to be relevant to the study's goals or not adhering to the VLE scope.

Taking part in live classes and giving timed speeches about English linguistic topics were used to grade students in the current blended-learning system; among other activities that were not directly related to or used through the VLE in question were also graded.

Methodological consistency of data collection instruments

The critical question to empirical research methodologies is whether a standardized assessment tool accurately measures the construct it purports to evaluate—the concept otherwise known as validity. Validity, as defined by Thompson (2013), constitutes the empirical evidence demonstrating that survey outcomes appropriately reflect the intended theoretical construct or phenomenon under investigation. This concept is distinct from the mere presence of data; it signifies the extent to which the instrument’s results are substantively meaningful and conceptually sound.

The assessment of this construct is intrinsically linked to the data generated by the instrument itself, as evidenced by the absolute counts of valid and excluded cases documented in Table 3.

Table 3

Number of cases

		N	%
Cases	Valid	14	93.3
	Excluded [a]	1	6.7
	Total	15	100.0

Note: Deletion based on the non-completion of required items. Source: De Leon (2022)

Reliability, on the other hand, is a crucial but separate aspect of the overall validity framework; in particular, reliability is the ability of the instrument to reliably yield consistent, repeatable results under various measurement conditions or administrations. For the COLLES survey instrument employed in this study, internal consistency—a key indicator of reliability—was rigorously evaluated using Cronbach's Alpha coefficient (α). The calculated value of α = 0.913 for the full instrument demonstrates a high degree of internal consistency see Table 4, indicating that the items function cohesively and measure the same underlying construct. This robust level of internal consistency supports the instrument's utility as an internal reliability benchmark.

Furthermore, the SPSS analysis revealed that the internal consistency coefficient remained exceptionally stable at α = 0.909 when the analysis was refined to exclude items identified as invalid or non-respondent cases (a common practice to enhance focus on the intended population). This outcome is in close proximity to the ideal value of 1.00 (Nunnally, 1967), which denotes perfect internal consistency and emphasizes the instrument's robust psychometric properties, even under this more stringent condition.

Table 4

Reliability Criteria

Cronbach's Alpha	N of Items
.913	15

Note: De Leon (2022)

Additional analytical methods were used to thoroughly examine the statistical integrity of the measurement process in order to further validate the validity and reliability of the instrument. One such method was the application of a Two-Factor ANOVA (No Replication) using Excel's data analysis add-in, which offered a cross-validation mechanism for the reliability metrics obtained from the initial Cronbach's Alpha analysis. As part of judging the instrument's performance, the distribution of response data was also looked at by plotting Q-Q points.

The median values observed within the instrument's response range (2.14 to 4.21) yielded an observed variance of 0.3338. This calculated variance aligns with the standard deviation of 0.0443, derived from the corresponding response interval (0.611 to 1.406). It is important to note that the variance analysis employed here utilized the entire population variance, deliberately excluding the influence of logical or outlier values to ensure the metric reflected the core response distribution. Additionally, the reliability of each survey question was checked by systematically putting them into one of Instrument 1's six predefined dimensions. This was done to make sure that each part added something useful to the whole and didn't cause any measurement errors.

In conjunction, these methodological steps—which include the definition of validity through empirical evidence, the establishment of robust internal consistency through Cronbach's Alpha, the cross-validation of reliability through advanced statistical techniques, and the examination of the underlying response distribution—provide a comprehensive framework for assessing the instrument's suitability. The COLLES survey satisfies strict requirements for validity and reliability in the context of this study, as evidenced by the consistently high internal consistency values ($\alpha = 0.913$ and $\alpha = 0.909$) and the alignment of the observed variance with the theoretical expectations.

This methodological rigor supports that the survey results can be confidently interpreted as meaningful indicators of the intended construct, thereby accenting the validity of the conclusions drawn from the empirical analysis.

Data analysis techniques

Among the techniques used for the statistical analysis of data, Q-Q distribution tests were used in each of the variables of the COLLES survey, and they are grouped into the 6 dimensions of this test. The association of the items and the total score is considered as a measure of internal consistency of the instrument (first measure of reliability), it is measured by the computation of Cronbach’s Alpha in the analysis package of the IBM SPSS© software. In the same statistical analysis software, the Kolmogorov-Smirnov (K-S) and Shapiro-Wilk (S-W) distribution were tested.

Although both dispersion models are applicable, their difference lies in the dependence on the degree of correlation and sample size (Fasano & Franceschini, 1987). K-S from a single sample is considered for more than 50 values and serves as a basis of comparison for the Shapiro-Wilk test, since small samples (n=<50) are used as a measure of dispersion between individual items, accompanied by the formulation in Table 5.

Table 5

Formulas synthesized in application by statistical package

Kendall tau-b correlation coefficient	Shapiro-Wilk Distribution Test
Formula	**Formula**
$T_{XY} = \frac{2 \cdot S}{n(n-1)}$	$W = \frac{\left(\sum_{i=1}^{n} a_i x_{(i)}\right)^2}{\sum_{i=1}^{n}(x_i - \bar{x})^2}$
Legend	**Legend**
Where: S = P – M P = Number of positive values. M = Number of negative values	Where x(i) is ordered values, (x(1) is the smallest) and the *AI* are the constants generated from the means, variances, and covariances in the statistics of a sample of size *n* of a normal distribution.

The demonstration of dispersion of the results lies through Q-Q diagrams. At the same time, the mean and standard deviation of each item are analyzed as a demonstration of reliability of the well-known Cronbach's Alpha.

According to Wilk and Gnanadesikan (1968), Q-Q plots (short for Quantile-VS-Quantile) represent the proper approximation of the function for a standardized normal variable. What they mainly represent graphically is their attachment to the 45° line from the zero of a two-dimensional Cartesian plane. By using absolute values, the need to graph in other quadrants of the Cartesian plane is ruled out (by using the quadrant I [+/+]) $\log X_{10}^2$

The most common use of Q-Q diagrams is given as a graphical demonstration of the degree of reliability of an item representing its attachment or deviation to an imaginary line; however, in the article *Probability plotting methods for the analysis of data*, Wilk & Gnanadesikan (1968), show that, "with Q-Q plots for a variable, in a simple interpretation mapping, it is possible both to specify an aberrant value, and to gain the statistical reliability of the remaining points". In the same article, the authors also define probability

points (Q-Q) as alternative methods of analysis and even as "informal aid" to infer unexpected characteristics and find outliers.

The analysis is divided among the dimensions present in Instrument I, and the descriptive statistics data and the verification through the graphical analysis by points Q-Q in each of them are presented.

Despite the coincidence of the Q-Q points near the normal line, in this work they are not considered part of the statistical analysis; becoming a graphical representation of the statisticians of the Shapiro-Wilk test, and keeping the same cohesion that the same author, Martin Bradbury Wilk, demonstrated in his works. The same relationship would also be verified by other authors such as Razali & Wah (2011), who demonstrated that the Quantile-VS-Quantile graph (Q-Q graph) is the most effective and commonly used diagnostic tool to review the normality of the data.

There is also the *Kendall Tau-b Correlation*, for using nominal/ordinal (non-parametric) variables for the analysis of the COLLES survey data. Knowing that the Kendall coefficient provides values between -1/+1, the values are directly proportional between their magnitudes.

With the analysis shared by Morales and Rodríguez (2016), the application of Kendall's correlation coefficients (tau-b) is considered because it is a small sample. And, to compute the coefficient, the IBM SPSS® 26 program was used. And the analogous equivalence with the formula is represented in Table 6.

In order to verify the individual validity of the criteria in each item (grouped in their respective dimensions), the data of the descriptive statistics and their graphical representation are presented below. It begins with the relevance dimension and is presented in Table 6.

Table 6

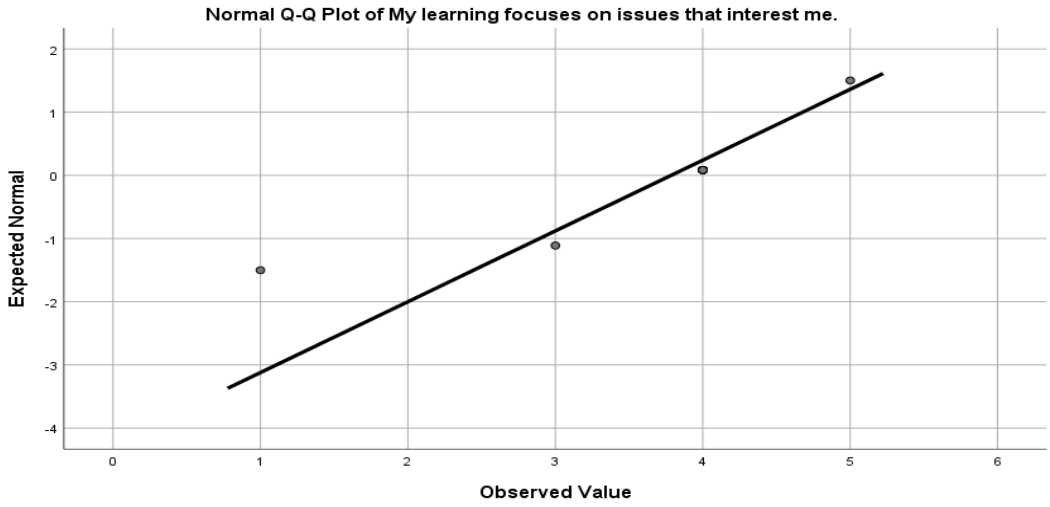
Dimension Statistics: Relevance

	N	Range	Mean	Std. Deviation	Variance
My learning focuses on issues that interest me.	14	4	3.79	.893	.797
What I learn is important for my professional practice.	14	3	4.21	.893	.797
I learn how to improve my professional practice.	14	2	3.71	.726	.527
What I learn connects well with my professional practice.	14	3	3.79	1.122	1.258
Valid N (listwise)	14				

Source 1: De Leon (2022)

In regards to the dispersion of the *relevance dimension*, it was checked using the Q-Q graphs in Figures 2-5 showing each item of the dimension.

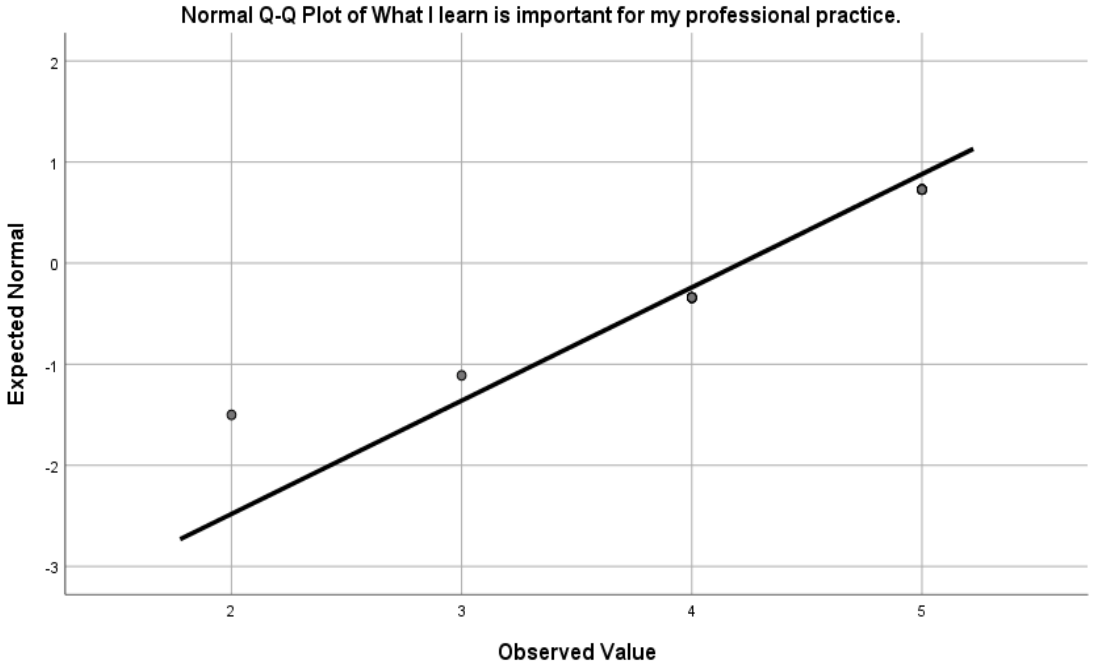
Figure 2 *Normal Q-Q distribution diagram for the item: My learning focuses on issues that interest me*



Note: Normal distribution. Source: De Leon (2022)

Figure 3

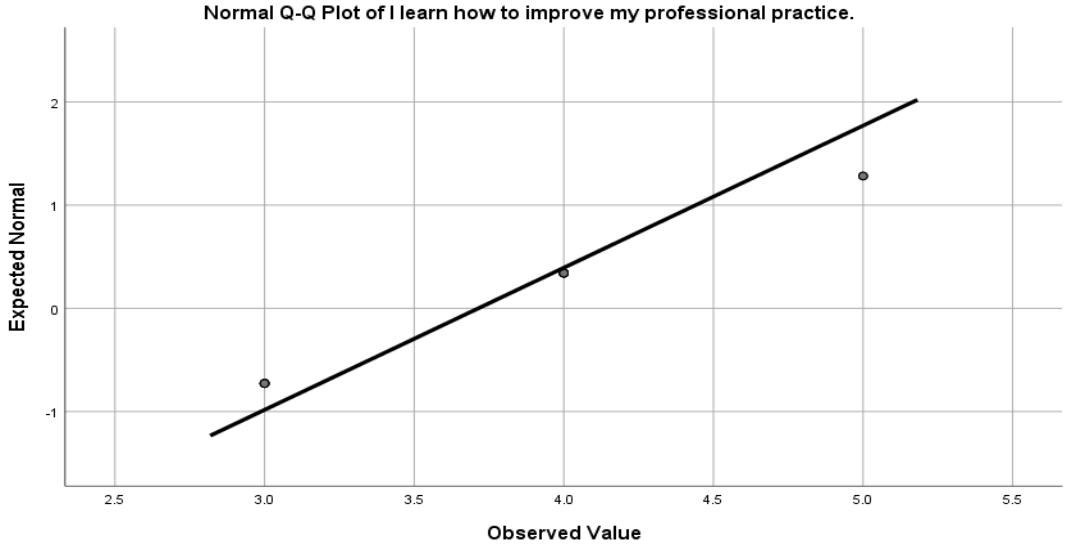
Normal Q-Q distribution diagram for the item: What I learn is important for my professional practice



Note: Normal distribution. Source: De Leon (2022)

Figure 4

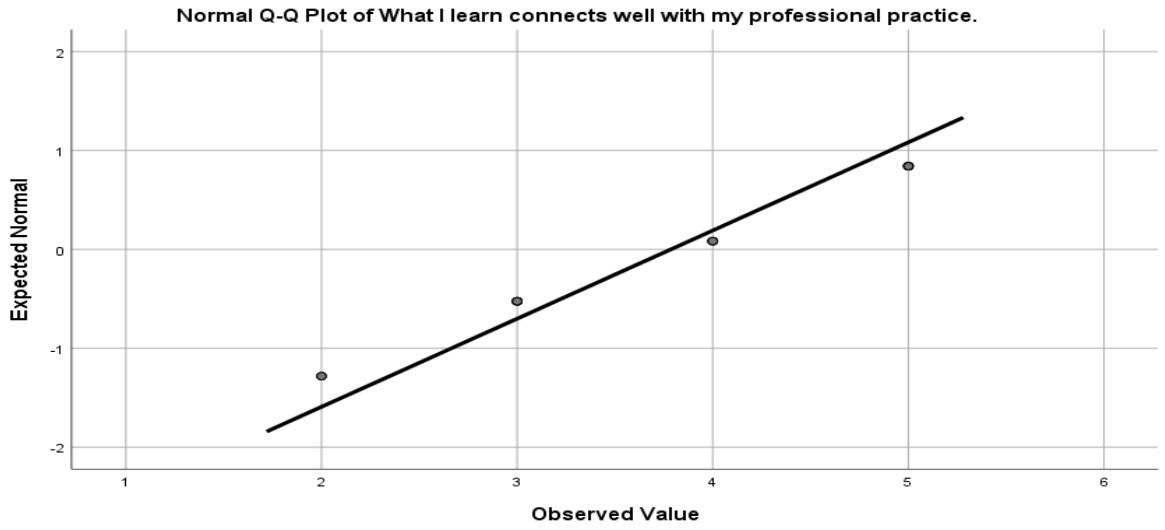
Normal Q-Q distribution diagram for the item: I learn how to improve my professional practice



Note: Normal distribution. Source: De Leon (2022)

Figure 5

Normal Q-Q distribution diagram for the item: What I learn connects well with my professional practice



Note: Normal distribution. Source: De Leon (2022)

The data from the descriptive statistics for the *reflection dimension* are obtained and presented in Table 7.

Table 7

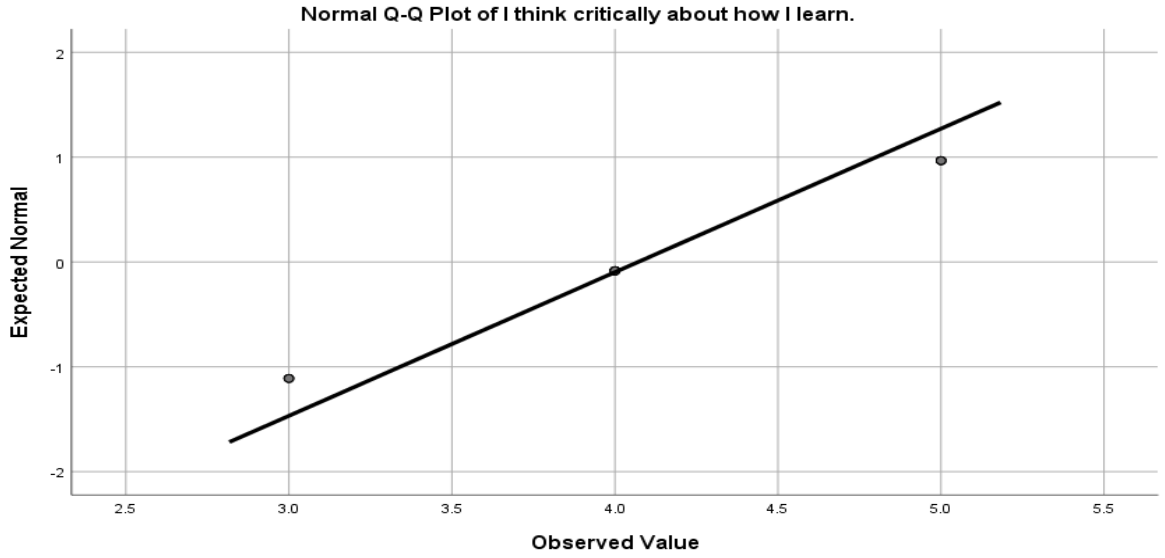
Reflection dimension statistics

	N	Range	Mean	Std. Deviation	Variance
I think critically about how I learn.	14	2	4.07	.730	.533
I think critically about my own ideas.	14	2	4.14	.770	.593
I think critically about other students' ideas.	14	3	3.29	.914	.835
I think critically about ideas in the readings.	14	2	3.71	.611	.374
Valid N (listwise)	14				

And the dispersion of the dimension is checked using the Q-Q graphs in Figures 6-9 showing each item of the dimension.

Figure 6

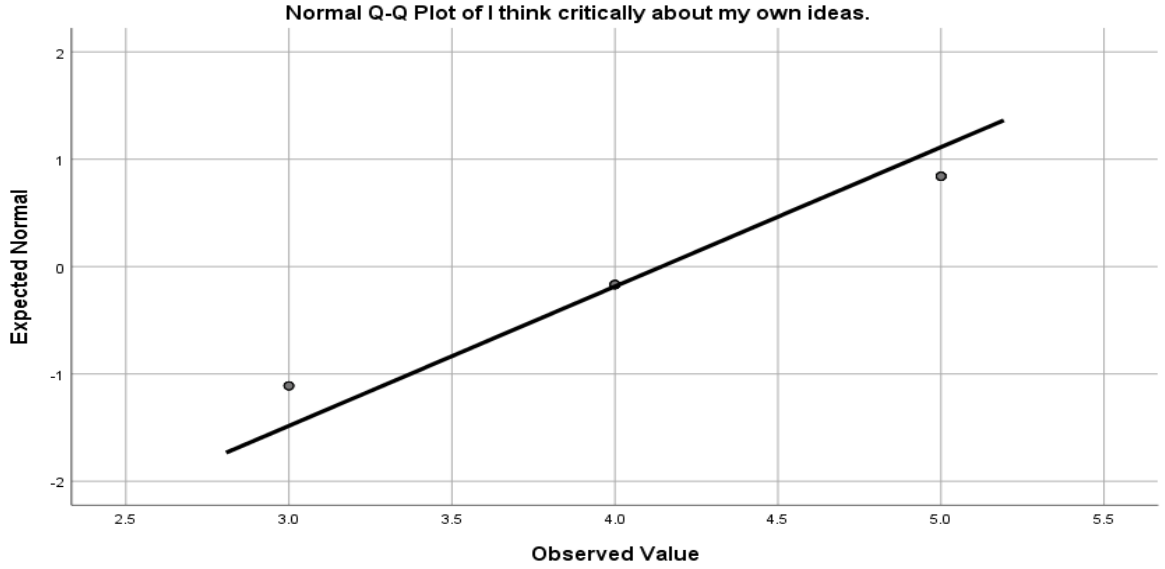
Normal Q-Q distribution diagram for the item: I think critically about how I learn



Note: Normal distribution. Source: The author using SPSS Q-Q Plotting.

Figure 7

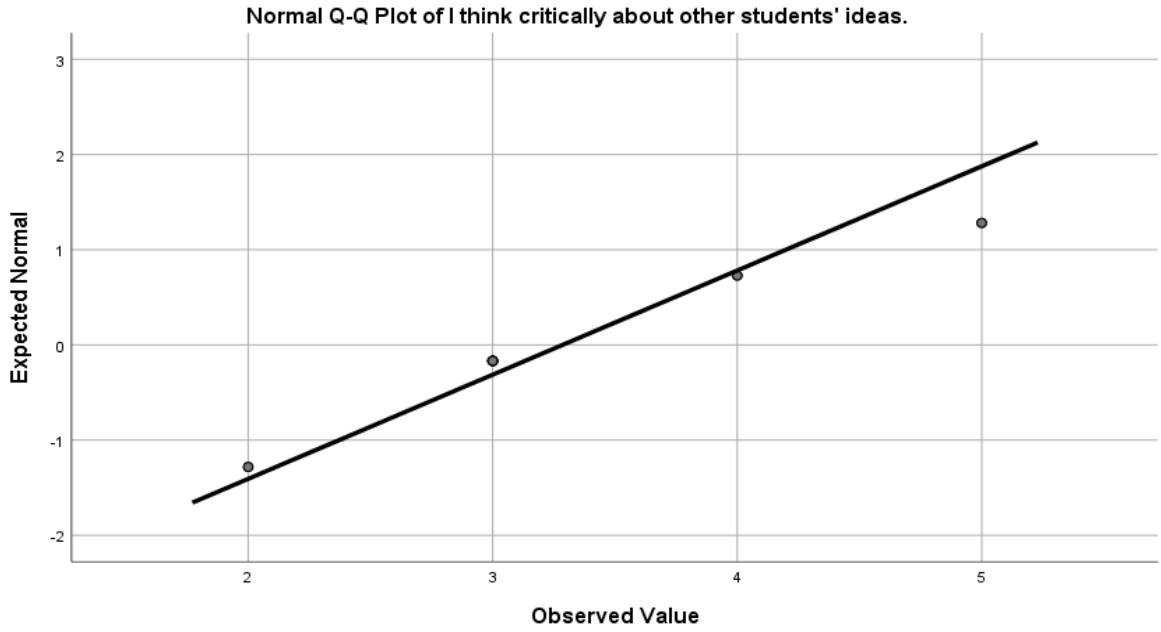
Normal Q-Q distribution diagram for the item: I think critically about my own ideas



Note: Normal distribution. Source: The author using SPSS Q-Q Plotting.

Figure 8

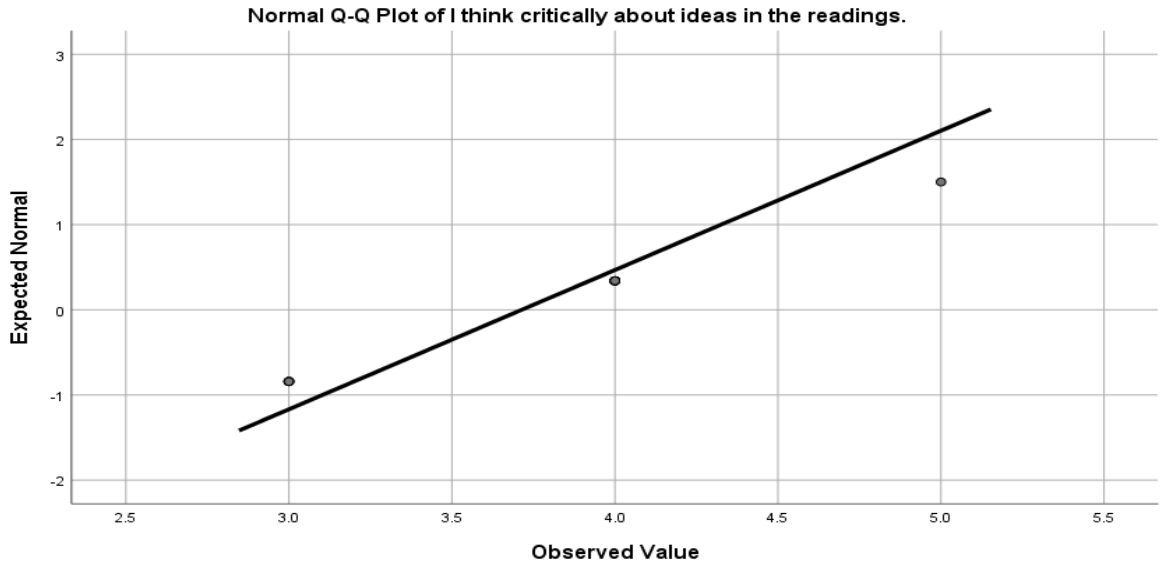
Normal Q-Q distribution diagram for the item: I think critically about other students' ideas



Note: Normal distribution. Source: The author using SPSS Q-Q Plotting.

Figure 9

Normal Q-Q distribution diagram for the item: I think critically about ideas in the readings



Note: Normal distribution. Source: The author using SPSS Q-Q Plotting.

The data from the descriptive statistics for the *interactivity dimension* are obtained and presented in Table 8.

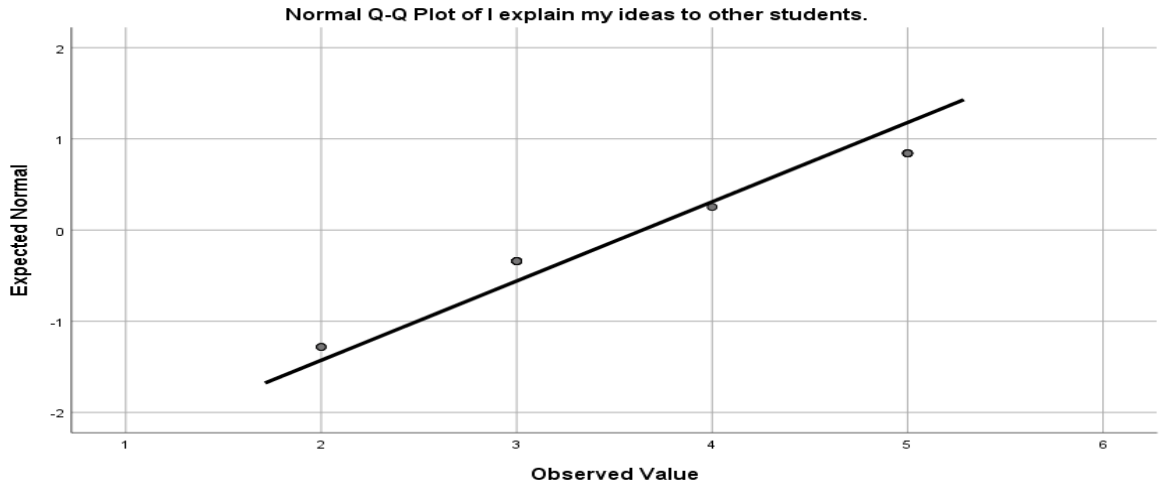
Table 8 *Interactivity dimension statistics*

	N	Range	Mean	Std. Deviation	Variance
I explain my ideas to other students.	14	3	3.64	1.151	1.324
I ask other students to explain their ideas.	14	4	3.36	1.336	1.786
Other students ask me to explain my ideas.	14	4	2.93	1.385	1.918
Other students respond to my ideas.	14	4	2.93	.997	.995
Valid N (listwise)	14				

Source 2. De Leon (2022).

And the dispersion of the dimension is checked using the Q-Q graphs in Figures 10-13, showing each item in the dimension.

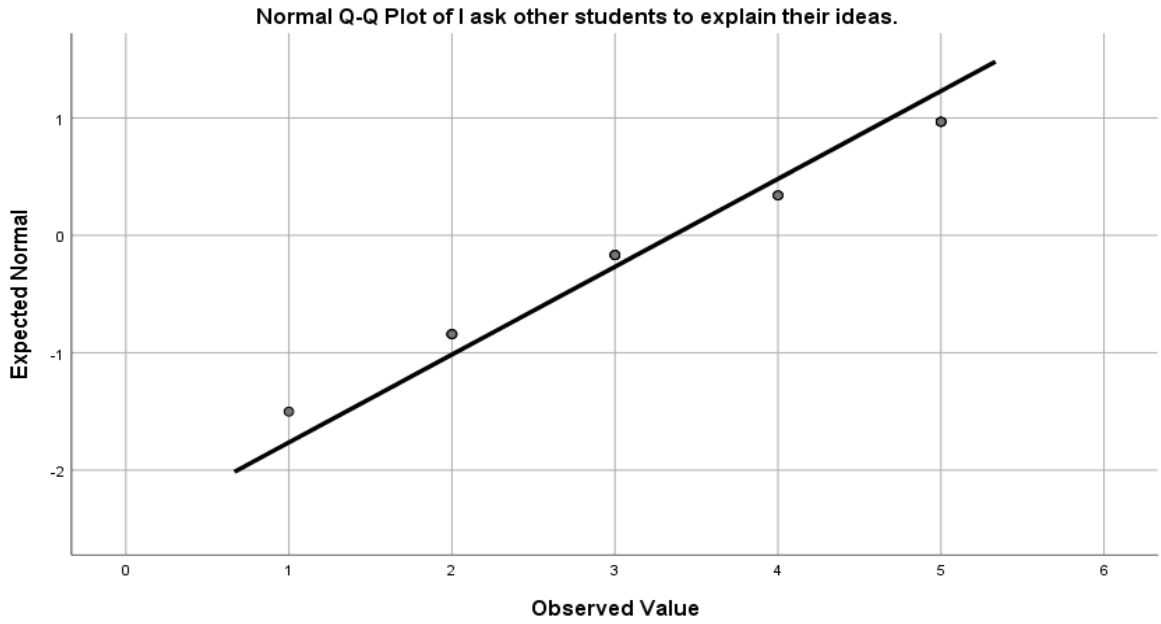
Figure 10 *Normal Q-Q distribution diagram for the item: I explain my ideas to other students*



Note; Normal distribution. Source: The author using SPSS Q-Q Plotting.

Figure 11

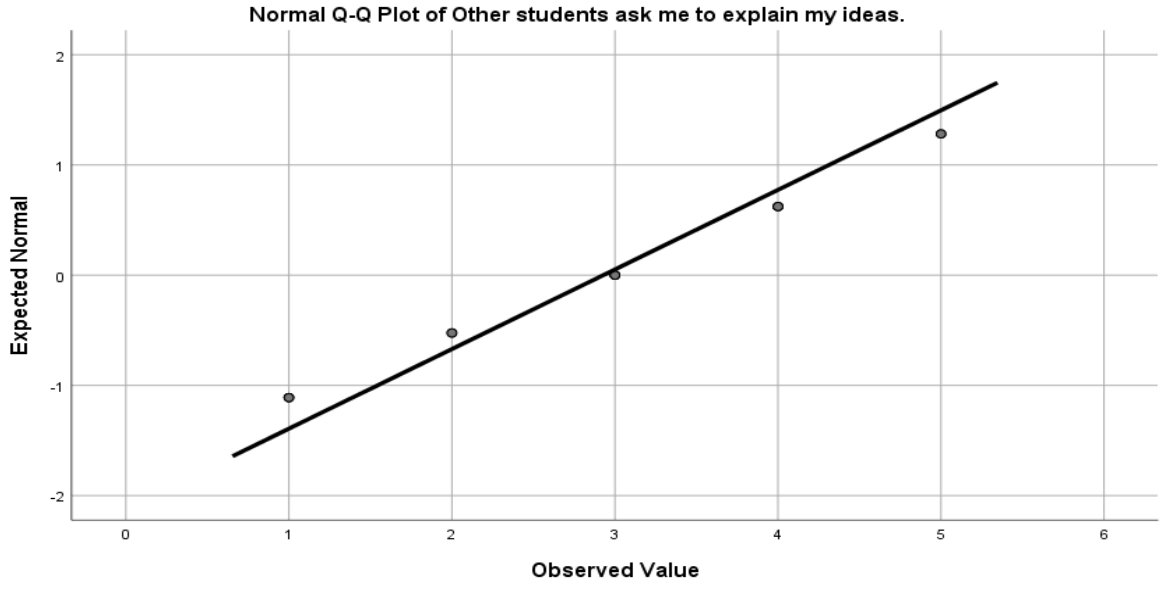
Normal Q-Q distribution diagram for the item: I ask other students to explain their ideas



Note: Normal distribution. Source: The author using SPSS Q-Q Plotting.

Figure 12.

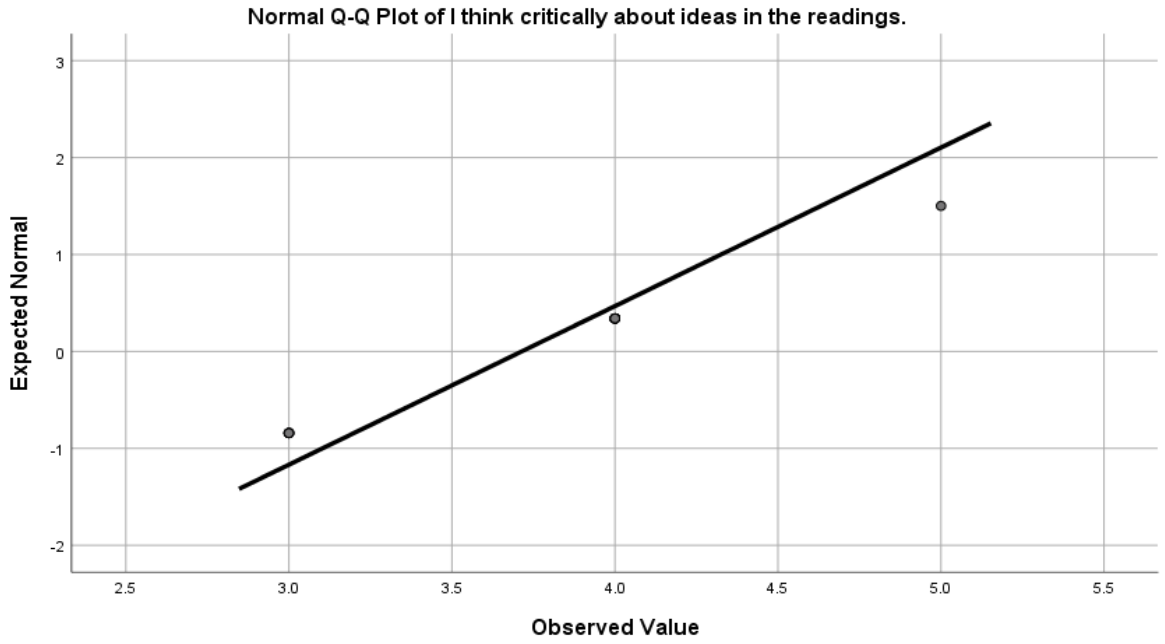
Normal Q-Q distribution diagram for the item: Other students ask me to explain my ideas



Note: Normal distribution. Source: The author using SPSS Q-Q Plotting.

Figure 13

Normal Q-Q distribution diagram for the item: I think critically about ideas in the readings



Note: Normal distribution. Source: The author using SPSS Q-Q Plotting.

Table 9

Dimension Statistics Tutor Support

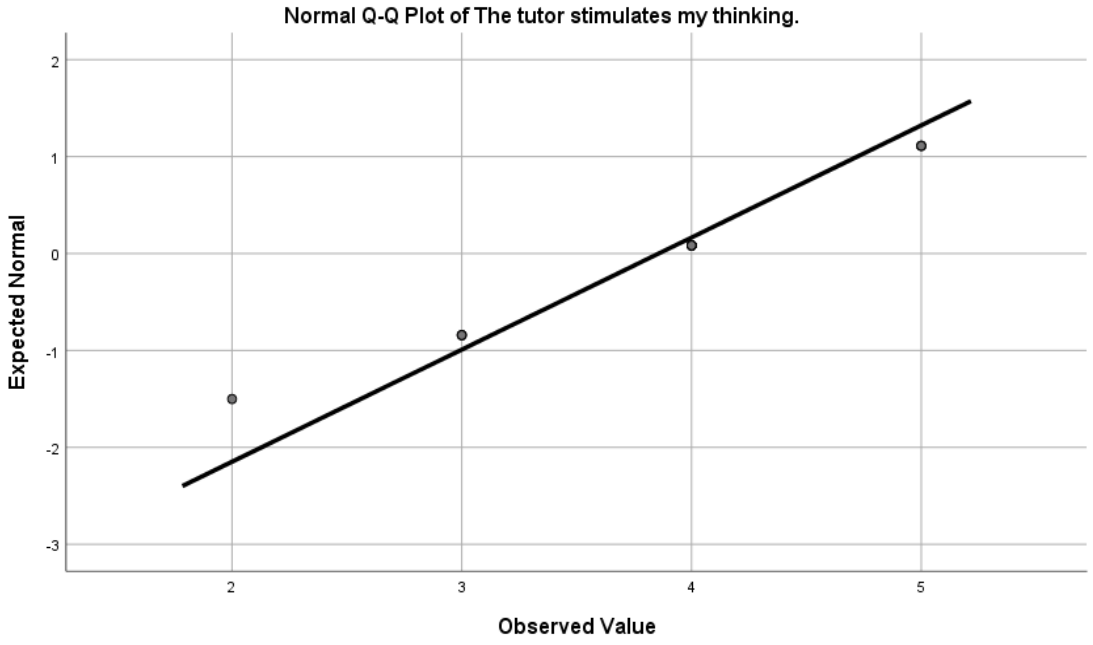
	N	Range	Mean	Std. Deviation	Variance
The tutor stimulates my thinking.	14	3	3.86	.864	.747
The tutor encourages me to participate.	14	3	3.64	.929	.863
The tutor model's good discourse.	14	2	4.14	.864	.747
The tutor models critical self-reflection.	14	2	4.00	.877	.769
Valid N (listwise)	14				

Source 3. De Leon (2022).

At the same time, the dispersion of the *tutor support dimension* is checked using the Q-Q graphs in Figures 14-17 showing each item in the dimension.

Figure 14

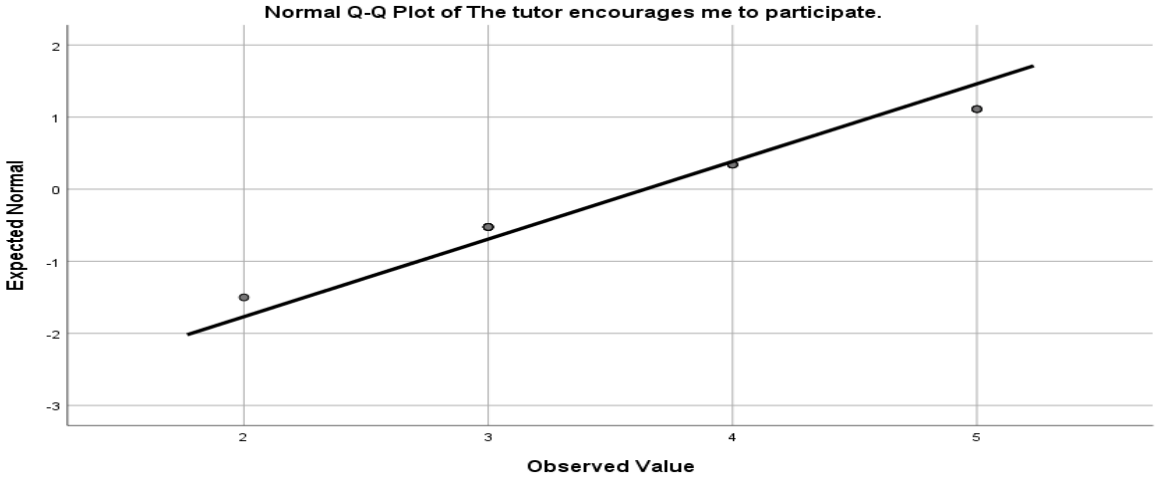
Normal Q-Q distribution diagram for the item: The tutor stimulates my thinking



Note: Normal distribution. Source: The author using SPSS Q-Q Plotting.

Figure 15

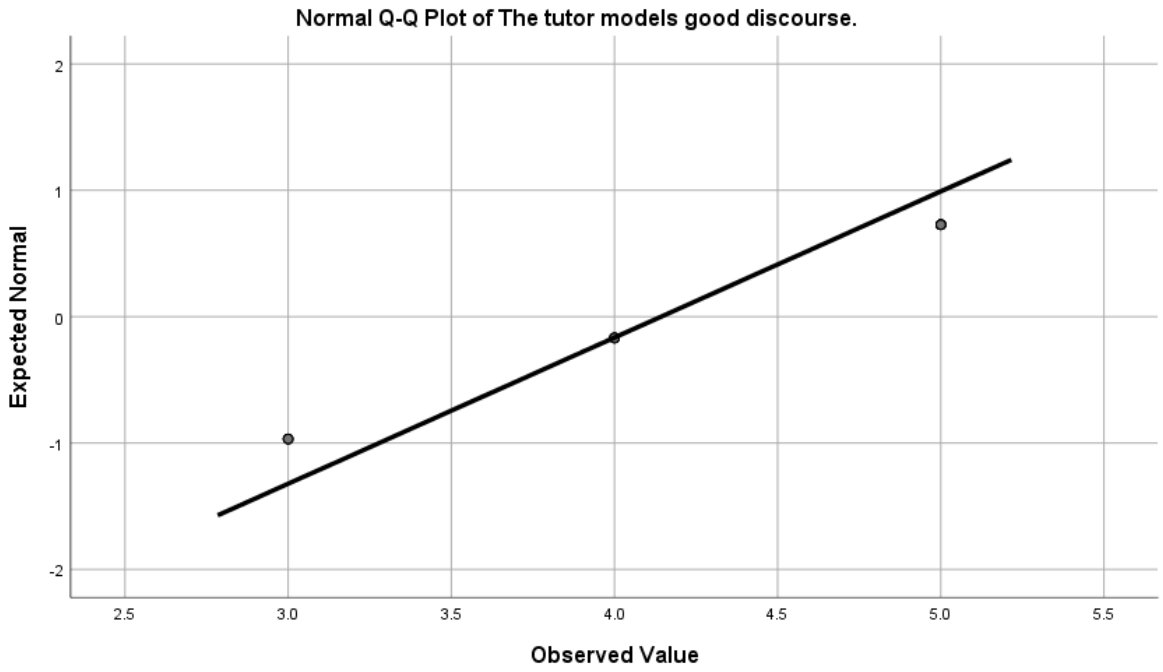
Normal Q-Q distribution diagram for the item: The tutor encourages me to participate



Note: Normal distribution. Source: The author using SPSS Q-Q Plotting.

Figure 16

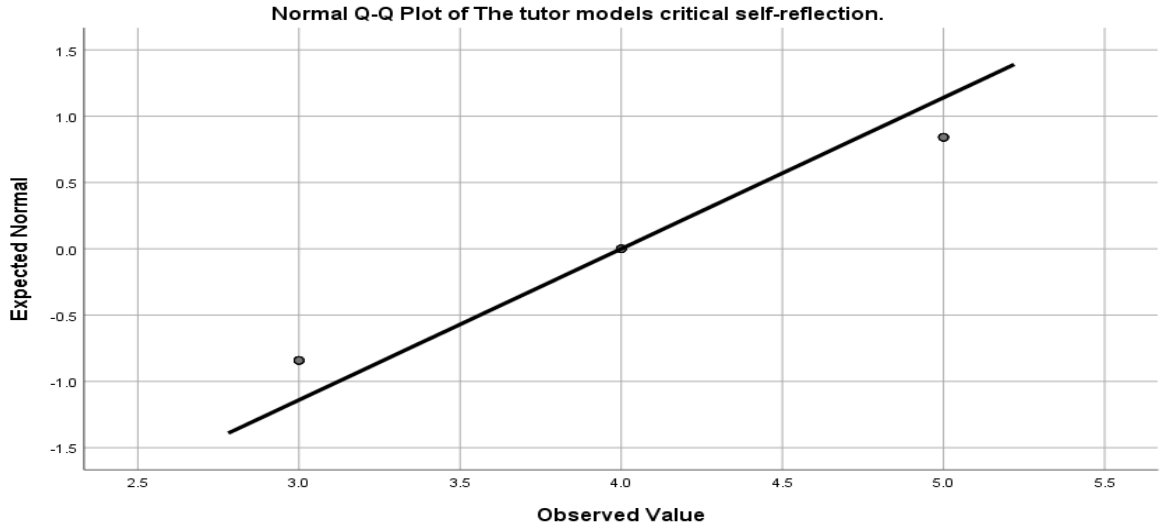
Normal Q-Q distribution diagram for the item: The tutor model's good discourse.



Note: Normal distribution. Source: The author using SPSS Q-Q Plotting.

Figure 17

Normal Q-Q distribution diagram for the item: The tutor models critical self-reflection



Note. Normal distribution. Source: The author using SPSS Q-Q Plotting.

The data from the descriptive statistics for the Teamwork dimension are obtained and presented in Table 10.

Table 10

Teamwork dimension statistics

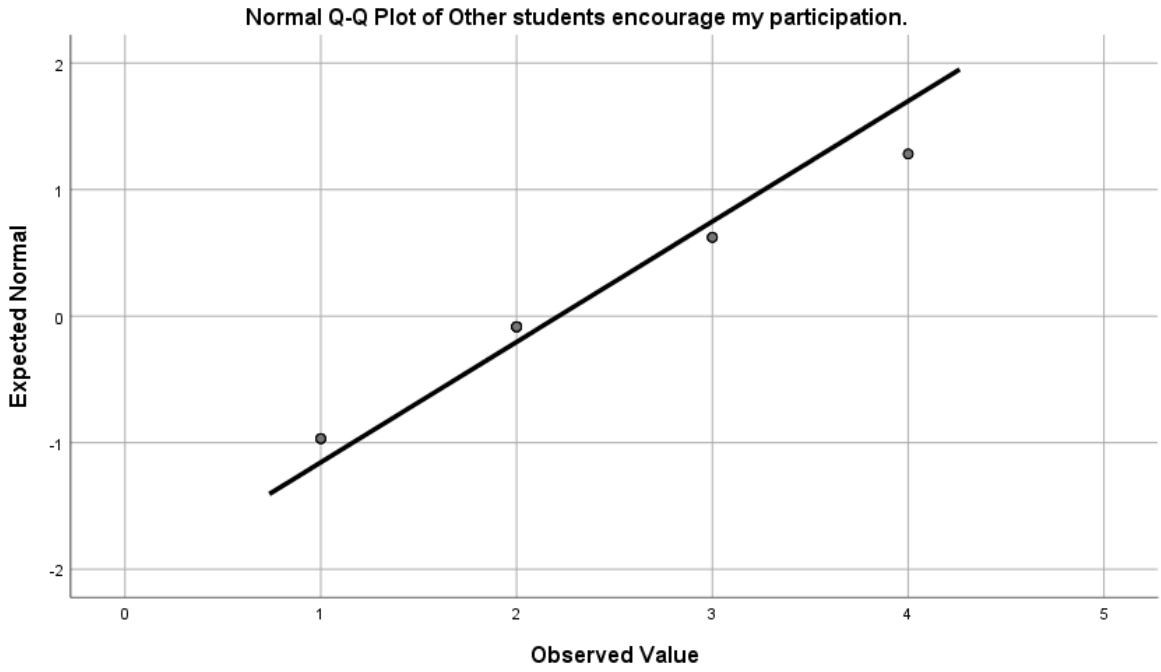
	N	Range	Mean	Std. Deviation	Variance
Other students encourage my participation.	14	3	2.21	1.051	1.104
Other students praise my contribution.	14	3	2.14	1.099	1.209
Other students value my contribution.	14	4	2.64	1.336	1.786
Other students empathize with my struggle to learn.	14	4	2.86	1.406	1.978
Valid N (listwise)	14				

Source 4. De Leon (2022).

And the dispersion of the teamwork dimension is checked using the Q-Q graphs in Figures 18-21 showing each item of the dimension.

Figure 18

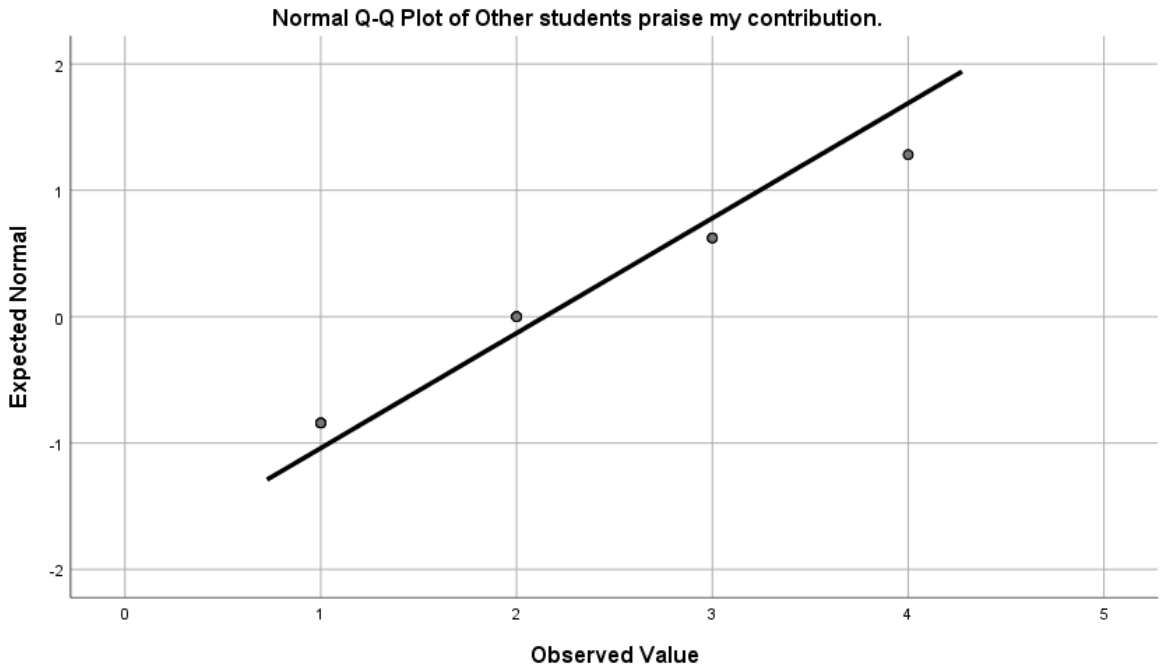
Normal Q-Q distribution diagram for the item: Other students encourage my participation



Note: Normal distribution. Source: The author using SPSS Q-Q Plotting.

Figure 19

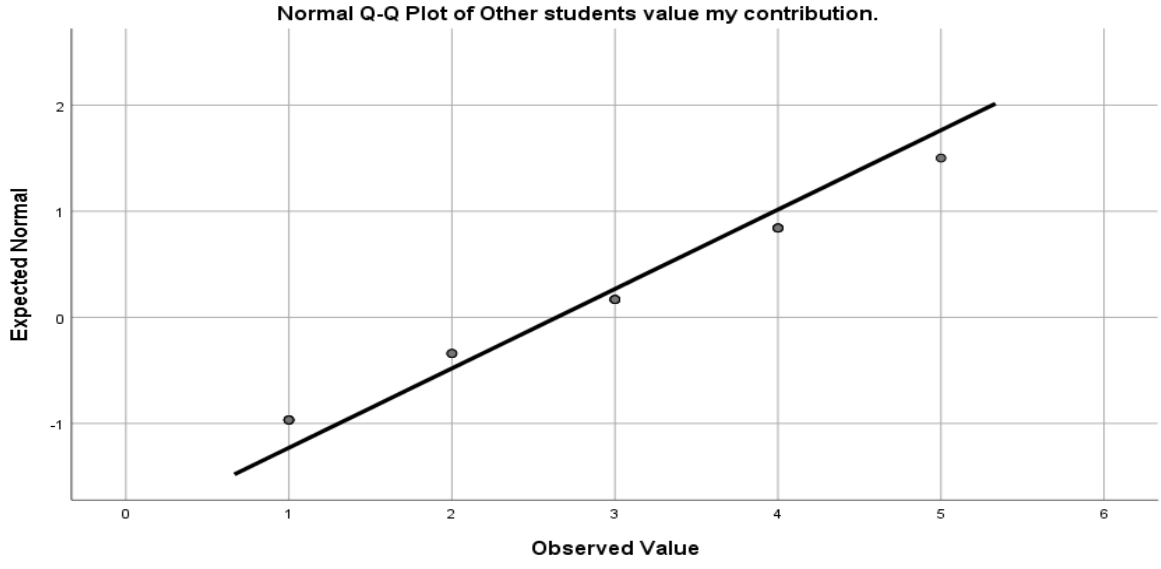
Normal Q-Q distribution diagram for the item: Other students praise my contribution



Note. Normal distribution. Source: The author using SPSS Q-Q Plotting.

Figure 20

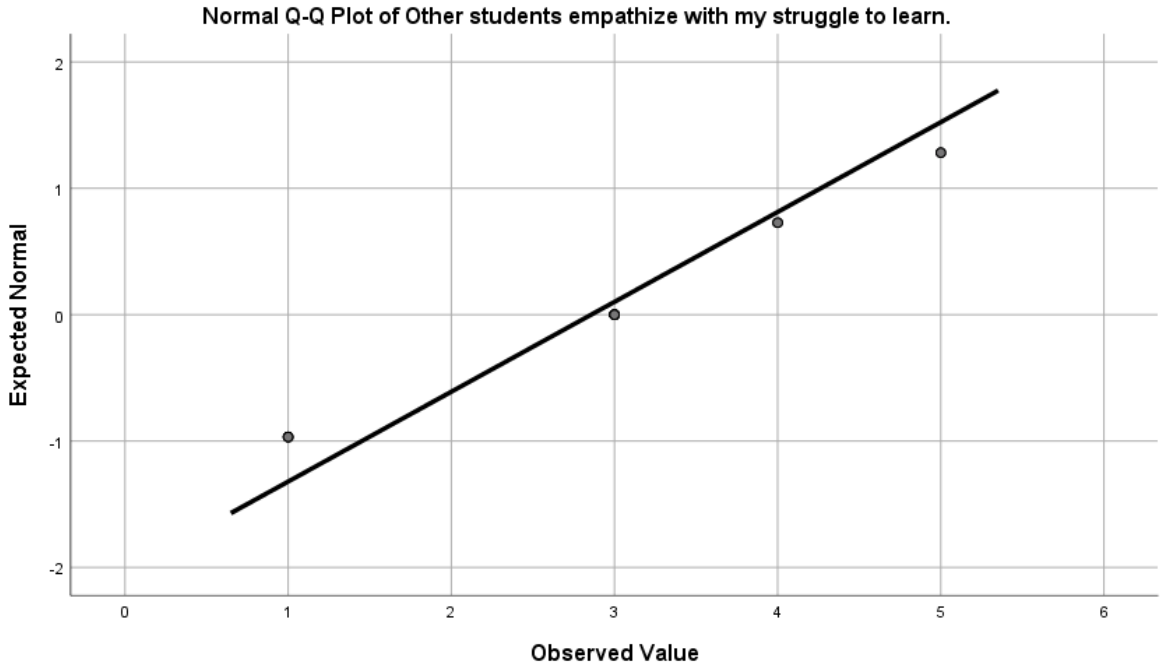
Normal Q-Q distribution diagram for the item: Other students value my contribution



Note: Normal distribution. Source: The author using SPSS Q-Q Plotting.

Figure 21

Normal Q-Q distribution diagram for the item: Other students empathize with my struggle to learn



Note: Normal distribution. Source: The author using SPSS Q-Q Plotting.

The descriptive statistics |data for the Interpretation dimension are obtained *and* presented in Table 11.

Table 11

Dimension Statistics Interpretation

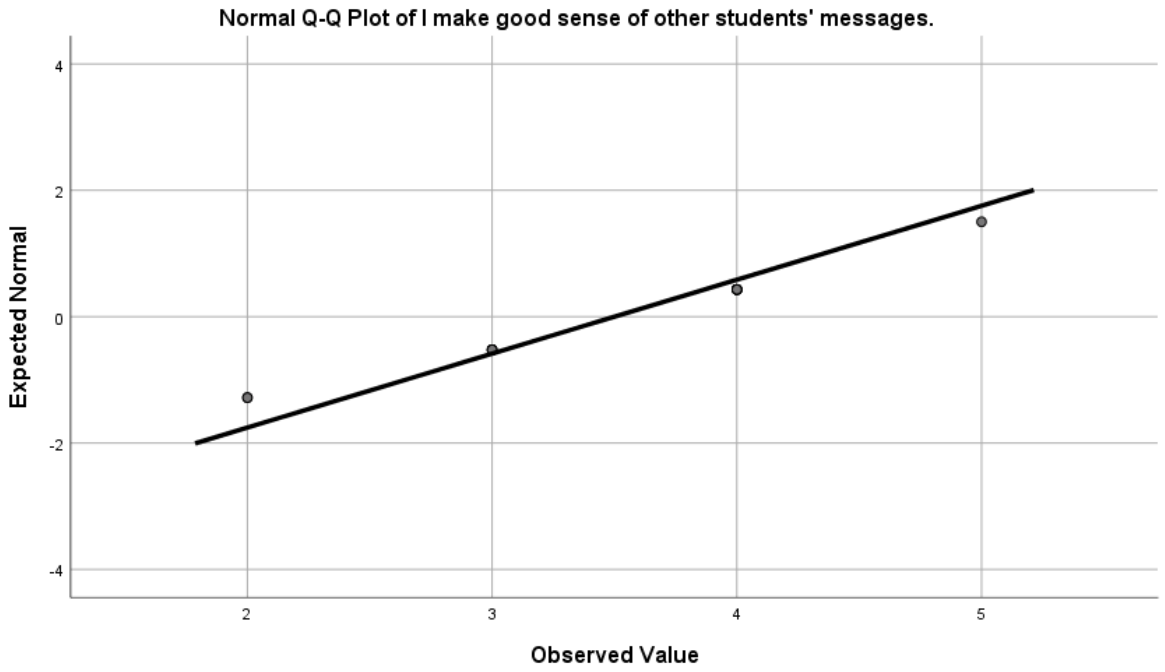
	N	Range	Mean	Std. Deviation	Variance
I make good sense of other students' messages.	14	3	3.50	.855	.731
Other students make good sense of my messages.	14	4	3.00	1.038	1.077
I make good sense of the tutor's messages.	14	3	3.64	.929	.863
The tutor makes good sense of my messages.	14	3	3.79	.893	.797
Valid N (listwise)	14				

Source 5. The author using SPSS Q-Q Plotting.

And the dispersion of the dimension is checked using the Q-Q graphs in Figures 22-25 showing each item in the dimension.

Figure 22

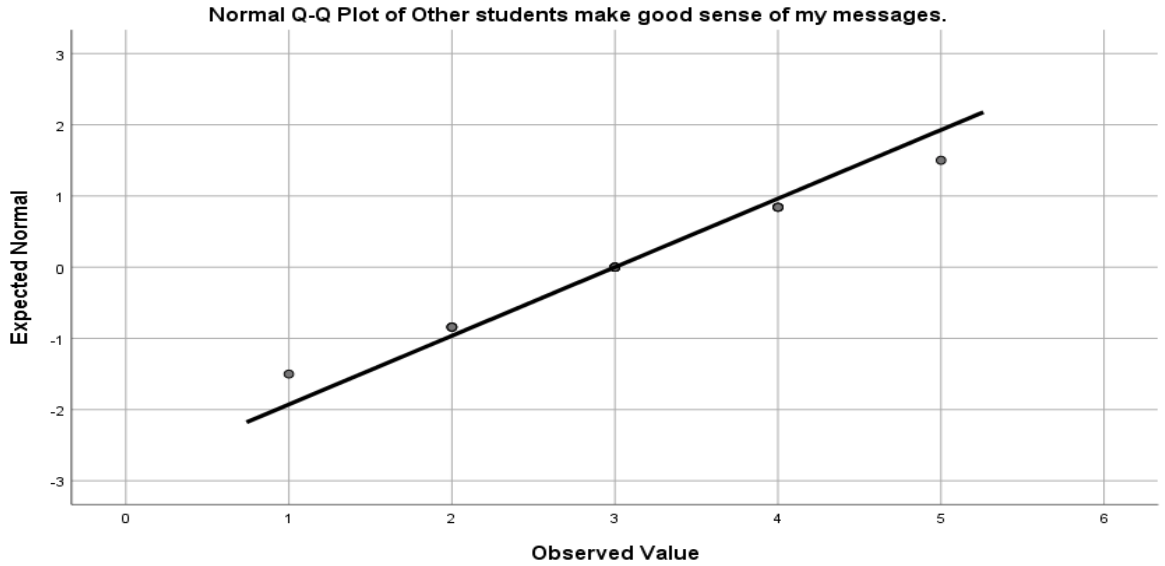
Normal Q-Q distribution diagram for the item: I make good sense of other students' messages



Note: Normal distribution. Source: The author using SPSS Q-Q Plotting.

Figure 23

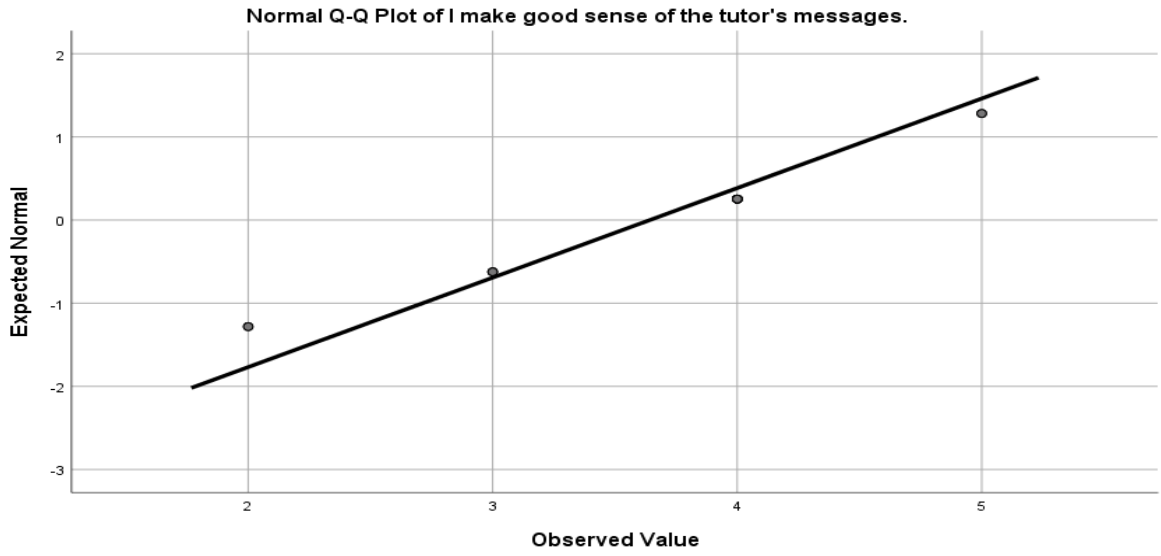
Normal Q-Q distribution diagram for the item: Other students make good sense of my messages



Note: Normal distribution. Source: The author using SPSS Q-Q Plotting.

Figure 24

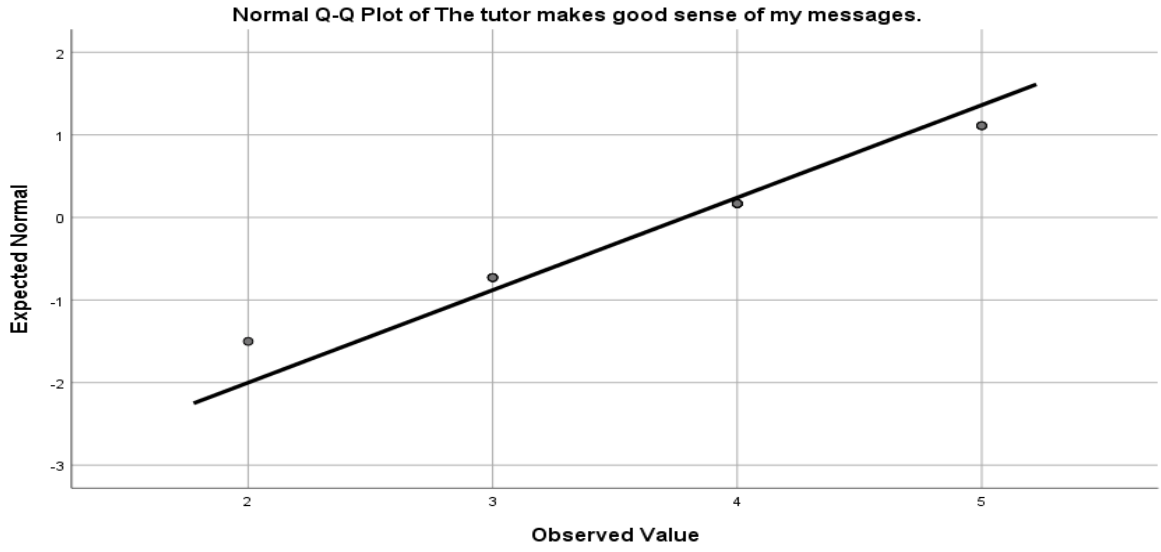
Normal Q-Q distribution diagram for the item: I make good sense of the tutor's messages



Note. Normal distribution. Source: The author using SPSS Q-Q Plotting.

Figure 25

Normal Q-Q distribution diagram for the item: The tutor makes good sense of my messages



Note. Normal distribution. Source: The author using SPSS Q-Q Plotting.

As could be seen in the measures of validity and reliability, all the results remain close to the nominal values. Thus, discarding aberrations and extremely outlier values among the items.

Chapter 4

Analysis of the results

Chapter 4: Analysis of the results

Results and Statistical Analysis of Constructivist Learning and Linguistic Performance

For statistical verification, a Kendall correlation matrix is considered between each of the items of instrument 1 (COLLES survey) to check their internal relationship and affirm or disprove the hypothesis.

Table 11 shows the theoretical approximation represented in the Kendall tau-b correlation formula; which, after its application, represents the data computed by the SPSS statistical package, giving rise to the compilation of Table 12. The Kendall Tau-b correlation is considered to be a non-parametric test—using ordinal values on a Likert scale—that has a normal distribution between the values of the Shapiro-Wilk test and Q-Q graphs.

During the analysis of the correlation matrix (values shown in Table 12), all the resulting data are comprised between $0 \leq X \leq 1$, and the positive (+) and negative (-) numbers are discarded, leaving only the nominal values, thus demonstrating the inter-item correlation of Instrument 1. However, given the variation in values, they are considered to maintain a low correlation; For easy display, correlated values are enclosed in highlighted boxes to make it easier to view the values.

All of the above means that the responses obtained from the COLLES survey applied to the group had different levels of acceptance by the population. It also means that a clear propensity cannot be established in terms of the perception of the study subjects and their point of view regarding the frequency in which the items are applied to their reality.

Correlation matrix

Table 12

Kendall Correlation Matrix (tau-b)

	ITEM #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	Correlation Coefficient	1.000	0.085	0.387	0.079	0.021	0.399	0.301	0.206	0.145	0.366	.399*	-0.021	0.146	.428*	-0.333	-0.186	0.396	0.356	0.346	.424*	.483*	0.378	0.269	0.122
	Sig. (1-tailed)		0.369	0.065	0.374	0.467	0.058	0.115	0.215	0.282	0.066	0.049	0.467	0.280	0.043	0.094	0.231	0.054	0.074	0.077	0.044	0.027	0.062	0.140	0.312
2	Correlation Coefficient	0.085	1.000	0.281	0.289	0.344	-0.065	.496*	0.334	0.349	0.133	0.233	0.205	.512*	.579**	0.176	.524*	0.334	.471*	0.251	.466*	0.274	0.275	0.159	.454*
	Sig. (1-tailed)	0.369		0.132	0.117	0.085	0.398	0.022	0.096	0.079	0.289	0.162	0.200	0.019	0.009	0.240	0.018	0.084	0.026	0.146	0.028	0.134	0.127	0.259	0.032
3	Correlation Coefficient	0.387	0.281	1.000	-0.077	-0.248	0.146	0.200	0.053	0.384	.507*	.530*	0.175	.420*	.505*	0.258	0.128	0.184	.506*	0.253	.454*	0.130	0.093	0.080	0.173
	Sig. (1-tailed)	0.065	0.132		0.377	0.163	0.280	0.210	0.418	0.061	0.018	0.013	0.238	0.045	0.021	0.152	0.304	0.226	0.019	0.146	0.032	0.301	0.352	0.373	0.241
4	Correlation Coefficient	0.079	0.289	-0.077	1.000	0.122	0.164	0.306	0.359	-0.118	-0.219	-0.230	0.131	0.089	0.043	-0.089	.442*	.437*	0.056	0.082	0.101	.464*	.440*	.515*	.449*
	Sig. (1-tailed)	0.374	0.117	0.377		0.308	0.248	0.100	0.074	0.311	0.172	0.159	0.289	0.355	0.427	0.356	0.033	0.032	0.405	0.361	0.335	0.027	0.030	0.015	0.029
5	Correlation Coefficient	0.021	0.344	-0.248	0.122	1.000	0.258	.595**	.528*	0.270	0.044	0.175	0.268	0.272	0.172	-0.112	0.000	.517*	0.274	0.296	0.311	0.371	.413*	0.222	0.297
	Sig. (1-tailed)	0.467	0.085	0.163	0.308		0.151	0.008	0.020	0.137	0.426	0.230	0.136	0.135	0.242	0.326	0.500	0.017	0.130	0.108	0.102	0.067	0.044	0.182	0.113
6	Correlation Coefficient	0.399	-0.065	0.146	0.164	0.258	1.000	.407*	0.398	0.313	0.145	0.302	.543*	-0.016	0.169	-0.425*	-0.281	.658**	0.269	0.233	0.061	0.333	.422*	0.391	0.246
	Sig. (1-tailed)	0.058	0.398	0.280	0.248	0.151		0.049	0.060	0.102	0.271	0.101	0.013	0.474	0.245	0.044	0.129	0.003	0.133	0.164	0.401	0.088	0.040	0.055	0.157
7	Correlation Coefficient	0.301	.496*	0.200	0.306	.595**	.407*	1.000	.585*	.576**	0.283	.427*	.413*	.549*	0.347	-0.178	0.240	.689**	.444*	.447*	0.282	.748**	.694**	.624**	.678**
	Sig. (1-tailed)	0.115	0.022	0.210	0.100	0.008	0.049		0.010	0.009	0.115	0.034	0.043	0.012	0.076	0.235	0.164	0.002	0.032	0.029	0.121	0.001	0.002	0.005	0.003
8	Correlation Coefficient	0.206	0.334	0.053	0.359	.528*	0.398	.585*	1.000	0.085	0.048	0.125	0.237	0.378	0.084	-0.086	0.034	0.408	0.082	-0.063	0.183	.554*	.575*	.426*	0.269
	Sig. (1-tailed)	0.215	0.096	0.418	0.074	0.020	0.060	0.010		0.368	0.423	0.303	0.171	0.067	0.369	0.368	0.447	0.050	0.371	0.398	0.232	0.014	0.010	0.045	0.143
9	Correlation Coefficient	0.145	0.349	0.384	-0.118	0.270	0.313	.576**	0.085	1.000	.487*	.636**	.565**	.481*	.500*	-0.186	0.046	.412*	.559**	.430*	0.180	0.188	0.222	0.169	0.394
	Sig. (1-tailed)	0.282	0.079	0.061	0.311	0.137	0.102	0.009	0.368		0.019	0.003	0.009	0.024	0.019	0.225	0.425	0.042	0.010	0.034	0.227	0.221	0.176	0.242	0.052
10	Correlation Coefficient	0.366	0.133	.507*	-0.219	0.044	0.145	0.283	0.048	.487*	1.000	.763**	0.227	0.144	.437*	-0.274	-0.186	0.274	.425*	0.360	0.308	0.102	0.083	-0.115	-0.028
	Sig. (1-tailed)	0.066	0.289	0.018	0.172	0.426	0.271	0.115	0.423	0.019		0.000	0.164	0.270	0.031	0.124	0.216	0.118	0.033	0.057	0.093	0.333	0.360	0.312	0.452
11	Correlation Coefficient	.399*	0.233	.530*	-0.230	0.175	0.302	.427*	0.125	.636**	.763**	1.000	.435*	0.342	.613**	-0.142	-0.028	.446*	.622**	.526*	0.318	0.201	0.300	0.042	0.209
	Sig. (1-tailed)	0.049	0.162	0.013	0.159	0.230	0.101	0.034	0.303	0.003	0.000		0.030	0.072	0.004	0.273	0.452	0.026	0.003	0.010	0.085	0.196	0.096	0.428	0.185
12	Correlation Coefficient	-0.021	0.205	0.175	0.131	0.268	.543*	.413*	0.237	.565**	0.227	.435*	1.000	0.323	.421*	-0.138	0.137	.570**	.526*	0.313	0.045	0.124	0.338	0.214	.526*
	Sig. (1-tailed)	0.467	0.200	0.238	0.289	0.136	0.013	0.043	0.171	0.009	0.164	0.030		0.089	0.039	0.284	0.285	0.008	0.013	0.089	0.425	0.303	0.075	0.185	0.014

	ITEM #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	16	17	18	19	21	22	23	24
13	Correlation	0.146	.512*	.420*	0.089	0.272	-0.016	.549*	0.378	.481*	0.144	0.342	0.323	1.000	.458*	0.313	.434*	0.237	.504*	0.303	0.303	.441*	0.388	.419*	.596**
	Coefficient																								
	Sig. (1-tailed)	0.280	0.019	0.045	0.355	0.135	0.474	0.012	0.067	0.024	0.270	0.072	0.089		0.029	0.101	0.038	0.160	0.017	0.099	0.104	0.035	0.051	0.041	0.007
14	Correlation	.428*	.579**	.505*	0.043	0.172	0.169	0.347	0.084	.500*	.437*	.613**	.421*	.458*	1.000	-0.046	0.167	.536*	.754**	.607**	.489*	0.215	0.336	0.091	0.328
	Coefficient																								
	Sig. (1-tailed)	0.043	0.009	0.021	0.427	0.242	0.245	0.076	0.369	0.019	0.031	0.004	0.039	0.029		0.426	0.247	0.012	0.001	0.005	0.021	0.187	0.078	0.353	0.086
15	Correlation	-	0.176	0.258	-	-	-	-	-	-	-	-	-	0.313	-	1.000	.558*	-	0.089	-	0.212	-	-	-	0.153
	Coefficient	0.333			0.089	0.112	.425*	0.178	0.086	0.186	0.274	0.142	0.138		0.046			0.356		0.087		0.157	0.224	0.078	
	Sig. (1-tailed)	0.094	0.240	0.152	0.356	0.326	0.044	0.235	0.368	0.225	0.124	0.273	0.284	0.101	0.426		0.012	0.070	0.356	0.358	0.191	0.261	0.176	0.375	0.266
16	Correlation	-	.524*	0.128	.442*	0.000	-	0.240	0.034	0.046	-	-	0.137	.434*	0.167	.558*	1.000	0.044	0.250	0.158	0.211	0.219	0.119	0.277	.621**
	Coefficient	0.186					0.281				0.186	0.028													
	Sig. (1-tailed)	0.231	0.018	0.304	0.033	0.500	0.129	0.164	0.447	0.425	0.216	0.452	0.285	0.038	0.247	0.012		0.427	0.150	0.253	0.193	0.187	0.311	0.128	0.005
17	Correlation	0.396	0.334	0.184	.437*	.517*	.658**	.689**	0.408	.412*	0.274	.446*	.570**	0.237	.536*	-0.356	0.044	1.000	.563**	.603**	0.302	.583**	.738**	.500*	.536*
	Coefficient																								
	Sig. (1-tailed)	0.054	0.084	0.226	0.032	0.017	0.003	0.002	0.050	0.042	0.118	0.026	0.008	0.160	0.012	0.070	0.427		0.008	0.005	0.101	0.007	0.001	0.018	0.012
18	Correlation	0.356	.471*	.506*	0.056	0.274	0.269	.444*	0.082	.559**	.425*	.622**	.526*	.504*	.754**	0.089	0.250	.563**	1.000	.713**	.676**	0.224	0.298	0.147	.507*
	Coefficient																								
	Sig. (1-tailed)	0.074	0.026	0.019	0.405	0.130	0.133	0.032	0.371	0.010	0.033	0.003	0.013	0.017	0.001	0.356	0.150	0.008		0.001	0.002	0.175	0.102	0.268	0.016
19	Correlation	0.346	0.251	0.253	0.082	0.296	0.233	.447*	-0.063	.430*	0.360	.526*	0.313	0.303	.607**	-0.087	0.158	.603**	.713**	1.000	.406*	.451*	.428*	0.358	.423*
	Coefficient																								
	Sig. (1-tailed)	0.077	0.146	0.146	0.361	0.108	0.164	0.029	0.398	0.034	0.057	0.010	0.089	0.099	0.005	0.358	0.253	0.005	0.001		0.041	0.028	0.032	0.063	0.035
20	Correlation	.424*	.466*	.454*	0.101	0.311	0.061	0.282	0.183	0.180	0.308	0.318	0.045	0.303	.489*	0.212	0.211	0.302	.676**	.406*	1.000	0.183	0.101	-0.015	0.222
	Coefficient																								
	Sig. (1-tailed)	0.044	0.028	0.032	0.335	0.102	0.401	0.121	0.232	0.227	0.093	0.085	0.425	0.104	0.021	0.191	0.193	0.101	0.002	0.041		0.224	0.334	0.475	0.177
21	Correlation	.483*	0.274	0.130	.464*	0.371	0.333	.748**	.554*	0.188	0.102	0.201	0.124	.441*	0.215	-0.157	0.219	.583**	0.224	.451*	0.183	1.000	.798**	.875**	.554*
	Coefficient																								
	Sig. (1-tailed)	0.027	0.134	0.301	0.027	0.067	0.088	0.001	0.014	0.221	0.333	0.196	0.303	0.035	0.187	0.261	0.187	0.007	0.175	0.028	0.224		0.000	0.000	0.011
22	Correlation	0.378	0.275	0.093	.440*	.413*	.422*	.694**	.575*	0.222	0.083	0.300	0.338	0.388	0.336	-0.224	0.119	.738**	0.298	.428*	0.101	.798**	1.000	.712**	.540*
	Coefficient																								
	Sig. (1-tailed)	0.062	0.127	0.352	0.030	0.044	0.040	0.002	0.010	0.176	0.360	0.096	0.075	0.051	0.078	0.176	0.311	0.001	0.102	0.032	0.334	0.000		0.001	0.011
23	Correlation	0.269	0.159	0.080	.515*	0.222	0.391	.624**	.426*	0.169	-0.115	0.042	0.214	.419*	0.091	-0.078	0.277	.500*	0.147	0.358	-0.015	.875**	.712**	1.000	.652**
	Coefficient																								
	Sig. (1-tailed)	0.140	0.259	0.373	0.015	0.182	0.055	0.005	0.045	0.242	0.312	0.428	0.185	0.041	0.353	0.375	0.128	0.018	0.268	0.063	0.475	0.000	0.001		0.003
24	Correlation	0.122	.454*	0.173	.449*	0.297	0.246	.678**	0.269	0.394	-0.028	0.209	.526*	.596**	0.328	0.153	.621**	.536*	.507*	.423*	0.222	.554*	.540*	.652**	1.000
	Coefficient																								
	Sig. (1-tailed)	0.312	0.032	0.241	0.029	0.113	0.157	0.003	0.143	0.052	0.452	0.185	0.014	0.007	0.086	0.266	0.005	0.012	0.016	0.035	0.177	0.011	0.011	0.003	

Source 6. De Leon (2022).

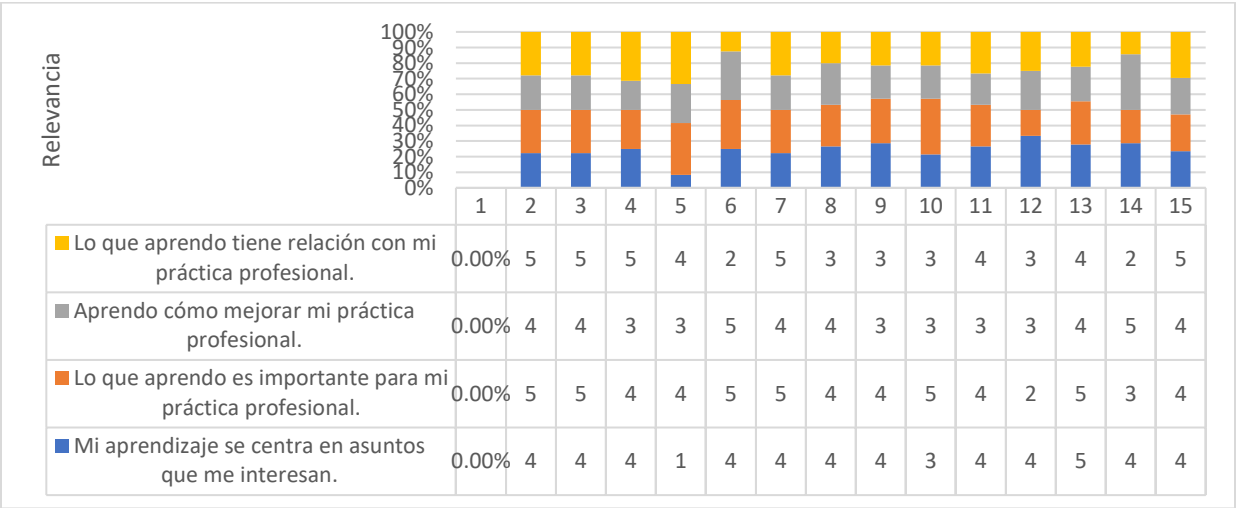
It is worth starting the presentation of the results by clarifying that, of the total population of twenty-two (22) students, seven (7) had yet to take all the prerequisite subjects and, having passed the retirement-inclusion period, remained on the official list until the end of the semester. It is also known that the sociodemographic data do not show significant variation. Additionally, one of the responses showed a refusal to continue after informed consent, demonstrating a permanent 7% of null data for each value in the graphs. This percentage is represented in the figures with 0.00 to demonstrate the absence of the value.

The arrangement of results is illustrated in figures that graphically represent each of the six dimensions and provide the values for each case. The equivalence of values is decanted in Table 2, which only displays numbers from five to one (5 – 1). Subsequently, we will look at each dimension in the three groups that will be further explained through the analysis.

The values and graphs for the relevance dimension are depicted in Figure 26. Each of the four items is color-coded, and its values are displayed within. The vertical line is projected onto the graph to represent the answers (1 – 15).

Figure 26

Dimension Results: Relevance



		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Lo que aprendo tiene relación con mi práctica profesional.	0.00%	5	5	5	4	2	5	3	3	3	4	3	4	2	5
Aprendo cómo mejorar mi práctica profesional.	0.00%	4	4	3	3	5	4	4	3	3	3	3	4	5	4
Lo que aprendo es importante para mi práctica profesional.	0.00%	5	5	4	4	5	5	4	4	5	4	2	5	3	4
Mi aprendizaje se centra en asuntos que me interesan.	0.00%	4	4	4	1	4	4	4	4	3	4	4	5	4	4

Source 7. De Leon (2022).

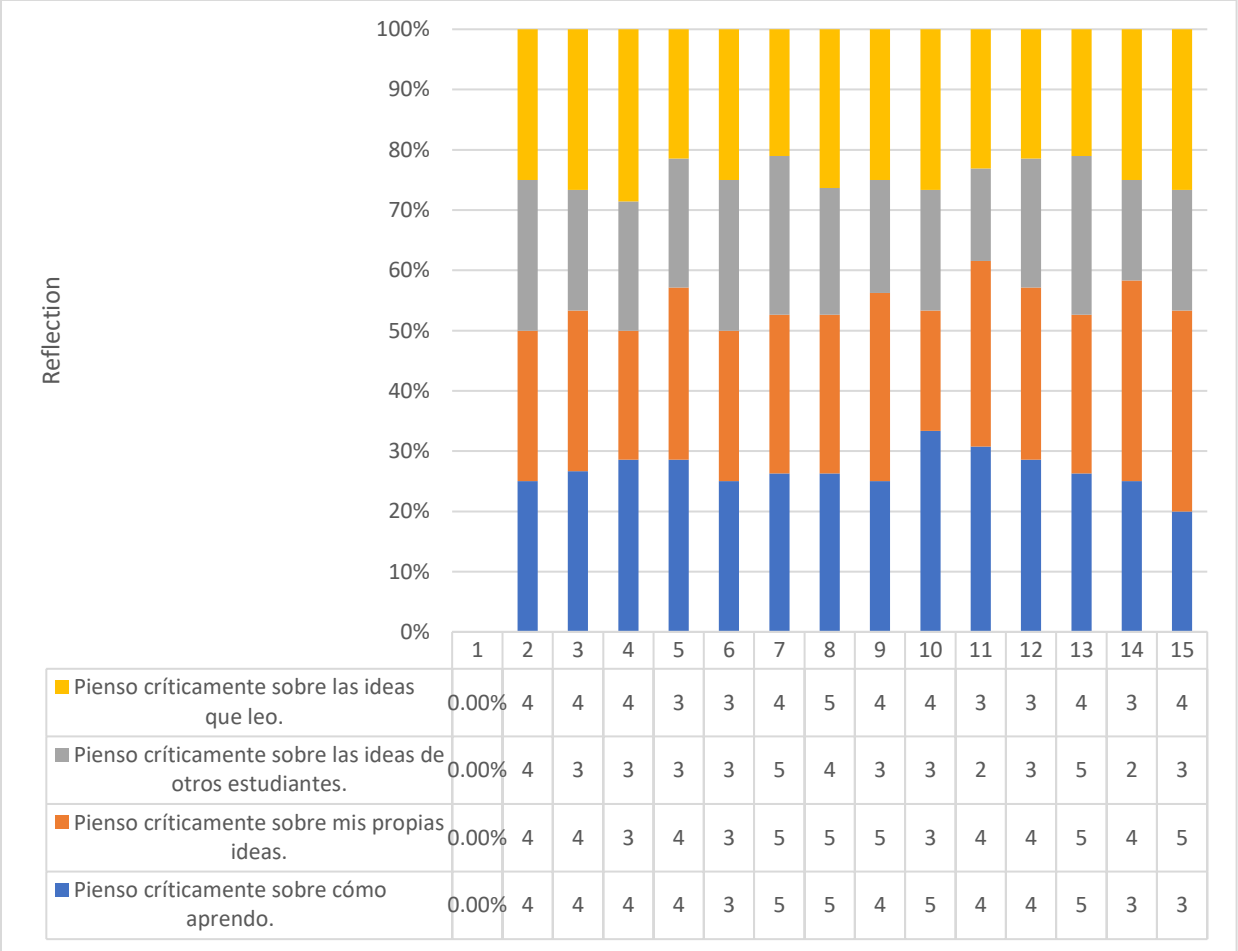
Figure 27 shows the *reflection* dimension, which comprises four items, namely:

- I think critically about how I learn.
- I think critically about my own ideas.
- I think critically about other students' ideas.
- I think critically about the ideas I read.

The values are graphed based on the incidence of the results and expressed in Figure 27.

Figure 27

Reflection dimension



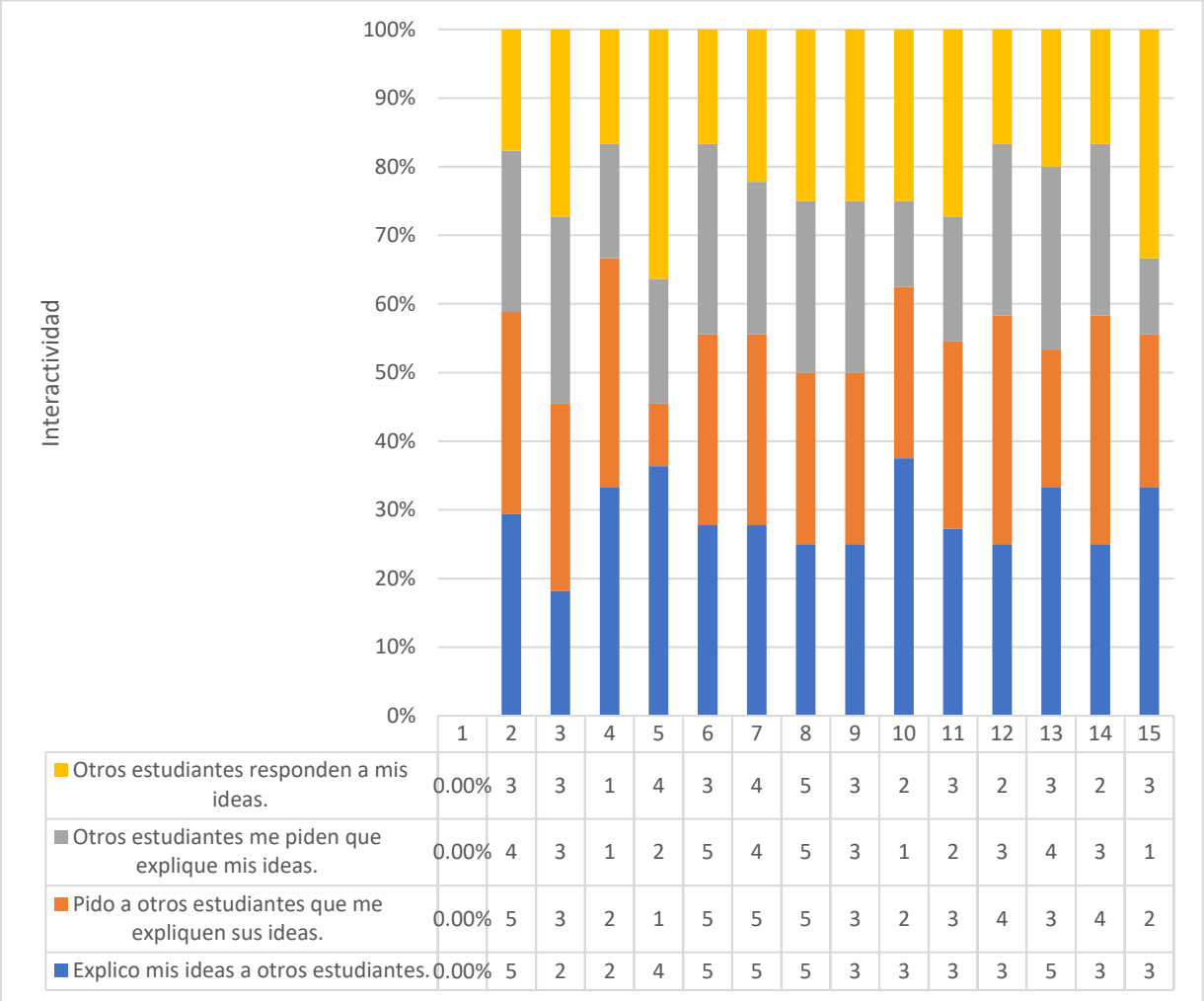
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Pienso críticamente sobre las ideas que leo.	0.00%	4	4	4	3	3	4	5	4	4	3	3	4	3	4
Pienso críticamente sobre las ideas de otros estudiantes.	0.00%	4	3	3	3	3	5	4	3	3	2	3	5	2	3
Pienso críticamente sobre mis propias ideas.	0.00%	4	4	3	4	3	5	5	5	3	4	4	5	4	5
Pienso críticamente sobre cómo aprendo.	0.00%	4	4	4	4	3	5	5	4	5	4	4	5	3	3

Source 8. De Leon (2022).

- *I explain my ideas to other students.*
- I ask other students to explain their ideas to me.
- Other students ask me to explain my ideas.
- Other students respond to my ideas.

Figure 28

Interactivity dimension



		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Otros estudiantes responden a mis ideas.	0.00%	3	3	1	4	3	4	5	3	2	3	2	3	2	3	
Otros estudiantes me piden que explique mis ideas.	0.00%	4	3	1	2	5	4	5	3	1	2	3	4	3	1	
Pido a otros estudiantes que me expliquen sus ideas.	0.00%	5	3	2	1	5	5	5	3	2	3	4	3	4	2	
Explico mis ideas a otros estudiantes.	0.00%	5	2	2	4	5	5	5	3	3	3	3	5	3	3	

Source 9. De Leon (2022).

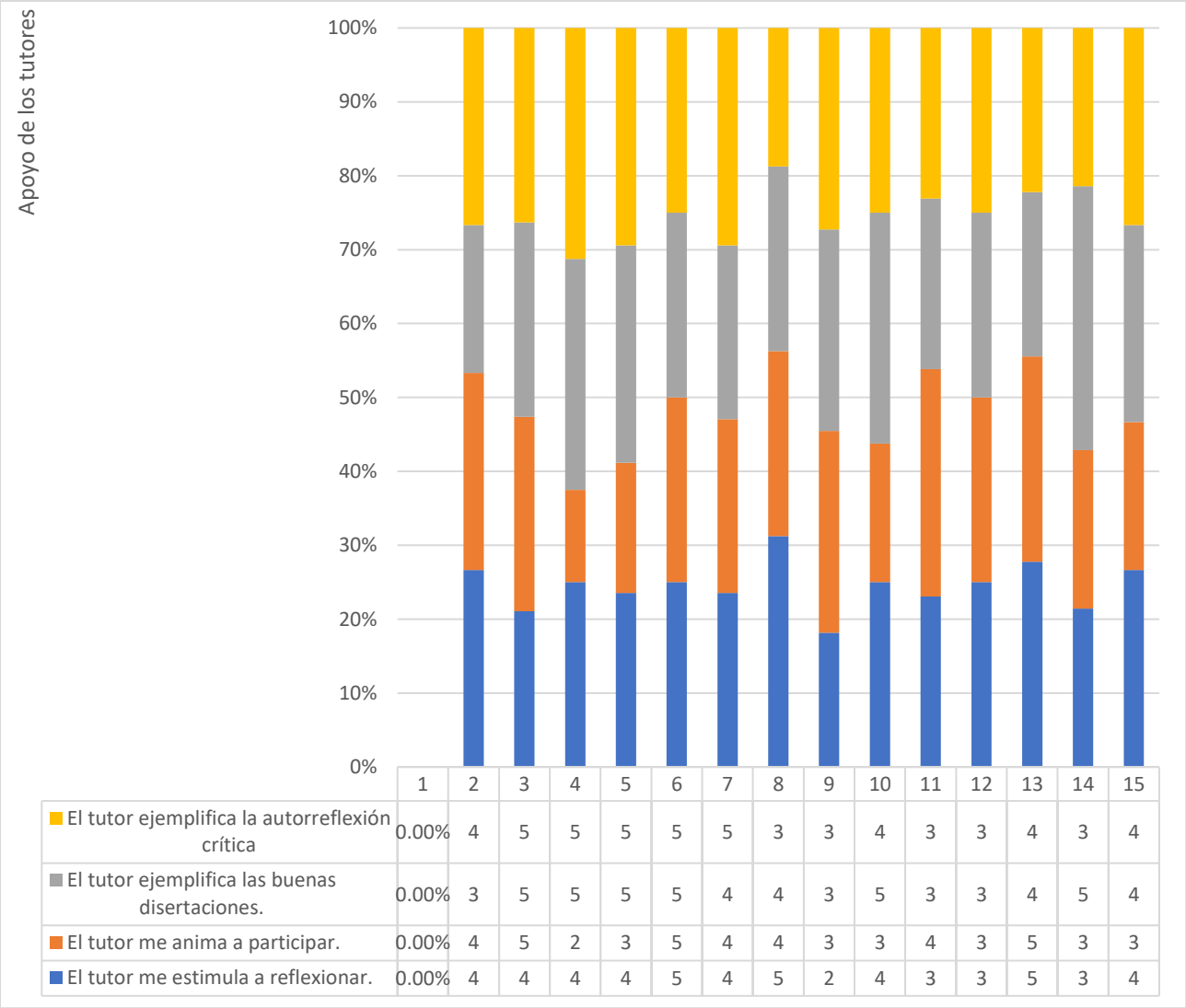
Figure 28 shows the items in the *tutor support dimension*, which includes the following items:

- *The tutor stimulates me to reflect.*
- *The tutor encourages me to participate.*
- *The tutor exemplifies good dissertations.*
- *The tutor exemplifies critical self-reflection*

Additionally, Figure 29 represents the values and corresponding graph.

Figure 29

Tutor Support Dimension



		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
El tutor ejemplifica la autorreflexión crítica	0.00%	4	5	5	5	5	5	3	3	4	3	3	4	3	4	
El tutor ejemplifica las buenas disertaciones.	0.00%	3	5	5	5	5	4	4	3	5	3	3	4	5	4	
El tutor me anima a participar.	0.00%	4	5	2	3	5	4	4	3	3	4	3	5	3	3	
El tutor me estimula a reflexionar.	0.00%	4	4	4	4	5	4	5	2	4	3	3	5	3	4	

Source 10. De Leon (2022).

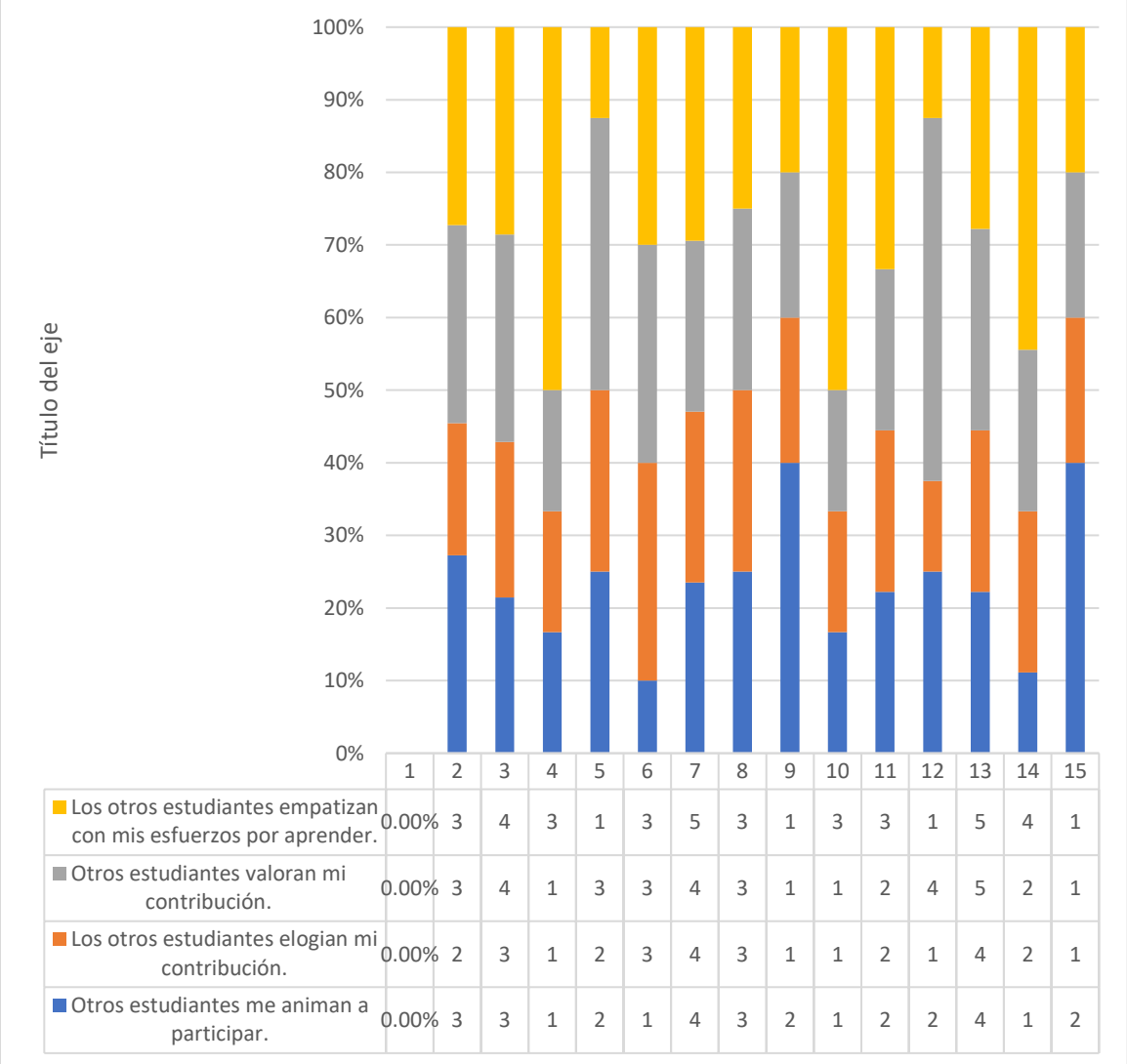
Figure 13 documents the results of the teamwork dimension, where the items are shown:

- *Other students encourage me to participate.*
- *The other students praise my contribution.*
- *Other students value my contribution.*
- *The other students empathize with my efforts to learn.*

Added to Figure 30 are the values of each item and their respective graph.

Figure 30

Teamwork dimension



		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Los otros estudiantes empatizan con mis esfuerzos por aprender.	0.00%	3	4	3	1	3	5	3	1	3	3	1	5	4	1
Otros estudiantes valoran mi contribución.	0.00%	3	4	1	3	3	4	3	1	1	2	4	5	2	1
Los otros estudiantes elogian mi contribución.	0.00%	2	3	1	2	3	4	3	1	1	2	1	4	2	1
Otros estudiantes me animan a participar.	0.00%	3	3	1	2	1	4	3	2	1	2	2	4	1	2

Source 11. De Leon (2022).

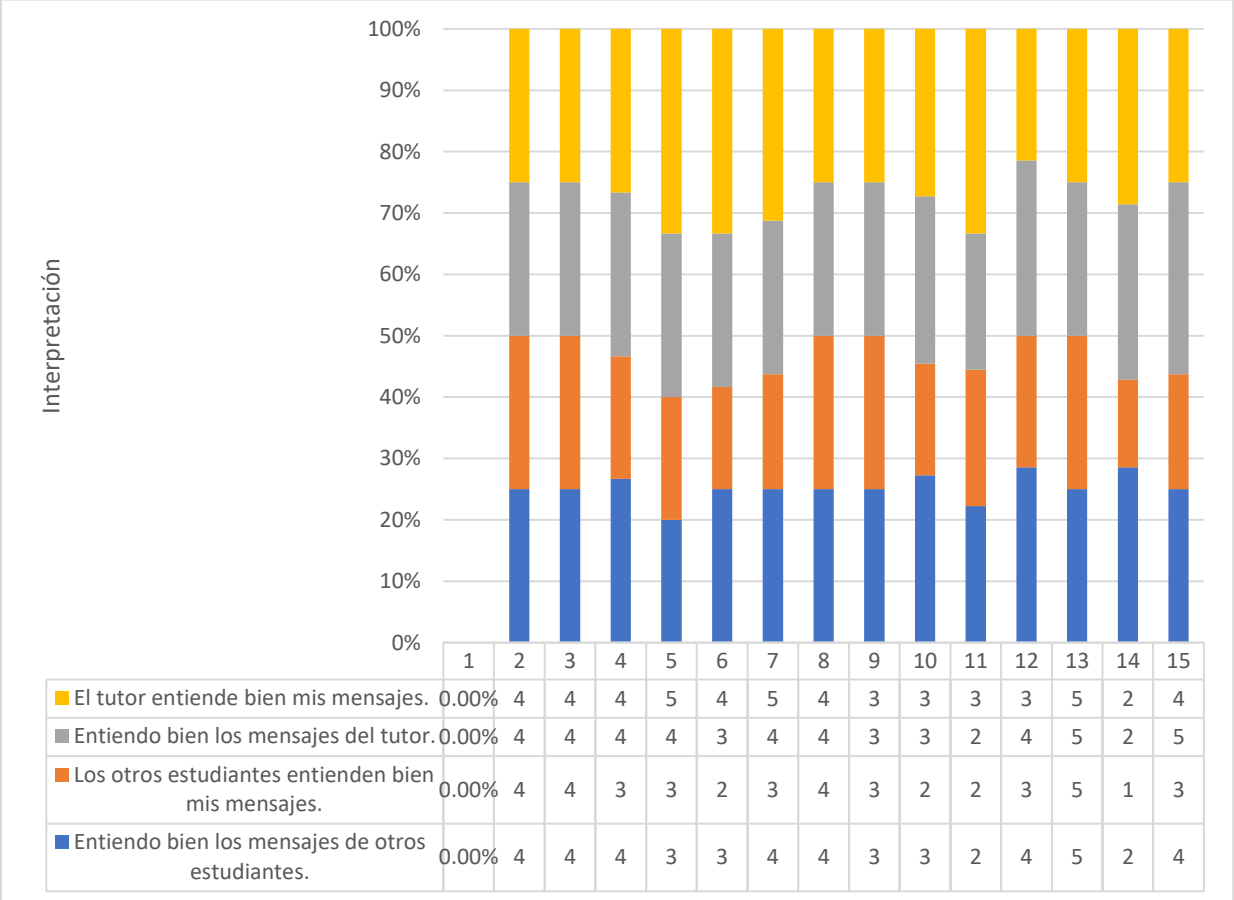
Figure 14 introduces the dimension of *interpretation*, where the following items are presented:

- *I understand the messages of other students well.*
- *The other students understand my messages well.*
- *I understand the tutor's messages well.*
- *The tutor understands my messages well.*

Added in Figure 31 are the individual values and their respective graphs.

Figure *31*

Interpretation dimension



		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
El tutor entiende bien mis mensajes.	0.00%	4	4	4	4	5	4	5	4	3	3	3	3	5	2	4
Entiendo bien los mensajes del tutor.	0.00%	4	4	4	4	4	3	4	4	3	3	2	4	5	2	5
Los otros estudiantes entienden bien mis mensajes.	0.00%	4	4	3	3	2	3	4	3	2	2	3	5	1	3	
Entiendo bien los mensajes de otros estudiantes.	0.00%	4	4	4	3	3	4	4	3	3	2	4	5	2	4	

Source 12. De Leon (2022).

The three categories of "positive," "indifferent," and "apprehension" are used to gauge how constructivist learning is perceived. Those who expressed infrequently or near-infrequently (values 2-1), those who were indifferent (value 3), and those who always or nearly always responded (values 5–4) were regarded as apprehensive. The

students' perception of constructivist learning was evaluated using the scales described in Table 13, which were based on these characteristics.

Table 13

Scales for the classification of general constructivist perception and by dimensions

Overall Perception/Dimensions	Categories	Values
General perception	Positive	96-120
	Indifferent	49-95
	Apprehension	24-48
Dimensions 1 to 6	Positive	16-20
	Indifferent	9-15
	Apprehension	4-8

Source 13. De Leon (2022).

The use of Classroom as a virtual tool in constructivist learning was viewed favorably by the remaining students, of whom 79% (11) were unconcerned Table 14. These findings suggest that students do not perceive any advantages or disadvantages in their knowledge acquisition process when utilizing Google Classroom as a virtual learning environment.

Table 14

Percepción general de los estudiantes

Perception	Frequency	Percentage
Indifferent	11	79
Positive perception	3	21
Total	14	100

Source 14. De Leon (2022).

The general classification of constructivist learning reveals a significant inclination toward indifference, as evidenced by the dimension Reflection (64%) and the positive perceptions of Relevance (50%) and Support from tutors (57%). Interactivity (14%),

Interpretation (7%) and Teamwork (43%), the latter of which exhibited the highest percentage of apprehension (Table 7), also exhibited apprehension.

The findings suggest that Google Classroom does not improve constructivist learning and, conversely, has no discernible impact on it. However, the results of this empirical analysis confirm the statistical data presented above; however, they indicate deficiencies in the a priori implementation of virtuality. As shown in Table 15, The Teamwork dimension is one of the side effects; it displays both apathy and anxiety, which serves as a warning to everyone engaged in the knowledge-building process.

Table 15

Perception by dimensions of the students

Dimensions	Showing apprehension	Indifference	Positive perception	Total
Relevance	0	50	50	100
Reflection	0s	64	36	100
Interactivity	14	57	29	100
Support from tutors	0	43	57	100
Teamwork	43	43	14	100
Interpretation	7	50	43	100

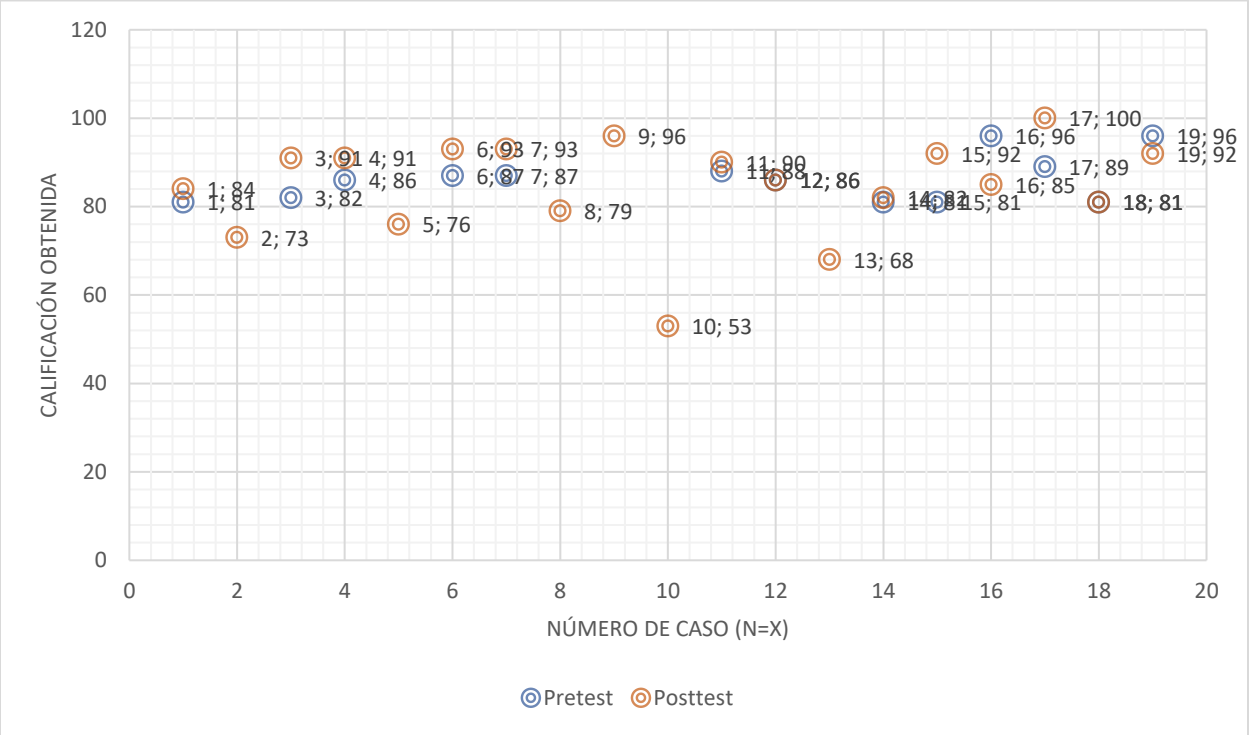
Source 15. De Leon (2022).

Because of the results of how the students felt about constructivist learning, it is important to compare those feelings with how they actually learned English, which could be done with Instrument 2.

Regarding Instrument 2's results, the EF SET Quick Test, which was administered at the start and finish of the test period, the values displayed in Figure 16 are taken into account. In addition, the test subjects' voluntary participation in the pre-test and post-test stands out, with 13 and 19 students, respectively, out of the 22 on the final course list.

Figura *32*

EF SET Quick Test scores as pre-test and post-test



Source 16. De Leon (2022).

Every variation is magnified in the mean and deviation because the universe is small (De Leon, 2022), and it is thought to address the following emerging hypotheses:

H_E: The students got a real learning of English at the end of the course.

H_N: The students did not get a real learning of English at the end of the course.

Table 16

Statisticians for EF SET Quick Test pretest/post-test application results

	Applied	N	Mean	Hours of deviation	Std. Error Mean
Test	Pre	13	86.23	5.246	1.455
	Post	19	84.47	11.217	2.573

Source 17. De Leon (2022).

The results of the statistical analysis by Student's T for independent samples are displayed in Table 17, with a significance of.045 (less than.05), indicating that the null hypothesis—that there is no change in the students' actual learning—can be rejected.

Table 17

Student's t-test for independent samples

		Levene's Test for Equality of Variances		T-test for equality of means						
									99% Confidence Interval of the Difference	
		F	Itself.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Pretest /Poste st	Equal variances assumed	4.371	.045	.525	30	.604	1.757	3.348	-7.449	10.963
	Equal variances not assumed			.594	27.182	.557	1.757	2.956	-6.430	9.944

Source 18. De Leon (2022).

Because the test is standardized and teacher-supervised, its reliability percentage is increased to 99% (instead of the common 95%) for the analyses. It is presumed that the mean difference (1,757) could influence the results, given the small population. Nevertheless, the experimental value of 4.371 with a significance level of.045 supports the HE, confirming that the students genuinely acquired some understanding of English by the conclusion of the course.

In order to address the inquiry regarding the influence of sociodemographic data on this investigation, Figure 18 presents a summary of the data obtained from Instrument 1. The information regarding the current year, age group, schedule, and time of completion is presented in Figure 32, and it is consistent with the normative ranges for the course.

Table 18

Results of the sociodemographic data collected

Day		Tomorrow						
Completion Time		1-2 min	2-3 min	3-4 min	4-5 min	5-10 min	<1 min	Total
Current year or most courses	III	5	4	2	1	1	1	14
Age group	17-25	4	4	2	1	1	1	13
	26-35	1						1
Total		5	4	2	1	1	1	14

Source 19. De Leon (2022).

The analysis of these sociodemographic data reveals that the cohort possesses similar characteristics. For instance, all students attend university in the morning. Additionally, they focus on an optimal age range for pursuing a third year of a bachelor's degree. Clariana et al. (2012), further indicate that unjustified delay (procrastination) in academic progress at the university level typically occurs between the ages of 17 and 20. Considering the ages between 17 and 35 years of age among the population, as well as the fact that they are in the third year of a bachelor’s degree, the extemporaneity of studies is ruled out.

The responses of the instrument will not be significantly influenced by the variation in sociodemographic characteristics, as these categorize the study population in terms of age, majority of courses, and day.

Conclusions

The results of the analysis of student perception of the use of Google Classroom are notoriously indifferent, indicating that the use of Google Classroom as a virtual learning environment does not affect constructivist learning of English. As a result, using Google Classroom as a virtual classroom leads to more real knowledge, regardless of how it is perceived. This means that the constructivist way of thinking about learning is not directly linked to using Google Classroom.

We can rule out significant differences in perception and actual learning during the study because students in group 2 of English Linguistics share similar sociodemographic characteristics (year in current or most subjects, shift, age, and time of test completion); thus, English Linguistics students are thought to have an initial level of English that is higher than the average in Panama. The perceptions and reality similarities are partially due to the fact that they are currently in the third year of their Bachelor's Degree in English, which has given them a more comprehensive understanding of the language and its distinctive characteristics. It is therefore advised to compare the findings and perform comparable analyses on additional subjects, and from various cohorts.

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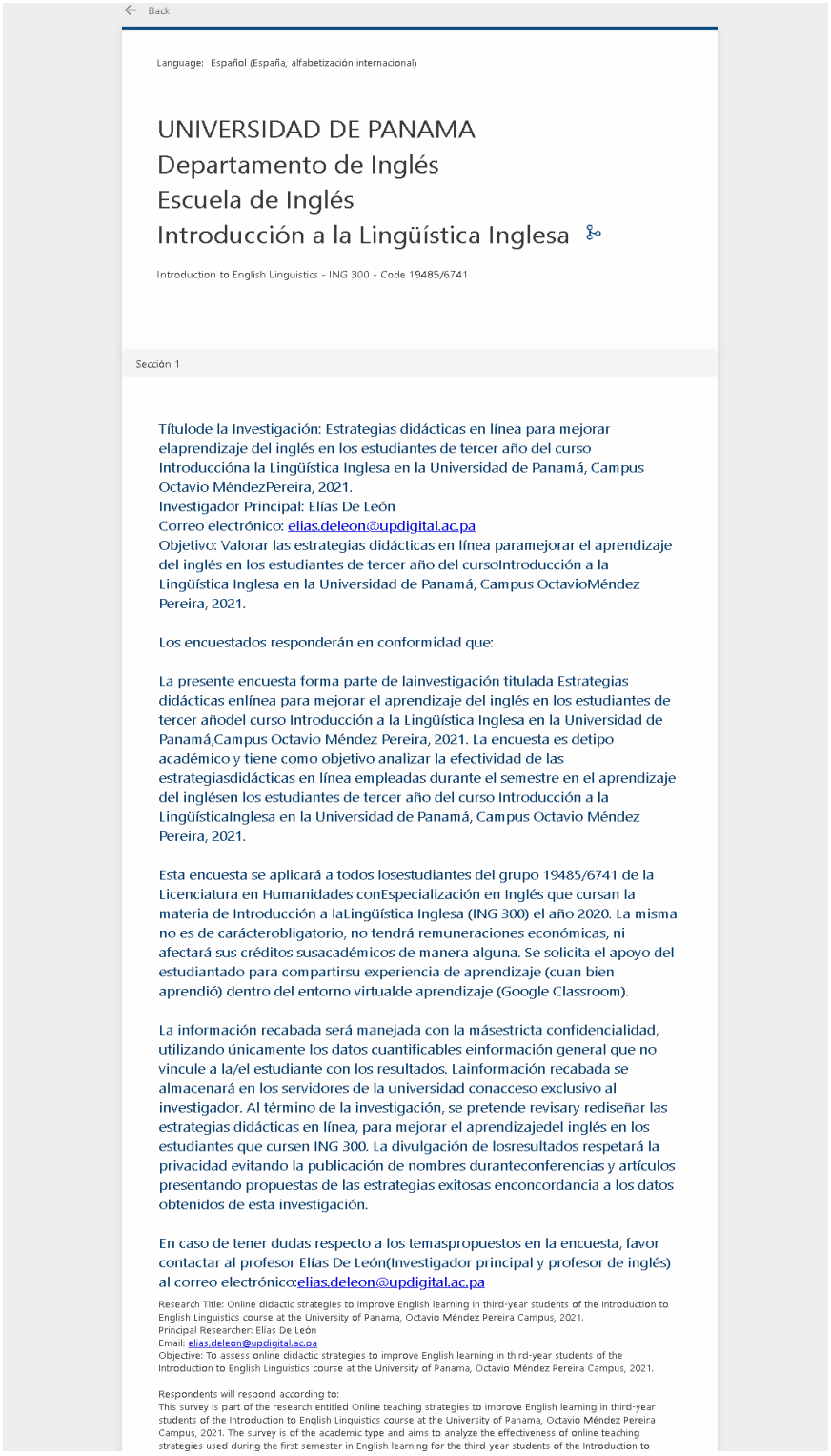
Annexes

Appendix 1. Instrument 1 – COLLES Survey (modified for Spanish/English)



Back

Language: Español (España, alfabetización internacional)

UNIVERSIDAD DE PANAMA
Departamento de Inglés
Escuela de Inglés
Introducción a la Lingüística Inglesa

Introduction to English Linguistics - ING 300 - Code 19485/6741

Sección 1

Títulode la Investigación: Estrategias didácticas en línea para mejorar elaprendizaje del inglés en los estudiantes de tercer año del curso Introduccióna la Lingüística Inglesa en la Universidad de Panamá, Campus Octavio MéndezPereira, 2021.
Investigador Principal: Elías De León
Correo electrónico: elias.deleon@updigital.ac.pa
Objetivo: Valorar las estrategias didácticas en línea paramejorar el aprendizaje del inglés en los estudiantes de tercer año del cursoIntroducción a la Lingüística Inglesa en la Universidad de Panamá, Campus OctavioMéndez Pereira, 2021.

Los encuestados responderán en conformidad que:

La presente encuesta forma parte de lainvestigación titulada Estrategias didácticas enlínea para mejorar el aprendizaje del inglés en los estudiantes de tercer añodel curso Introducción a la Lingüística Inglesa en la Universidad de Panamá,Campus Octavio Méndez Pereira, 2021. La encuesta es detipo académico y tiene como objetivo analizar la efectividad de las estrategiasdidácticas en línea empleadas durante el semestre en el aprendizaje del inglésen los estudiantes de tercer año del curso Introducción a la LingüísticaInglesa en la Universidad de Panamá, Campus Octavio Méndez Pereira, 2021.

Esta encuesta se aplicará a todos losestudiantes del grupo 19485/6741 de la Licenciatura en Humanidades conEspecialización en Inglés que cursan la materia de Introducción a laLingüística Inglesa (ING 300) el año 2020. La misma no es de carácterobligatorio, no tendrá remuneraciones económicas, ni afectará sus créditos susacadémicos de manera alguna. Se solicita el apoyo del estudiantado para compartirsu experiencia de aprendizaje (cuan bien aprendió) dentro del entorno virtualde aprendizaje (Google Classroom).

La información recabada será manejada con la másestricta confidencialidad, utilizando únicamente los datos cuantificables eninformación general que no vincule a la/el estudiante con los resultados. Lainformación recabada se almacenará en los servidores de la universidad conacceso exclusivo al investigador. Al término de la investigación, se pretende revisary rediseñar las estrategias didácticas en línea, para mejorar el aprendizajedel inglés en los estudiantes que cursen ING 300. La divulgación de losresultados respetará la privacidad evitando la publicación de nombres duranteconferencias y artículos presentando propuestas de las estrategias exitosas enconcordancia a los datos obtenidos de esta investigación.

En caso de tener dudas respecto a los temaspropuestos en la encuesta, favor contactar al profesor Elías De León(Investigador principal y profesor de inglés) al correo electrónico:elias.deleon@updigital.ac.pa

Research Title: Online didactic strategies to improve English learning in third-year students of the Introduction to English Linguistics course at the University of Panama, Octavio Méndez Pereira Campus, 2021.
Principal Researcher: Elías De León
Email: elias.deleon@updigital.ac.pa
Objective: To assess online didactic strategies to improve English learning in third-year students of the Introduction to English Linguistics course at the University of Panama, Octavio Méndez Pereira Campus, 2021.

Respondents will respond according to:
This survey is part of the research entitled Online teaching strategies to improve English learning in third-year students of the Introduction to English Linguistics course at the University of Panama, Octavio Méndez Pereira Campus, 2021. The survey is of the academic type and aims to analyze the effectiveness of online teaching strategies used during the first semester in English learning for the third-year students of the Introduction to

Forms

UNIVERSIDAD DE PANAMA Departamento de Inglés Escuela de Inglés Introducción a la Lingüística Inglesa-Saved

EL



UNIVERSIDAD DE PANAMA
Departamento de Inglés
Escuela de Inglés
Introducción a la Lingüística Inglesa

Introduction to English Linguistics - ING 300 - Code 19485/6741

Section 1

Acknowledgement

Research Title: Online didactic strategies to improve English learning in third-year students of the Introduction to English Linguistics course at the University of Panama, Octavio Méndez Pereira Campus, 2021.
Principal Researcher: Elías De León
Email: elias.deleon@updigital.ac.pa
Objective: To assess online didactic strategies to improve English learning in third-year students of the Introduction to English Linguistics course at the University of Panama, Octavio Méndez Pereira Campus, 2021.

Respondents will respond according to:

This survey is part of the research entitled Online teaching strategies to improve English learning in third-year students of the Introduction to English Linguistics course at the University of Panama, Octavio Méndez Pereira Campus, 2021. The survey is of the academic type and aims to analyze the effectiveness of online teaching strategies used during the first semester in English learning for the third-year students of the Introduction to English Linguistics course at the University of Panama, Campus Octavio Méndez Pereira, 2021.

This survey will be applied to all students in the group 19485/6741 of the Bachelor of Humanities with a Specialization in English taking Introduction to English Linguistics (ING 300) in 2020. It is not mandatory; it will have no economic remuneration, nor will it affect the academic credits in any way. The support of the students is requested to share their learning experience (how well they learned) within the virtual learning environment (Google Classroom).

The information collected will be handled with the strictest confidentiality, using only quantifiable data and general information that does not link the student with the results. The collected data will be stored within the university servers, accessible only to the researcher. At the end of the research, it is intended to review and redesign the online didactic strategies, to improve the learning of English in students who take ING 300. The disclosure of the results will respect privacy by avoiding the publication of names during conferences and articles presenting proposals of successful strategies according to the data obtained from this research.

In case of doubts regarding the topics proposed in the survey, please contact Professor Elias De Leon (Researcher and Professor of English) at the email: elias.deleon@updigital.ac.pa

1.Do you agree to proceed?

- Yes
- No

Section 2

Relevance

2.My learning focuses on issues that interest me.

- Almost never
- Seldom
- Sometimes
- Often
- Almost always

3.What I learn is important for my professional practice.

- Almost never
- Seldom
- Sometimes
- Often
- Almost always

4.I learn how to improve my professional practice.

- Almost never
- Seldom
- Sometimes
- Often
- Almost always

5.What I learn connects well with my professional practice.

- Almost never
- Seldom
- Sometimes

- Often
- Almost always

Section 3

Reflective thinking

6.I think critically about how I learn.

- Almost never
- Seldom
- Sometimes
- Often
- Almost always

7.I think critically about my own ideas.

- Almost never
- Seldom
- Sometimes
- Often
- Almost always

8.I think critically about other students' ideas.

- Almost never
- Seldom
- Sometimes

- Often
- Almost always

9.I think critically about ideas in the readings.

- Almost never
- Seldom
- Sometimes
- Often
- Almost always

Section 4

Interactivity

10.I explain my ideas to other students.

- Almost never
- Seldom
- Sometimes
- Often
- Almost always

11.I ask other students to explain their ideas.

- Almost never
- Seldom
- Sometimes

- Often
- Almost always

12.Other students ask me to explain my ideas.

- Almost never
- Seldom
- Sometimes
- Often
- Almost always

13.Other students respond to my ideas.

- Almost never
- Seldom
- Sometimes
- Often
- Almost always

Section 5

Tutor support

14.The tutor stimulates my thinking.

- Almost never
- Seldom
- Sometimes

- Often
- Almost always

15.The tutor encourages me to participate.

- Almost never
- Seldom
- Sometimes
- Often
- Almost always

16.The tutor models good discourse.

- Almost never
- Seldom
- Sometimes
- Often
- Almost always

17.The tutor models critical self-reflection.

- Almost never
- Seldom
- Sometimes
- Often
- Almost always

Section 6

Peer support

18.Other students encourage my participation.

- Almost never
- Seldom
- Sometimes
- Often
- Almost always

19.Other students praise my contribution.

- Almost never
- Seldom
- Sometimes
- Often
- Almost always

20.Other students value my contribution.

- Almost never
- Seldom
- Sometimes
- Often
- Almost always

21.Other students empathize with my struggle to learn.

- Almost never
- Seldom
- Sometimes
- Often
- Almost always

Section 7

Interpretation

22.I make good sense of other students' messages.

- Almost never
- Seldom
- Sometimes
- Often
- Almost always

23.Other students make good sense of my messages.

- Almost never
- Seldom
- Sometimes
- Often
- Almost always

24.I make good sense of the tutor's messages.

- Almost never
- Seldom
- Sometimes
- Often
- Almost always

25.The tutor makes good sense of my messages.

- Almost never
- Seldom
- Sometimes
- Often
- Almost always

Section 8

General information

26.How long did this survey take you to complete?

- Under 1 min
- 1-2 min
- 2-3 min
- 3-4 min
- 4-5 min
- 5-10 min
- More than 10 min

27.Age

- 17-25
- 26-35
- 36+

28.Shift

- Morning
- Afternoon
- Evening

29.Current year (or most courses)

- I
- II
- III
- IV
- V

30.Do you have any other comments?

Section 9

Thanks for your time.

Please click "Submit" to finish.

Add new
Choice
Text
Rating
Date

5mins

You've added branching

Now that your form uses branching, we'll stop estimating completion time.

Got it

Annex 1. Experts' Validation

Validación de instrumento de medición

Gracias por abrir el presente enalce. Usted a sido seleccionado(a) por ser docente y conocedor(a) de las estratégias didácticas en el proceso de enseñanza aprendizaje. La presente investigación comprende el trabajo final (tésis) del estudiante Elías De León para optar por el título de Magister en Entornos Virtuales de Aprendizaje; quien agradece su cooperación en la compleción del mismo.

Favor completar el siguiente formulario de evaluación del instrumento de medición en la Investigación: *Estrategias didácticas en línea para mejorar el aprendizaje del inglés en los estudiantesde tercer año del curso Introducción a la Lingüística Inglesa en la Universidadde Panamá, Campus Octavio Méndez Pereira, 2021.*

La primera sección comprende la aceptación del presente consentimiento informado. Seguidamente, se solicitarán datos personales no vinculantes. Posteriormente se le solicitará completar preguntas por su punto de vista respecto a los 29 ítems del instrumento de recolección de datos y finalmente, su impresión general sobre la propuesta de aplicación del instrumento.

Cualquier pregunta, duda o comentario adicional, sírvase contactar al autor al correo: elías.deleon@oteima.ac.pa (mailto:elías.deleon@oteima.ac.pa)

* Required

1. ¿Está de acuerdo en compartir sus impresiones en la validación del instrumento? *

   ○ Sí

   ○ No

Datos de experto(a) encuestado(a)

2. Nivel académico

- ◯ Doctorado
- ◯ Magister
- ◯ Licenciatura

3. Sexo

- ◯ Femenina
- ◯ Masculino

4. Años de servicio

- ◯ Menos de 10
- ◯ De 10 a 15 años
- ◯ De 16 a 20 años
- ◯ Mayor de 20 años

Tras leer el instrumento, favor comparta sus impresiones.

Enlace del instrumento: https://forms.office.com/r/an1PD9k0sE (https://forms.office.com/r/an1PD9k0sE)

Sírvase en leer el instrumento de medición en la Investigación: *Estrategias didácticas en línea para mejorar el aprendizaje del inglés en los estudiantesde tercer año del curso Introducción a la Lingüística Inglesa en la Universidadde Panamá, Campus Octavio Méndez Pereira, 2021.*

Tras completar la lectura, favor responder las siguientes preguntas en base a su criterio.

5. Acknowledgement (Consentimiento)

	Nula	Baja	Regular	Alta
La claridad del ítem es	○	○	○	○
La pertinencia del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

6. My learning focuses on issues that interest me.

	Nula	Baja	Regular	Alta
La claridad del ítem es	○	○	○	○
La pertinencia del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

7. What I learn is important for my professional practice.

	Nula	Baja	Regular	Alta
La claridad del ítem es	○	○	○	○
La pertinencia del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

8. I learn how to improve my professional practice.

	Nula	Baja	Regular	Alta
La claridad del ítem es	○	○	○	○
La pertinencia del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

9. What I learn connects well with my professional practice.

	Nula	Baja	Regular	Alta
La claridad del ítem es	○	○	○	○
La pertinencia del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

10. I think critically about how I learn.

	Nula	Baja	Regular	Alta
La claridad del ítem es	○	○	○	○
La pertinencia del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

11. I think critically about my own ideas.

	Nula	Baja	Regular	Alta
La claridad del ítem es	○	○	○	○
La pertinencia del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

12. I think critically about other students' ideas.

	Nula	Baja	Regular	Alta
La claridad del ítem es	○	○	○	○
La pertinencia del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

13. I think critically about ideas in the readings.

	Nula	Baja	Regular	Alta
La claridad del ítem es	○	○	○	○
La pertinencia del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

14. I explain my ideas to other students.

	Nula	Baja	Regular	Alta
La claridad del ítem es	○	○	○	○
La pertinencia del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

15. I ask other students to explain their ideas.

	Nula	Baja	Regular	Alta
La claridad del ítem es	○	○	○	○
La pertinencia del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

16. Other students ask me to explain my ideas.

	Nula	Baja	Regular	Alta
La claridad del ítem es	○	○	○	○
La pertinencia del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

17. Other students respond to my ideas.

	Nula	Baja	Regular	Alta
La claridad del ítem es	○	○	○	○
La pertinencia del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

18. The tutor stimulates my thinking.

	Nula	Baja	Regular	Alta
La claridad del ítem es	○	○	○	○
La pertinencia del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

19. The tutor encourages me to participate.

	Nula	Baja	Regular	Alta
La claridad del ítem es	○	○	○	○
La pertinencia del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

20. The tutor models good discourse.

	Nula	Baja	Regular	Alta
La claridad del ítem es	○	○	○	○
La pertinencia del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

21. The tutor models critical self-reflection.

	Nula	Baja	Regular	Alta
La claridad del ítem es	○	○	○	○
La pertinencia del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

22. Other students encourage my participation.

	Nula	Baja	Regular	Alta
La claridad del ítem es	○	○	○	○
La pertinencia del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

23. Other students praise my contribution.

	Nula	Baja	Regular	Alta
La pertinencia del ítem es	○	○	○	○
La claridad del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

24. Other students value my contribution.

	Nula	Baja	Regular	Alta
La pertinencia del ítem es	○	○	○	○
La claridad del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

25. Other students empathize with my struggle to learn.

	Nula	Baja	Regular	Alta
La pertinencia del ítem es	○	○	○	○
La claridad del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

26. I make good sense of other students' messages.

	Nula	Baja	Regular	Alta
La pertinencia del ítem es	○	○	○	○
La claridad del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

27. Other students make good sense of my messages.

	Nula	Baja	Regular	Alta
La pertinencia del ítem es	○	○	○	○
La claridad del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

28. I make good sense of the tutor's messages.

	Nula	Baja	Regular	Alta
La pertinencia del ítem es	○	○	○	○
La claridad del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

29. The tutor makes good sense of my messages.

	Nula	Baja	Regular	Alta
La pertinencia del ítem es	○	○	○	○
La claridad del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

30. How long did this survey take you to complete?

	Nula	Baja	Regular	Alta
La pertinencia del ítem es	○	○	○	○
La claridad del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

31. Age

	Nula	Baja	Regular	Alta
La pertinencia del ítem es	○	○	○	○
La claridad del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

32. Shift

	Nula	Baja	Regular	Alta
La pertinencia del ítem es	○	○	○	○
La claridad del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

33. Current year (or most courses)

	Nula	Baja	Regular	Alta
La pertinencia del ítem es	○	○	○	○
La claridad del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

34. Do you have any other comments? (Open question)

	Nula	Baja	Regular	Alta
La pertinencia del ítem es	○	○	○	○
La claridad del ítem es	○	○	○	○
La redacción del ítem es	○	○	○	○
La relevancia del ítem es	○	○	○	○

Consideraciones

35. Considerando la población de estudio, considera usted que el instrumento de medición se puede aplicar en la población de estudio.

○ Sí

○ No

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