# Validating Schlange as an Educational Electronic Resource Designed on Game-Based Learning Activities for Teaching English as a Foreign Language

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## Dedication

To Ignacio Cordon and Julia Sanchez de Cordon– a fine example of a man with a heart as big as his soul is beautiful and the woman who anchored generations of a family with her warmth and care. Without them, this would not have been possible.

**Acknowledgements**

First, I want to thank my beloved husband, Maximilian Josef Duchow. His support at all times was indispensable –giving feedback, being patient, supporting me above all emotionally when I needed it the most. Secondly, I want to show my gratitude to Edith Grande, for guiding me through the academic process –patiently, always available for feedback, help or encouragement. Thirdly, Carlos Herrera and Dora Cordon –for supporting the idea of further academic pursuit and the unconditional love only parents can give. Fourthly, my heartfelt gratitude to my aunt Martha –a fellow educator, who always had an open ear and heart, providing feedback when needed. In closing, my sister Valery –for providing fresh perspectives from her unique view as not only an academic, but an artist.

**Specialized Analytical Summary**

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|---|---|
| Title | Validating Schlange as an Educational Electronic Resource Designed on Game-Based Learning Activities for Teaching English as a Foreign Language |
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| Contents | Schlange es un recurso electrónico educativo que fue diseñado para contribuir a los profesores, practicantes o estudiantes de inglés como lengua extranjera. La tecnología permite materializar ideas innovadoras y su integración en diferentes campos de la realidad humana ha modificado todo lo conocido. Esto implica una transformación paulatina de los entornos, los recursos y con ellos los procesos de enseñanza-aprendizaje. Los estándares básicos de competencias en lenguas extranjeras (inglés) brindan una orientación fundamental a padres, directores y profesores de inglés de lo que |

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| | deben desarrollar los estudiantes durante su educación básica e intermedia. La autonomía del estudiante es un factor muy importante en el proceso de aprendizaje, y es a partir de los modelos de enseñanza que los estudiantes pueden iniciarlo, llevándolos a generar autorregulación. Los elementos, el docente y los recursos que cumplan con estas características pueden promover a través de la tecnología y la interacción, el uso de juegos y experiencias motivacionales para obtener estímulos-respuestas que los estudiantes necesitan. El diseñador de recursos educativos podría utilizar en sus diseños las características de los modelos de estilos de aprendizaje de Felder y Silverman.<br>El estudio contempla los principios del enfoque pragmático y como diseño de investigación cualitativo y cuantitativo, el investigador participó en las clases y la implementación de la herramienta en la población. Como diseño de métodos mixtos convergentes, la información mostrará los criterios y la retroalimentación brindada por la comunidad académica. La información vista en las visualizaciones del recurso educativo será descrita bajo un método de investigación cuantitativa y métodos cualitativos a través de comentarios abiertos.<br>Los instrumentos para la recogida de datos incluyen una lista de control, una rúbrica de evaluación, un cuestionario abierto-cerrado y un Informe Genially. Las investigaciones comenzaron buscando la validación de un recurso electrónico educativo, sin embargo, llevaron a darse cuenta de que los docentes llevaban el peso del proceso de enseñanza-aprendizaje, dejando al |

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|---|---|
| | estudiante con una mínima responsabilidad cuando se revisa su rol. Un punto a considerar en todos ellos es el carácter autónomo de la educación a distancia, que exige un papel activo por parte del estudiante. En el marco de la recopilación de datos cuantitativos, las opiniones de los evaluadores indican la eficacia de Schlange en este ámbito. |
| Research Line | The study contemplates the principles of the pragmatic approach using mixed methods. The investigator collects and analyses data, integrates findings, using qualitative and quantitative approaches. The instruments for data recolection include checklist –yes-no marking option; evaluation rubric –rating scale: absent (0), weak (1), strong (2) or exemplary (3) and an open option to collect comments. Additionally, a Genially Report that is an analytic tool included as a service of the platform where the educational electronic resource was programmed.<br>The students answer an Open-close questionnaire –include 8 close-ended questions and 2 open-ended questions, which will be send via e-mail or when necessary, aditional communication tools. |
| Conclusions | Schlange as an educational electronic resource was validated as an educational electronic resourece which improve the teaching learning process and promote the autonomous learning. It is essential the active role of the students in their learning process for this to exist and be effective. |
| Advisor | Edith Grande Triviño |

## Abstract

Schlange is an educational electronic resource that was designed to contribute to the teachers, practitioners or students of English as a foreign language. Technology allows the materialization of innovative ideas and its integration in different fields of human reality has modified everything known. This implies a gradual transformation of the environments, resources and with them the teaching-learning processes. The basic standards of competencies in foreign languages (English) provides fundamental guidancefor parents, principals and English teachers of what students must develop during their basic and intermediate education.

Student autonomy is a very important factor in the learning process, and it is fromthe teaching models that students can initiate it, leading them to generate self-regulation.The elements, the teacher and resources that meet these characteristics can promote through technology and interaction, use of games and motivational experiences to obtainstimulus-responses that students need. The designer of educational resources could use the characteristics of learning style models of Felder and Silverman in their designs.

The study contemplates the principles of the pragmatic approach and as qualitative and quantitative research design, the researcher participated in the classesand the implementation of the tool in the population. As a convergent mixed methods design, information will show the criteria and the feedback given by the academic community. The information seen in the visualizations of the educative resource will bedescribed under a quantitative research method and qualitative methods through opencommentaries.

The instruments for data recollection include a checklist, and an evaluationrubric, an open-closed questionnaire and a Genially Report.

The research began looking for the validation of an educational electronic resource, nevertheless, they lead to a realization of the fact that teachers carried the weight of the teaching-learning process, leaving the student with a minimal responsibilitywhen the students' role is reviewed. A point of consideration in all is the autonomous nature of long-distance learning, which demands an active role on the part of the student.As part of the quantitative data recollection, the feedback of the evaluators indicates the effectiveness of Schlange in this matter.

***Keywords:*** Technology, Teaching English, Educational Electronical Resources, Students Autonomy, Learning Styles.

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## Introduction

The emergence of technologies has changed all areas of society, including education. This is how technology has facilitated the creation of new teaching and learning environments. Nowadays it is possible to choose between face-to-face and virtual classrooms, which implies new forms of teacher-knowledge-student interaction, which in turn implies the integration of innovative educational resources to try to cover new needs and facilitate the processes of students and teachers.

Therefore, considering the students' learning styles in the development of educational resources to integrate different experiences and the integration of the game as an interesting and motivating element could facilitate both the teaching work and the students' learning process. In this order of ideas, the implementation of educational resources that meet these characteristics in virtual classrooms will facilitate the evaluation by students and to complete the process it is essential to also have the evaluation of educational resources from the teaching perspective, which is intended during this investigation.

### Significance of the Study

National System of Permanent Education (SINEP) is an institution that offers long distance education, which is why it mostly uses virtual scenarios that require the autonomy, self-discipline, and self-regulation of the students, to carry out the tasks of each of the phases. Therefore, the interns do not have relevant contact with the students and are in charge of preparing extraordinary support sessions for the student whom attendance is voluntary. This process entails the creation of friendly and didactic educational resources that encourages participation and that seeks to facilitate the development of the different communication skills of

the participants. Given the little motivation that students find to attend these meetings. The resources used in the session are required to be attractive and generate interest.

Given the results of some studies found, it has been possible to establish that the game learning approach are strategies that can promote participation and motivation in virtual environments. For this reason, it is important not only to test the respond of this type of educational resource from the students, but also the teacher perspective, in order to identify if there are shortcomings in it or, on the contrary, it can be replicated by others.

The evaluation of the process will allow finding better ways of organizing, planning, choosing, or executing the activities, as well as finding the best way to adapt the activities to the different themes of the course and the diversity of participants. The results may also have a positive response, which would entail a contribution for the institution, teachers, and future practitioners, who can use this format as a basis for the design of new educational resources to share on the virtual platform and to be used in sessions support or individually by the students. In this way, the learning of the second language is favored, student participation in the support sessions is increased and possibly the work deliveries as well, thanks to a better understanding and management of the language.

**Statement of the Problem**

The students of the course English Elementary A2.1 of cycle V of Sinep have a low participation in non-obligatory sessions. The cause of this could be that they do not think they will develop their communicative skills in a structured center session, and they may need additional material to understand the topic and get accustomed to practicing the language. There are two concepts they have not worked with: gamification and game-based learning. The first one refers to the use of game characteristics in the process of teaching a class. The second one

refers to the adaptation of games with an academic purpose. Despite sounding quite similar, the one needed in this population is the game-based learning and that is the reason Schlange as an educative resource and its evaluation criteria become fundamental in this project.

# Objectives

## General Objective

To validate Schlange as an educational electronic resource designed on game-based learning activities for teaching English as a Foreign Language through the use of rubrics that examine teaching and cognitive presence in order to improve the teaching/learning process of the Language.

## Specific Objectives

To define the criteria with the aspects to be evaluated in the resource in a numerical scale that contains medium, low and high score for highlighting the teachers and cognitive presence in the resource.

To bring forth a rubric of evaluation to be modified according to the feedback given by the academic community.

To implement the approved evaluation rubric for gathering information about Schlange and future educative resources with similar characteristics.

# Literature Review

## Technology

Technology is a concept that has accompanied humanity in recent centuries, although according to its definition it has always been present. The definition of the term has changed over time, this is how we find that Bain (1937) establishes that “technology includes all tools, machines, utensils, weapons, instruments, housing, clothing, communication and transportation devices and the skills by which we produce and use them.” (p. 860) Technology then encompasses all objects created by man and is linked to the skills necessary to produce those objects.

In 1967, Galbraith stated that "Technology means the systematic application of scientific or other organized knowledge to a practical task." (p. 14) Later, in 1993, Barbour stated “Technology may be defined as the application of organized knowledge to practical tasks by ordered systems of people and machines.” (Barbour, 1993, p. 3). In this case, it includes in its definition practical experiences –production of material goods and provision of services, inventions, and results of scientific theories as part of what technology represents. (Barbour, 1993) Innovations change societies and their perception of what technology is and that is why, returning to Heidegger's proposal (1953), technology should not only be defined from instrumentalization, but can be understood as the materialization of the hidden. The technique is the way in which the recognition of information leads to revealing what does not occur by itself and is not yet present. It is the way in which the real is revealed as existence, man being a means –today possibly not the only one– through which this revelation or discovery exists.

In conclusion, technology is everything –knowledge, skills, all that exists– that allows the materialization of reality through a process that is understood as technique. In this way, the door is opened for not only man to be the means of revelation, but what has already been revealed or discovered – for example, artificial intelligence – can itself become a means of discovery.

Currently, society is in the digital age, and this implies a digitalization of the economy asa drive for progress, this reflected in the different fields in which society operates. Digital technologies include technologies based on hardware, software and networks differentiated from classic technologies thanks to their availability and flexibility.

This is why the Bundesministerium für Wirtschaft und Energie (BMWi) –Ministry of Economy and Energy today called Ministry of Economy and Climate Protection (Germany)– published a study in 2021 in which it differentiates information technology from digital technology as it is found in table 1 followed by its classification according to trends.

**Table 1**

*Definition of Digital and Information Technology*

| Term | Description |
|---|---|
| Information technology | The entire input, output, conversion, transmission and storage of available information and material and intangible aids. This includes transmission technologies, human-machine interface, or IT infrastructure. (Bleck, 2004, paraphrased by Stich et al, 2021) |
| Digital Information | Solution components for the digitally connected enterprise. It results from the network connection. |

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|---|---|
| | Software and hardware exist to process data to create added value in an application. (Stich et al, 2021) |

*Note*. Adapted from "Digitalisierung der Wirtschaft in Deutschland, Technologie- und Trendradar 2020," by V. Stich, V. Seelmann, M. Stroh, M. Abbas, S. Kremer, J. Hicking, L. Wenger, and L. Henke, 2021, *Bundesministerium für Wirtschaft und Energie (BMWi).* (Digitalisierung der Wirtschaft in Deutschland Download.)

### *Networks Technology*

Within this technological field are technologies that are used to merge or forward data and information. Table 2 includes infrastructure, interface, transmission, and data storage technologies.

**Table 2**

*Vernetzung / Networks' Technology Classification*

| Technology | Description |
|---|---|
| 4G | Comprehensive solution based entirely on IP that provides voice, data, and multimedia transmission to users anytime, anywhere at much higher data speeds and efficiency compared to 3G. Their characteristics are:<br>Spectrally system with high capacity of simultaneous users per cell and speed (100 Mbps).<br>Smooth transfer, global roaming, and quality of service.<br>Interoperability with wireless standards with an IP packet switched network. (Saxena et al, 2013) |

| Technology | Description |
|---|---|
| 5G | Fifth generation of wireless communications technology that supports mobile data networks. Requires the use of devices designed to support the technology. Its latency is very low and easy to use as a replacement for wireless systems. (Mane, 2022) |
| Gigabit-WLAN o Wi-Fi 6 (802.11ac) | WLANs adopted advanced physical devices such as high-order modulation and multiple input and output (MIMO), to improve the transmission speed and data performance of wireless users. It proposed a IEEE 802.11ac as a distributed channel bonding protocol to allow a wireless user to join multiple available channels for high speed. Gigabit WLAN becomes a technological tool for emerging innovative applications. (Khairy et al, 2017) |
| Bluetooth 5 | Bluetooth wireless technology was developed as a short-range connectivity solution for small and portable electronic devices (Bisdikian, 2001, in Stich et al, 2021). The Bluetooth 5 was released at the end of 2016 as a further development of Bluetooth version 4.2. It improves data speed and range. (smartphones and wireless headphones) |
| ZigBee | It is a radio-based communication protocol. (Wendzel, 2018, in Stich et al, 2021) It was developed by the ZigBee Alliance with the aim of providing a cost-effective solution and open, reliable, and energy-saving communication standard for short distances.<br>ZigBee wireless technology is based on IEEE 802.15.4 (Zillner, 2016, in Stich et al, 2021) It is used to connect devices to each other. (Home devices) |
| IoT (Internet of Things) | It refers to a physical network that connects objects to each other over the internet. Provides worldwide software access to physical objects. (Balas et al, 2019, in Stich et al, 2021)<br>It is widely used in smart home programming. |
| Cloud- | It is a model that allows access anytime, anywhere over a network. A |

| Technology | Description |
|---|---|
| Computing | shared set of configurable computing resources (e.g., networks, servers, storage systems, applications, and services). (Mell and Grance, 2011, in Stich et al, 2021). (Centralized data storage) |
| Distributed Cloud | Distributed cloud architecture is used for scalability and efficiency reasons. It is a data center purpose-built for latency-sensitive systems. (Roseboro,2019; Östberg et al, 2007 in Stich et al, 2021). The distributed cloud is a form of data storage of distributed systems in a cloud. (Östberg et al, 2017 in Stich et al, 2021) |

*Note*. Adapted from "Digitalisierung der Wirtschaft in Deutschland, Technologie- und Trendradar 2020," by V. Stich, V. Seelmann, M. Stroh, M. Abbas, S. Kremer, J. Hicking, L. Wenger, and L. Henke, 2021, *Bundesministerium für Wirtschaft und Energie (BMWi).* (Digitalisierung der Wirtschaft in Deutschland Download.)

***Virtualization Technology***

This technological field includes technologies for creating a digital image (reality), data flow automation technologies as the table 3 shows.

**Table 3**

*Virtualisierung / Virtualization's Technology Classification*

| Technology | Description |
|---|---|
| Digitaler Schatten | The digital shadow shapes production and development processes. Needing the collection of data from all relevant sources. (Bauernhansl et al, 2016 in Stich et al, 2021) It does not require a high-resolution copied database. |
| Digitaler Zwilling | The digital twin is a virtual representation of a real object. (Klostermeier et Al, 2018, in Stich et al, 2021) It allows the definition, simulation, prediction, optimization and verification of a product. |

| Technology | Description |
|---|---|
| | (Schuh et al, 2018, in Stich et al, 2021) (Algorithms or simulation models. |
| Conversational Interfaces | They aim to facilitate interactions between people and electronic devices through natural conversations. They allow language processing (NLP) and artificial intelligence with natural communication. Furini et al, 2020, in Stich et al, 2021) |
| AR (Augmented Reality) | It involves the enrichment of environments through virtual content happening directly and interactively. At this point reality and virtuality combine and influence each other. (Dörner et al, 2019, in Stich et al, 2021) |
| VR (Virtual Reality) | It describes a computer system that is generated and displayed for one or more users. It consists of hardware – virtual reality glasses and software to display the content. Allows intuitive interaction in real time. (Dörner et al, 2019, in Stich et al, 2021) |

*Note*. Adapted from "Digitalisierung der Wirtschaft in Deutschland, Technologie- und Trendradar 2020," by V. Stich, V. Seelmann, M. Stroh, M. Abbas, S. Kremer, J. Hicking, L. Wenger, and L. Henke, 2021, *Bundesministerium für Wirtschaft und Energie (BMWi).* (Digitalisierung der Wirtschaft in Deutschland Download.)

***Data processing***

Evaluates existing data and the conversion of information to a digital format. Its tasks are registration, direct digital processing, and measurement derivation. Data logging transforms the information available in the environment into something digital. The processing allows the restructuring of existing data –Artificial Intelligence (AI), Machine Learning (ML) or Deep Learning, data analysis and quantum computing. The derivation of measurements represents a logical use, and it is the consequence of data processing what implies that decisions are made based on the results. (Stich et al, 2021) The description is shown in table 4.

**Table 4**

*Datenverarbeitung / Data Processing's Classification*

| Technology | Description |
|---|---|
| Artificial Intelligence (AI) | It deals with the development of intelligent computer programs that solve problems independently. Strong AI focuses on understanding processes and capabilities at an abstract level –human brain. The weak AI deals with more limited and simple problems. (Buxmann and Schmidt, 2019 in Stich et al, 2021) |
| AI-Cloud-Services | AI integrated into cloud systems allowing developers greater access to AI to include functions such as intelligent search, dynamic translation or computer vision. (Kumar, 2016, in Stich et al, 2021) |
| Machine-Learning | It is a branch of artificial intelligence by which IT systems can find solutions to problems. (Horvitz, and Mulligan, 2015 in Stich et al, 2021) |
| Deep Learning | It is a subarea of machine learning that uses parameterized models that work like a neural network. It can identify description problems through supervised, unsupervised, or non-learning. (Folkers, 2019, in Stich et al, 2021) |
| Natural-Language-Processing | It is a young, interdisciplinary field that combines computational linguistics, computer science, cognitive science, and AI. NLP aims to process and understand oral and written human language. Develops practical applications for the interaction between computers and human languages. (Deng and Liu, 2018, in Stich et al, 2021) |
| Data Analytics | It is the automated application of algorithms to analyze large amounts of data to aid decision making. It covers aspects of statistics, machine learning, pattern recognition and systems theory. (Runkler, 2020, in Stich et al, 2021) |
| Computer vision | It is a branch of computer visualization and includes computer vision that deals with the acquisition, processing, analysis, and interpretation of |

| Technology | Description |
|---|---|
| | images. All this makes the identification of objects possible. (Priese, 2015, in Stich et al, 2021) |
| Process-Mining | It allows the analysis and visualization of complex processes in a simple way. (Ahmed and Al, 2019, in Stich et al, 2021) It is used for business data analysis to improve processes. |
| Quantum | It uses the state superposition principle of quantum mechanics to process computer algorithms. It uses quantum bits or Qubits that allow a greater number of computing operations. (Anukool et al, 2018, in Stich et al, 2021) |

*Note*. Adapted from "Digitalisierung der Wirtschaft in Deutschland, Technologie- und Trendradar 2020," by V. Stich, V. Seelmann, M. Stroh, M. Abbas, S. Kremer, J. Hicking, L. Wenger, and L. Henke, 2021, *Bundesministerium für Wirtschaft und Energie (BMWi).* (Digitalisierung der Wirtschaft in Deutschland Download.)

***Processes Technology***

It summarizes those technologies belonging to the framework of the operational process, including edge computing that can process data directly at its point of origin and provide consistently traceable data. It can be combined with AI to automate processes, detect anomalies and possible cases of fraud. Table 5 shows its classification.

**Table 5**

*Prozesse / Procesess' Technology Classification*

| Technology | Description |
|---|---|

| Technology | Description |
|---|---|
| DevOps | It means development and operations. It describes a software development method that covers these two areas. (Wahaballa et al, 2015, in Stich et al, 2021) With the help of DevOps, software applications can be created and tested automatically (AWS, 2019, in Stich et al, 2021) |
| Digital Work | In traditional work, the employee works operating ICT. Digital work changes the role of the employee to a coordinator of tools and machinery. The need for office supplies, storage space, and maintenance, is reduced. (Ming Heng et al, 2019, in Stich et al, 2021) |
| Democratization of knowledge | It describes the process of creating as much knowledge as possible to make it accessible to as many people as possible. Normally in digital form through open access scientific databases. (Cearley et al, 2019; Britt Holbrook, 2019, in Stich et al, 2021) |
| Edge Computing | It moves computing capacity from centralized cloud servers, also called Edge Nodes, directly to end devices or local networks. (Li et al, 2018, Stich et al, 2021) |
| AI - Security | Application of AI to address challenges by protecting AI-enabled systems. Systems use AI to defend against attacks and anticipate new forms of attack. (Panetta, 2019, in Stich et al, 2021) |
| Hyperautomation | Automation describes the independent control and regulation of a process through a technical system. It also uses machine learning and AI for all automatable business processes including those of high complexity. (Cearley et al, 2019, in Stich et al, 2021) |
| Distributed Ledger – Technologie (DLT) | It is a digital accounting system for shared use. Provides tamper-proof transaction images. E.g blockchain –a basic component for cryptocurrencies. (Brühl, 2017, in Stich et al, 2021) |

*Note*. Adapted from "Digitalisierung der Wirtschaft in Deutschland, Technologie- und Trendradar 2020," by V. Stich, V. Seelmann, M. Stroh, M. Abbas, S. Kremer, J. Hicking, L.

Wenger, and L. Henke, 2021, *Bundesministerium für Wirtschaft und Energie (BMWi).* (Digitalisierung der Wirtschaft in Deutschland Download.)

***Products Technology***

It includes physical products, services, smart devices, and cyber-physical systems (CPS) with features of digitization, data processing and analysis, transmission technologies, human-machine interface, IT infrastructure and sensors. In particular, the networking of these products makes it possible to return field data and use it for further product development.

**Table 6**

*Produkte / Products'Technology Classification*

| Technology | Description |
|---|---|
| App Stores und Markplätze | App stores and marketplaces are digital sales platforms. Users access and can carry out both supply and demand transactions. Some may offer physical or digital goods and services. (Derave et al, 2020; Aichele and Schönberger, 2016 in Stich et al, 2021) |
| Kryptowährungen | Cryptocurrencies are encrypted and stored currency in a decentralized manner and without influence from a state central bank. Its transmission is direct from the sender to the recipient through encryption. It can be a payment method. (Thiele et al, 2017, in Stich et al, 2021) |
| Cyber – physische Systeme | A cyber-physical system (CPS) integrates networks and distributed computing systems with physical processes. (Lanotte et al, 2017, Stich et al, 2021) The processes are carried out by sensors that monitor networks and computers with controlled feedback mechanisms. For example, they can collect information about energy suppliers and consumers to monitor consumption and predict electricity supply. Another example is traffic flow logging. (Minerva et al, 2015, in Stich et al, 2021) |

| Technology | Description |
|---|---|
| Digitale Assistenzsysteme | Digital assistance systems support people in their actions. They are considered intelligent, and they are mainly known for their application in automobiles. (Beyerer et al, 2019, in Stich et al, 2021) |
| Autonomus Things | Autonomous things are physical components that are created using AI. They can assume human functions. (Cearley et al, 2019, in Stich et al, 2021) |
| Robotik | Robotics deals with the design, construction, and use of robots, understood as an object programmable in more than one axis and with a certain degree of autonomy. (Stich et al, 2021) |
| 3D- Scan | 3d scanning allows automated recording of measurement data or generation of 3D digital models. There are contact methods –a measuring arm to measure the material to be recorded. There are also non-contact methods which are based on the emission of light or ultrasonic pulses and subsequent triangulation. (Krowicki et al, 2019, in Stich et al, 2021) |
| 3D - Druck | 3D printing, also called additive manufacturing, is a technology that uses information from a computer-generated design to create physical objects. They are created from the application of successive layers of material through an additive process that results in a solid material forming a three-dimensional structure. (Noorani, 2018, in Stich et al, 2021) |
| Predictive Productivity | It is used to generate productivity insights. The systems are usually based on machine learning or AI to establish causal relationships between process parameters and consequently optimize it. (Ni et al, 2018, in Stich et al, 2021) |
| Human Augmentation | Human augmentation research (Human 2.0) is interested in implementing cognitive abilities and physical enhancements through technologies integrated into the body externally or internally. |

| Technology | Description |
|---|---|
| | (Raisamo et al, 2019, in Stich et al, 2021) Among these are exoskeletons, contact lenses (smart and implants), automatic insulin pumps, NFC, implants, etc. (Biswas et al, 2018 in Stich et al, 2021) |
| Human Multiexperience | It describes a future way of life in which computers will be omnipresent and multisensory (emulating human senses) through technical sensors. The buildings will also have multi-sensory interfaces. (Cearley et al, 2019, in Stich et al, 2021) |

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### *Business Model Technology*

This field analyzes business models based on data and platforms, which are present thanks to digitalization. Classification is shown in table 7.

**Table 7**

*Geschäftsmodelle / Business model's Technology Classification*

| Technology | Description |
|---|---|
| Shareconomy | Also known as collaborative economy. This concept was born thanks to the possibility of digital content, physical goods, or commercial activities, cultural or social projects through information and communication technologies. (Ellwein et al, 2018; Kraus and Giselbrecht, 2015, in Stich et al, 2021) |
| Subscription Economy | It offers customers access to an ever-changing environment, for regular payments. (Schuh et al, 2019, in Stich et al, 2021) |

| Technology | Description |
|---|---|
| User Designed | The user-designed business model implies that the client is responsible for the design of the products and the company provides the infrastructure. Both sides benefit, the customer has a distribution network, and the distributor has a finished product. (Remane et al, 2017; Gassmann et al, 2017 in Stich et al, 2021) |
| Infrastructure as a Service (IaaS) | It is a service that provides the customer with access to a virtual data center. The data center consists of servers, routers, and firewalls. (Belbergui et al, 2019 in Stich et al, 2021) |
| Platform as a Service (PaaS) | It is a component of cloud computing. Describes a service in which the client is provided with a virtual platform on the internet. The platform is used by software application developers and is used to offer and sell their applications and services. (Berrezzouq et al, 2019; Belbergui et al, 2019; Naji et al, 2019, in Stich et al, 2021) |
| Software as a Service (SaaS) | It is a component of cloud computing and is the most complete level of services, where the user has access to a centrally managed platform and software. It is offered on a subscription basis and enables data backups or training courses. (Berrezzouq et al, 2019; Belbergui et al, 2019; Krcmar, 2015, in Stich et al, 2021) |

*Note*. Adapted from "Digitalisierung der Wirtschaft in Deutschland, Technologie- und Trendradar 2020," by V. Stich, V. Seelmann, M. Stroh, M. Abbas, S. Kremer, J. Hicking, L. Wenger, and L. Henke, 2021, *Bundesministerium für Wirtschaft und Energie (BMWi).* (Digitalisierung der Wirtschaft in Deutschland Download.)

The above makes us understand the diversity and technological base that supports the interaction that technology can facilitate. Technology is not anymore an option since it has been involved in all aspects of human life. In education, technology has become an extraordinary tool

and the need to find new or easy ways to use it to improve the educative environments and the relationship between the knowledge and the students is more suitable. As Raja and Nagasubramani (2018) expressed, “the transfer of knowledge becomes very easy and convenient, as well as effective. What this means is, that our minds now tend to work faster when assisted with the use of modern technology.” (p. S33)

**Interaction**

With the advent of the internet, the World Wide Web, better known as www, was created. This is a set of interconnected documents that can be accessed through the network where it is called the internet. It is then that web 1.0 allowed unidirectional access to information through a browser since the information was anchored in a specific place. Berners-Lee (1997) already expressed that “the principal use of machines that read Web data is for search engines.” (p. 57)

Web 1.0 needed a change, and this occurred in 2004 when technology was sufficient for the creation of web 2.0 and with it, as explained by Kujur and Chhetri (2015) "major properties like participatory, collaborative, and distributed practices which enable formal and in-formal spheres of daily activities on going on web.” (p. 134) with the existence of bidirectionality interaction is allowed.

Web 2.0 allows the creation of websites as spaces in which inter-action, intra-action and outer-action affordances can be produced. In this way, Web 2.0 becomes a means through which users can communicate. Thus, a site becomes a third place that is outside of our physical reality, but that changes the ways in which we interact with other people, facilitating the creation, reproduction and distribution of content and documents. (Mechant and De Marez, 2012) “Web2.0 remains centralized with user data owned and managed by the companies in charge of

the web platforms. This social welcome fostered the development of web 2.0, thus reaching the next step." (E.C, 2023, p. 32)

Everything continues with web 3.0, which appeared in 2010. The advances did not take long to be plausible, since it would come to change the perception and interaction on the internet, having as possibilities the development of tools to create virtual worlds, 3d gaming, intelligent agents, personal assistants, and open educational resources. (Chisega, 2013) opening an entire field of research and testing. With these new tools, new forms of presentation and interpretation of information are generated and more and more virtual spaces that come out of the social sphere and are integrated into working life and the educational field.

Subsequently, the physical world is combined with the digital world allowing users to have more immersive and intuitive experiences which can be personalized, more interactive by being more decentralized, collaborative, and user-center approaches, after the emergence of Web 4.0. The web and real objects and environments will be able to communicate and be totally integrated thanks to the use of advanced artificial and ambient intelligence, internet of things, virtual worlds, and extended reality capabilities. (E.U., 2023)

In the same way that the integration of all types of technology and products in different fields of human reality has modified the economy, the way humanity interacts socially –opening up new fields in economics, health, media and the same concept of private life– have also been integrated and modified in education. This implies a gradual transformation of the environments, resources and with them the teaching-learning processes.

**Teaching English as a Foreign Language**

The teaching of English as a second or foreign language begins with the need to communicate with British merchants at the time of the empire. After the Second World War, not only did this communicative need increase, but several teaching methods, approaches and techniques were developed from scientific foundations from applied linguistics and the psychology of learning with which in the 20th century. However, there was no consensus or clear definition of these three concepts.

In consequence, Anthony, (1963) defined approach "as a set of correlative assumptions dealing with the nature of language and the nature of language teaching and learning." (pp. 63-64) Assumptions is related to a point of view or a believe which may not be prove but involves statements around the language manifestation and language teaching and learning. The approach is axiomatic, arguable just by measuring the effectiveness of a method that has emerged from it. (Anthony, 1963)

"Method is an overall plan for the orderly presentation of language material, no part of which contradicts, and all of which is based upon, the selected approach." (p.65) The method is procedural; therefore, several methods can emerge from one approach, due to the nature of the student's context. Finally, the technique is implementational and therefore it is what can be observed in the class. There are many techniques for the same objective and is the teacher who decides which technique is useful considering followed method and approach. (Anthony, 1963)

Within ELT teaching it is necessary to cover other topics such as the distinction "between the chronological stages of childhood and adulthood and the linguistic stages of childhood and adulthood." (Scott, 1965, p. 415) due to the difference teaching English to a native and nonnative

speaker because adults have already mastered a complex oral communication system. It is just one of the aspects to consider on the complexity of the learning human process phenomena and one of the reasons why the approaches, methods and technics evolve.

### *Teaching English as a Foreign Language in Colombia*

Sistema Nacional de Educación Permanente (SINEP) is a distance, basic and secondary education program for young people and adults who are of non-school age. As a Colombian educational institution, it is endorsed and governed by the guidelines of the Ministry of National Education (MEN). The MEN's educational development plan contemplates improving the efficiency of the educational sector and the quality of education, as well as expanding educational coverage. Taking into account the rapid social changes and the demands of the globalized world that arise from them, MEN defines education standards in order to prepare students for new challenges.

The basic standards of competencies in foreign languages (English) socialized through booklet 22 (Training in Foreign Languages: the challenge), allow establishing the basic levels of quality and provides fundamental guidance for parents, principals and English teachers on the competencies the students must develop during their basic and intermediate education. There are three concepts that is necessary to define in order to understand the context and foundations of the program.

Bilingualism refers to the degree of communicative mastery of an individual in more than one language. The degrees acquired will depend on the context in which it develops. This is how the concept of second language acquires its distinction, since it is that language that is acquired to enable social integration in migratory cases or access to job positions that include adaptation

to an immersion experience in the language. However, there is another contextual possibility that does not imply immersion but rather exposure to the language in controlled times and with equal possibilities of achieving an excellent performance known as a foreign language. (MEN, 2006)

### *Some Current Methods Used in TEFL*

Some of the methods named and described below maintain their validity, but they are a small sample among many other methods that can be found.

**Grammar-Translation.** It is known as the classical method –old language teaching method which was used first to teach Latin, focused on prayer and written skills developed for the translation of texts –for this reason, productive skills are not their main goal. It uses lists of vocabulary that must be memorized, its main activity in the classroom is the translation of sentences. The mother tongue is used to give instructions and explain grammar.

Pronunciation has little or no relevance in this methodology. The role of the teacher is that of an authority figure who gives the required instructions and explanations, the students must internalize the knowledge given by the teacher. Literature written in the target language in which the teacher looks for examples of some grammatical structure. Vocabulary lists and reading comprehension questions are also typical materials of the methodology. (Karakas, 2019)

**The Silent Way.** Caleb Gattegno (1962) published in a new method of teaching English, as a response to the traditional methods of the moment. The intention of this method is to break with the idea of a passive student and, on the contrary, make him the main actor and driver of his learning. For this, the student had to be aware of the need to obtain knowledge. For his part, the

teacher does not give him the knowledge he thinks is necessary but must facilitate the learning process of each student according to his experience with the language. (Çelik, 2020)

This method is divided into four stages and it follows three principles. They are represented in table 8.

**Table 8**

*Stages and Principles of Silent Way Method*

| No | Stage Description | Principles |
|---|---|---|
| 1 | The awareness stage is the first moment in which the student understands that there is something new to explore. This first moment is guided by the teacher. | Discovery and creation is what will facilitate learning, not memorization or repetition. |
| 2 | The exploration stage, during which students experiment with the materials to understand their structure and uses. | Learning is facilitated with the use of physical. |
| 3 | The transitional stage, in which the new ability is automated. | Manipulable objects. |
| 4 | The transfer stage, where the student internalizes the new knowledge and uses it naturally. | |

*Note*. Adapted from "Approaches and Principles: in English as a Foreign Language (EFL)," by S. Çelik, 2020, *Education Vizetek*.

Activities that present problems related to what is being learned is another way to facilitate learning. Through the search for the solution, students can be motivated to explore, develop, and apply their own understanding of language as a functional mechanism used to express themselves and communicate. It is intended that in the initial level's students can answer simple questions about themselves, their family, travel and daily situations. There is no set

syllabus for this method, instead the instructions and activities evolve with the needs of the students. For this reason, the lessons will be planned around grammatical aspects, vocabulary, and correct pronunciation. (Çelik, 2020).

The teacher's role involves silence as a facilitating tool for learning, creating an environment for student self-awareness and autonomy. This in turn will have an active role concentrating their attention on the exploration of language, their own correction and that of their classmates. The teacher evaluates his students through permanent observation of their performance and interaction with their classmates. Recognizing whether they have mastered their skills or not. This method uses unique teaching materials, among which we can find: cuisenaire rods, colored Fidel charts, sound-color charts, colored word charts, the pointer, wall pictures, among others. (Çelik, 2020).

**Task-Based-Language.** It was developed as a teaching methodology at the height of the Communicative Language Teaching Approach (CLT). It is student-centered, the student will use the language through the development of a task. The idea is that the student stays in communication and according to their level they will use linguistic and non-linguistic tools to share information. The way to complete the evaluation is through completing the tasks, which in turn are the ones that will reflect the true use of the language. Ellis (2019) in his presentation at Kotesol (2019) shares essential information of the Task-based Language Teaching method that are summarized in table 9.

**Table 9**

*Relevant Information of Task-Based-Language Method*

| What | | Description |
|---|---|---|
| Principles | | Ensure that homework is appropriate to the difficulty level and that students have an active role in it.<br><br>Set clear goals for each task-based lesson, creating opportunities for students to communicate and assess their performance and that of their peers.<br><br>To apply this method correctly, it is important to first distinguish between task and activity. |
| Differences | Task | The use of language is broader. Students could use different forms depending on the individual development of the task. |
| | Activity | The teacher offers the language that is developed in the exercise |
| Criteria for Task Recognition | | A task involves a primary focus on meaning.<br>A task has some kind of gap.<br>The participants choose the linguistic and non-linguistic resources needed to complete the task.<br>A task has a clearly defined communicative outcome. |
| Types of Tasks | Real-World: | Students may be faced with on a day-to-day basis. |
| | Pedagogical: | They are not necessarily found in everyday life but help to create genuine communication in the classroom. |
| | Input-Based: | Tasks recommended by Ellis (2019) for beginners as they enrich vocabulary and listening and reading skills. |
| | Output-Based: | Tasks recommended more frequently in the intermediate and more advanced levels since there will be greater production and variety of structures used. |
| | Closed: | The result of the task is limited. |
| | Open: | It allows an unpredictable result depending on the opinion. |
| | Here and | They are the easier ones in which the information needed to |

| | |
|---|---|
| Now: | perform is the same provided. |
| There and Then: | The information is part of the input, it must be discovered by the student, which makes them more complicated. |
| Focused | Task used for students to practice a certain grammatical structure. |
| Unfocused | Tasks give the student the opportunity to use different structures and communicative forms. |
| Teacher Generated: | The content or context is predetermined by the teacher. |
| Learner generated: | The student has the possibility of creating part or all the content or context. |

*Note*. Adapted from "Rod Ellis – TBLT:Where Did it Start and Where is it Going?," by KoreaTESOL, 2019, *2019* [Video Archive]. Youtube.
Adapted from "Rod Ellis-Using tasks in language teaching," by Cambridge University Press ELT, 2020 [Video Archive]. Youtube.

Similarly, Ellis (2019) highlights that one of the flaws in adapting this methodology is thinking that you should work in pairs or groups. Teachers must understand that although it is possible to work in groups or pairs, in the first levels it is not necessary and that it is possible to create tasks in which the teacher works with the whole group and that the tasks involve individual work with input-type tasks.

**Audio-lingual.** Within the principles of this method, we have that learning a foreign language is a mechanical process. The skills are obtained in a specific order, listening, speaking, reading and writing. For this reason, the teaching-learning process is more effective if the language is presented to the student orally and over time writing materials can be integrated. The development of language skills is formed through habit using repetitive drills and using

structured dialogue. Students must learn the language without resorting to their own mother tongue. Correct answers have immediate positive reinforcement through rewards. (Çelik, 2020).

The language is taught inductively, so there will be no explicit grammar instruction. The error must be avoided. Vocabulary is taught through demonstrations, objects, cue cards, images, and other media. Pupils should be taught phonology, morphology, and syntax of language. The type of techniques used to develop this method are dialogue memorization, backward build-up, repetition drill, chain drill, single-slot substitution drill, multiple-slot substitution drill, transformation drill, use of minimal pairs, complete the dialogue, grammar game. The role of the teacher is active and needs to have a native pronunciation and intonation of the language. In case you do not have that quality, you need to use native recordings. (Çelik, 2020)

**Suggestopedia.** This methodology created by Georgi Lozanov (1978) is based on the principles of suggestiology. It consists of memorization in a state of relaxation and concentration. In this way blockages are released and facilitating memories are loaded into memory.

For this process to be effective, it is necessary for the teacher to demonstrate authority, prestige and in this way the students trust him and the knowledge he delivers. The infantilization process indicates the relationship that is generated between the teacher and the students is like that of parents and children, so that the adult recovers the confidence, receptivity and spontaneity of the child. The environment must be appropriate, relaxing, with background music –preferably baroque instrumental that will allow entering a specific mental state that encourages desuggestion and allows suggestion (Lozanov, 2013) and decoration with information relevant to

the target language. The latter will serve as subliminals that they will learn without knowing they are doing it. (Çelik, 2020).

**Total Physical Response (TPR).** Developed by Asher (1977) it focuses on meaning rather than form. The student is committed to learning the language through motor activities that are activated by spoken commands from the teacher. Obtaining a foreign language is thought to be a parallel process to obtaining the mother tongue, so students should not be forced to speak before they are ready to do so. For Asher (1969), language education should focus on listening fluency. Listening comprehension is developed through motor activities that are related to the right hemisphere – the use of the right hemisphere triggers the left to speak the language. Learning should occur in an environment free from pressure and stress. Mistakes are natural and accepted as part of the process. (Çelik, 2020).

It is important to highlight that oral language is more important than written language in this method. Students then learn by observing actions that are directed with the use of imperatives by the teacher. The role of the teacher is to expose the students to the language, so that they acquire the language. Create opportunities, control input, and decide on the vocabulary and grammar to be used. The student for his part will listen and respond to the commands given by the teacher. At higher levels you will also have to produce, monitor, and evaluate your own performance. Many activities are incorporated in the design of a lesson such as: storytelling, songs, dinger plays, etc. (Çelik, 2020).

The teaching of English as a foreign language continues to advance. The introduction of technology in education and the advances that continue to emerge show that, like language, its education is a living organism that evolves and adapts to new contexts. Thus, it not only involves

the approaches, the methods, the technique, but also includes the resources, the contexts of the students and with them the continuous innovation. The knowledge accumulated in the area of English teaching is adaptable to any language teaching. Therefore, its advances are significant and appreciated as facilitators of communication worldwide.

**Classroom**

The classroom, as it is now known, is a concept that has evolved with education, so today's classrooms are not related to what happened in the 16th century. The first schools focused on skills like writing, reading, and math. Education only took on a new importance until after the American Revolution when public and somewhat charter schools appeared. When the figure of the Secretary of Education is created is when a process of standardization and control of educational institutions begins.

The classroom acquires another importance at the beginning of social psychologist research, finding the first classroom climate research on 1920s in the United States of America, which was focused on observation and recording of classroom phenomena. From this point Lewin (1936) affirmed that life space consists of the person and psychological environment after which it is developed in a need press theory. In 1963, Pace suggested that the overall atmosphere –the things rewarded, encouraged, emphasized and the style of life, are crucial aspects of the environment. It is not until Stern (1970) that students' outcomes are related with the person-environment. (Ghosh, 2015)

The modern era of classrooms learning environment has evolved rapidly concluding that educational productivity cannot be optimized if the role of psychosocial environment is not considered. (Ghosh, 2015) Therefore, the classroom now is seen as the "Environments that

provide experience, stimulate the senses, encourage the exchange of information, and offer opportunities for rehearsal, feedback, application, and transfer are most likely to support learning." (Van Note Chism, 2006, p.2.4) This is how an era of learning environment design begins that evolves in different directions as new ideas about the interference of the classroom and its setup in the learning process are produced.

With the advent of Web 1.0, new forms of information search appeared, as well as the appearance of e-learning that is characterized in its first moment using computers for the transmission of instructional content and for carrying out tests and evaluative questionnaires. Web 2.0 provides the use of email facilitating the exchange of information and learning managers (LMS) are developed that allow content to be connected to platforms. Students not only of e-learning but from any part of the world that had internet, could access the information, and interact with it. In August 2002, Moodle was launched, which is a learning platform. With this we see the beginning of the virtual classrooms designed by the teacher. Over time the idea of a virtual classroom evolves with technology and society as well as the needs and motivations of students.

One important topic to address in virtual education is the need to choose interesting and motivating educational resources, because "the lack of learner interaction in online courses may lead to failure due to a feeling of isolation." (Willging and Johnson, 2009, cited by Janmaimool and Nunsunanon, 2021, p. 3). Additionally, the new technologies "facilitate the implementation of strategies that promote interest, improve motivation, facilitate learning, and consequently reduce dropouts." (Acosta-Medina et al, 2021, p. 145).

Online learning could be confused on long distance-education, but for some authors is a form of distance education. For Joksimović et al (2015):

> technology mediates the learning process, teaching is delivered completely using internet, and students and instructor are not required to be available at the same time and place. It does not include more traditional distance education instruction methods, such as print-based correspondence education, broadcast television or radio, videoconferencing in its traditional form, videocassettes/DVDs and stand-alone educational software programs. (p. 100)

The author expressed that online learning has advantages such as flexibility, alleviation of overcrowded classrooms, among others, but presents the disadvantages such as the feeling of isolation and technology gaps, as well. It began a discussion about the effectiveness of online learning compared to face to face learning, the inclusion of the technology and how it influences the process. “Research revealed that students tend to value well-designed, frequently updated courses that incorporate extrinsic motivating factors, with tasks/examples immediately relevant for their practice, a reasonable level of control and flexibility (primarily in terms of deadlines).” (Joksimović et al, 2015, p. 115)

The design of online environments is closely related to digital resources. As teachers, it is possible to design a resource thinking about its setup, in the same way that a designer of learning environments in a physical place organizes the classroom in a certain way and with certain elements. The virtual classroom requires characteristics and tools that create an appropriate environment for learning. By not having any influence on the physical aspect of the geographical place where the students are. The environment will integrate the way in which the students

receive the information as well as the interactive options created. This also includes aspects such as consideration of learning styles and the integration of features of game-based learning during the sessions or included into educational resources.

**Learning-Style Models**

There is a big amount of information about learning styles that consider the term cognitive style as an equal, but there is a difference. Cognitive styles refer to the "ways in which different individuals characteristically approach different cognitive tasks." (Hartley, 1998, p.148) On the other hand, learning styles is defined as the "ways in which individuals characteristically approach different learning tasks." (Hartley, 1998, p. 149) The author emphasizes the automatic appearance of the learning style during the learning process, its identification becoming essential to improve the teacher decision making –selection of activities and educational resources– during the teaching-learning process.

In order to select a learning style model that brings enough information and input in the designing of an educational electronic resource, it is essential to know as many learning styles models as possible. The designer can use the information to choose how to present the content, what kind of activities are useful and its order of presentation. Furthermore, the table 10 compiles a description of different learning style models which introduce in a summarized way different perspectives of the authors regarding learning styles. It could help future teachers or designers in the selection of the best model to be applied in the creation of an educational electronic resource.

**Table 10**

*Compilation of Some Learning Style Models*

<table>
<tr><th>Model</th><th>Description</th></tr>
<tr><td>Kolb (1976, 1984)</td><td>The Experimental Learning Model (ELM) of Kolb proposes that a “learning style describes individual differences in learning based on the learner’s preference for employing different phases of the learning cycle.” (Kolb and Kolb, 2005, P. 195) Where the student positioned on these dimensions will define one of the four learning styles to which they belong. (Cassidy, 2004) Four phases of the cycle, two dimensions of learning and the four learning styles sttated by of Kolb are shown below.
<table>
<tr><th colspan="4">Experimental Learning Model (ELM) Kolb Cycle of Four Phases</th></tr>
<tr><td>Phase 1<br>Concrete experience (CE) Experiencing.</td><td>Phase 2<br>Abstract conceptualization (AC) thinking.</td><td>Phase 3<br>Active experimentation (AE) doing.</td><td>Phase 4<br>Reflective observation (RO) reflecting.</td></tr>
<tr><th colspan="4">The Two Dimensions of Learning (Kolb)</th></tr>
<tr><td colspan="2">Dimension I<br>Prehension: the grasping of information from experience. (CE-AC)</td><td colspan="2">Dimension II<br>Transformation. The processing of grasped information. (AE_RO)</td></tr>
<tr><th colspan="4">Learning Styles (Kolb)</th></tr>
<tr><td>LS 1</td><td>LS 2</td><td>LS 3</td><td>LS4</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Model</th><th colspan="4">Description</th></tr>
<tr><td></td><td>Convergence: Learner uses abstract conceptualization to drive active experimentation.</td><td>Divergence: Learner combines reflective observation with concrete experience to arrive to a creative solution.</td><td>Assimilation: Learners seek to make abstract theories explain their observations instead of focusing on applicable strategies and/or solutions.</td><td>Accommodation: Learners have a tendency for prompt action and adaptability to diverse situations.</td></tr>
<tr><td>Honey and Mumford (1992)</td><td colspan="4">Grounded in Kolb’s model. The Learning Styles Questionnaire (LSQ) is proposed as an alternative to Kolb’s (LSI). LSQ measure four learning styles. (Cassidy, 2004)</td></tr>
<tr><td></td><td colspan="4">Learning Styles of Honey and Mumford</td></tr>
<tr><td></td><td>LS 1 activist as Kolbs’ active experimentation.</td><td>LS 2 reflector as Kolbs’ reflective observation.</td><td>LS 3 theorist as Kolbs’ abstract conceptualization.</td><td>LS4 Pragmatist as Kolbs’ concrete experience</td></tr>
<tr><td>Vermunt (1992)</td><td colspan="4">It is described in four terms (components) shown below. The results of the test will position a learner in one of the four learning styles. Vermunt’s Learning Style Inventory (LSI) was developed for use in a high education context. (Cassidy, 2004)</td></tr>
<tr><td></td><td colspan="4">Learning Components of Vermunt</td></tr>
<tr><td></td><td>LS 1 Processing Strategies: awareness of the objectives. (what is learnt).</td><td>LS 2 Regulation Strategies: monitor learning</td><td>LS 3 Mental Models of Learning: encompassing the perceptions of the learning process.</td><td>LS4 Learning Orientations: personal aims, intentions, and expectations.</td></tr>
</table>

| Model | Description | | | |
|---|---|---|---|---|
| | Learning Styles of Vermunt | | | |
| | LS 1 | LS 2 | LS 3 | LS4 |
| | Undirected: present difficulties assimilating learning material and prioritizing its components. | Reproduction: achieves the minimum required with little or no effort understanding but reproducing information to complete the task. | Application directed: learner applies learning material to gain understanding and lastly. | Directed learning: learner attempts to gain a deeper use of learning material to achieve critical understanding. |
| Entwistle, Hanley and Houselet (1979) | They developed an instrument for assessing learning styles focused on the level of engagement or depth of processing applied during learning. The model centers around four modes of orientation of the learner: meaning orientation, reproduction orientation, achieving orientation and holistic orientation. The combination in different matters of those tendencies conform one of the four learning styles. (Cassidy, 2004) | | | |
| | Learning Styles of Entwistle et al | | | |
| | LS 1 | LS 2 | LS 3 | LS4 |
| | Deep: learner intents to understand, relating ideas, use of evidence and active learning. | Surface: learner intents to reproduce, unrelated memorizing, passive learning | Strategic: learner studies organization, time management, alertness, and intention to excel. | Apathetic: learner presents a lack of direction and interest. |
| | Description | | | |

| Model | Description | |
|---|---|---|
| Hunt, Butler, Noy and Rosser (1978) | Describe learning style as an individual's need for structure and conditions to learn effectively. The learning style will match with a teaching method. (Cassidy, 2004) | |
| | Learning Styles of Hunt et al | |
| | LS 1 | LS 2 |
| | Students with a high conceptual level (CL) are independent, self-assertive and need less or no structure. | Students with a low CL are impulsive and concrete and will require a highly structured learning environment. |
| | Description | |
| Dunn, Dunn and Prices' (1989) | Create a 100-item self-report questionnaire. Ask about key factors of the construct: environmental, emotional, sociological, physical, and psychological. It will give information about the construction of the learning situation, material, and teaching approach. (Cassidy, 2004) | |
| | Description | |
| Riechmann and Grasha's (1974) | It is focused on learners' preferences introducing social and affective dimensions to the measurement of the style. The dimensions are avoidant. Participant; competitive-collaborative; and dependent-independent. (Cassidy, 2004) | |

*Note*. Adapted from "Learning styles: an overview of theories, models, and measures," by S. Cassidy, 2004, *Educational Psychology, 24*(4), 419-444.

Felder and Silverman (1988) states that "a learning-style model classifies students according to where they fit on a number of scales pertaining to the ways they receive and process information." (p. 674) It is necessary to consider a learning-style model in the design of educational material for an EFL online session and Felder and Silverman approach offers relevant information that can be used designing and creating an educational electronic resource.

The Felder and Silverman model works on five dimensions of learning and teaching styles which respond to the type of information, mode of presentation and reception, how is the presentation organized, how does the student process the information and how does the student understand it. Felder and Silverman (2002) express that he omitted the inductive/deductive dimension from the model because "it isn't concise and prescriptive –you have to take a thorny problem or a collection of observations or data and try to make sense of it. Many or most students would say that they prefer deductive presentation." (Felder and Silverman, 2002, p. 1) Likewise, for design purposes it is important to consider the two ways to organize the presentation of the information.

Felder and Silverman (1988) base sensing and intuitive learners on the Carl Jung theory of psychological types (1921) which introduces two ways people perceive the world as sensing and intuition. The sensing involves the use of senses to observe and gather data, the sensor prefers information from the external world. The intuition involves speculation, imagination, and hunches as indirect perception, the intuitor prefers internal information. Identify their preferences will be helpful to choose the between abstract or concrete content. Table 11 present these two styles tendencies. (Felder and Silverman, 1988, p. 676)

**Table 11**

*Tendencies sensing and intuitive learners Felder and Silverman*

| Learners | Tendencies | | |
|---|---|---|---|
| Sensors | are | like | dislike |
| | patient with details. good memorizing facts. careful but slow. | facts, data, experimentation and solving problems by | Surprises, complications, symbols, and text |

| | | | |
|---|---|---|---|
| | | standard methods. | translations. |
| Intuitive | are | like | dislike |
| | bored by detail.<br>quick but careless.<br>good at grasping new concepts. | Principles, theories, innovation, complications, and symbols. | Repetitions and details. |

*Note*. Adapted from "learning and teaching styles in engineering education," by R. Felder, and L. Silverman, 1988, *journal of engineering education.* (Digital document)

Visual and auditory learners was changed by Felder and Silverman (2002) to visual/verbal because the written words are converted into and processed as spoken equivalents, which makes them more adequate to belong to verbal experience and not visual as well as the auditory classification. (Felder and Silverman, 2002) To cover this dimension, the information must be presented through materials that allow the different reception channels. Table 12 shows the type of external information that students effectively perceive, through their prominent sensory channel.

**Table 12**

*How learners Receive Information Felder and Silverman*

| Learners | remember better… |
|---|---|
| Visual | sights as Pictures, diagrams, flow charts, timelines, films, and plots. |
| Verbal | spoken and written words. They remember when they. |

*Note*. Adapted from "learning and teaching styles in engineering education," by R. Felder, and L. Silverman, 1988, 2002, *journal of engineering education.* (Digital document)

Inductive and deductive learners' styles focus on the way the students learn, how they process the information. Inductive is considered the natural learning style, it moves from particulars –observations, measurements, or data– to generalities –governing rules, laws, or theories. On the other hand, deductive moves from generalities to particulars. Felder and Silverman (1988) suggest teaching both styles using first an inductive teaching through the presentation of observable phenomena and then theory which will explain or solve the problem or what was observed. Because deductive is considered the natural teaching style, the table XX will present more information about inductive learners and teaching style. (Felder and Silverman, 1988)

**Table 13**

*Inductive Learners Needs and Benefits of Inductive Teaching*

| Inductive Learners Needs | Benefits of Inductive Teaching | |
|---|---|---|
| Motivation for learning. | Increase | Improve |
| To see phenomena to understand the theory. | Academic achievement.<br>Abstract reasoning skills.<br>Capability for inventive thought. | Retention of information.<br>Ability to apply principles.<br>Confidence in problem solving abilities. |

*Note*. Adapted from "learning and teaching styles in engineering education," by R. Felder, and L. Silverman, 1988, *journal of engineering education.* (Digital document)

Active and reflective learners refer to the process of the learner's perception of information and its conversion into knowledge. Active involves experimentation, action, discussion, and testing, active learners work well in groups. On the other hand, reflective involves observation, examination, and manipulation of the information, they work better by

themselves. In general terms, participation embrace the learning process of active experimentation and reflective observation learners. Teaching active and reflective styles involves alternate between lectures, pauses and activities –discussions or solving problem. (Felder and Silverman, 1988, p. 679)

Sequentially students master the material as it is presented, their reasoning processes are linear and they can work with the material, even if they partially understand it. Global learners make intuitive leaps, they may be better at divergent thinking and synthesis. (Felder and Silverman, 1988, p. 679) This journey leads us to reflect on the characteristics that an educational resource can offer to meet the needs of different learning styles and thus facilitate the teaching work and the student's learning process. It is useful to keep in mind that each learning style has a compatible teaching style as shown in table 14. This can also help in resource design process.

**Table 14**

*Dimensions of Learning and Teaching Styles Felder and Silverman*

| Preferred Learning Style | | Corresponding Teaching Style | |
|---|---|---|---|
| Sensory | Perception | Concrete | Content |
| Intuitive | | Abstract | |
| Visual | Input | Visual | Presentation |
| Verbal | | Verbal | |
| Inductive | Organization | Inductive | Organization |
| Deductive | | Deductive | |

| | | | |
|---|---|---|---|
| Active | | Active | |
| | Processing | | Student participation |
| Reflective | | Passive | |
| Sequential | | Sequential | |
| | Understanding | | Perspective |
| Global | | Global | |

*Note*. From "learning and teaching styles in engineering education," by R. Felder, and L. Silverman, 1988, *journal of engineering education.* (Digital document)

Language-learning materials are "anything that can be used to facilitate the learning of a language, they include printed and online materials." (Tomlinson, 2012, p. 143) The close relationship between the teacher, the educational material, and the student is understandable, since the material acts as an intermediary tool of the learning-teaching process.

During the material design it is important to remember that as was expressed by Memić-Fišić and Bijedic (2017) "electronic teaching materials should include activities for different learning styles so that students could choose activities suitable for their learning style." (p.44)

**Communicative Skills**

Another important factor to consider is the need to develop the different communicative skills in learners. The integration of listening and speaking –highly interrelated– with reading and writing. The integration of listening and speaking with reading and writing will make learners good listeners, speakers, readers, and writers to be able to communicate effectively. For instance, the students must be exposed to gradually challenging tasks and materials (Manaj Sadiku, 2015).

This implies planning the lesson carefully and designing attractive material and working in different steps or moments that help the student to develop their communication skills and to apprehend new knowledge about the language.

**Game-Based-Learning**

It is a controversial term since different authors give their own appreciation of what it means. The argumentative basis to integrate the game in the learning process was given by Jean Piaget (1964) who expressed about the stimulus-response schema that response will appear not because of the stimulus per se, but because the child already has a structure to realize the existence of the stimulus. The relation between the stimulus and the response is the assimilation which imply the child and the learning subject as active. Piaget concludes that "all the emphasis is placed in the activity of the subject himself, and I think that without this activity there is no possible didactic or pedagogy which significantly transforms the subject." (Piaget, 1964, p. 185) To carry out this kind of changes, it was necessary to imply in the education, the game and in this way the start of the game-based learning approach.

Within the design of games into educational resources, the principles of game-based learning could be implemented since this is "intended for educational purposes other than entertainment purposes. Game-based learning engages students more deeply in solving complex class works and they concentrate much harder to challenge each other to solve homework." (Akour et al, 2020, p.148).

This involves carefully planning the lesson and designing attractive educational resources and working on different steps or moments that help the student develop their communication skills and grasp new knowledge about the language. The academy is closely related to the

development of autonomous learning, understood as a process that includes three interrelated moments: the critical appropriation of reality and existing knowledge, creative construction, and the practical application of knowledge for the transformation of the reality.

The above takes autonomous learning as the central objective of open and distance education and from which the academic and pedagogical levels are articulated and integrated, through curricular dynamics and integration, without said processes losing their identity. The delivery and implementation of innovative, easily accessible, dynamic and motivational educational resources allow the student to engage with the class and advance on their own.

**Educational Electronic Resources**

Resources in education are "any instruments that help us to achieve any goal; that is, auxiliar material with which the pupils develop the learning process." (Marchena, 1996, first paragraph) The United Nations Educational, Scientific and Cultural Organization (UNESCO) defines Open Educational Resources (OER) as "learning, teaching and research materials in any format and medium that reside in the public domain or are under copyright that have been released under an open license, that permit no-cost access, re-use, re-purpose, adaptation and redistribution by others." (December 13, 2023) Open refers to the intellectual property license that grants a public right access to the resource, therefore my approach does not fall into that category, but simply as an educational resource.

To bring up the subject of educational electronic resources, it is essential to understand the differences between a digital and an electronic resource. The State Library of Victoria defines digital resources "as materials that have been conceived and created digitally or by

converting analogue materials to a digital format.” (Digital resources section) In contrast, the definition of an electronic resource is:

> a source which need[s] computer access or any electronic item for consumption that distribute a compilation of information, be it manuscript referring to complete book bases, electronical periodical, depiction, other multimedia products and arithmetical, graphical or time based as a commercially obtainable label that has been published with an aim to being marketed. The data may store on CD ROM, on tape, via internet and so on. (Kavithanjali, 2019, p. 775)

Considering the above information, an Educational Electronic Resource (EER) is any instrument created to be part of a teaching-learning process with specific goals and offers different kind of content and didactic materials to carry out various activities. It needs an electronic device to gain access. As part of the teaching learning process an EER is related to the teacher –who will use it as a means of teaching, to the student –who will use it to learn, as well as the knowledge –to making itself evident and understandable. In this way the triad between teacher, student and knowledge is completed and the information collected allows the creation of educational resources that meet the necessary characteristics for the best performance of an English as a foreign language accompaniment session.

**Figure 1**

*Schlange Screenshots I and II*

*Note.* The figure shows a compilation of pictures of different slides of Schlange. Each slide belongs to a different section following a lesson plan of a regular English class.

In this way, Schlange was born, as an educational electronic resource created on a platform that allows simultaneous user access and the integration of different types of digital learning resources, which provide the students the encounter of a variety of experiences matching their learning styles. Due to the lack of a consensual definition of digital learning resource, Wang et al (2019) define it as:

> using multimedia technology, internet technology, software development technology, virtual reality technology and artificial intelligence technology to design and develop information technology, which can support students to learn independently, cooperative learning, inquiry learning, and hybrid learning, and a sequence of binary digits that can be identified and processed by a computer consisting of 0.1. (pp. 95-96)

The classification offered by the author is summarized in table 15.

**Table 15**

*Classification of Digital Learning Resources*

| Subcategory | Categories |
|---|---|
| | 1 Basic Digital Learning Resources |
| Basic Knowledge Learning Resources | Refers to digital education resources for teachers and students. These resources correspond to national curricular standards and unified textbooks. It includes teaching material, extracurricular activities and exercises, electronic books (e-book), micro videos, etc. They must be authoritative, scientific, educational, and accurate and are necessary for formal education or informal teaching-learning activities. (Wang et al, 2019) |

| Subcategory | Categories |
|---|---|
| Auxiliary Development Learning Resources | It mainly refers to educational resources to socialize knowledge related to social and natural sciences. Among these we can find special websites, digital museums, etc. (Wang et al, 2019) |
| Generative Learning Resources | It refers to resources that teachers develop and apply in teaching activities. These resources are dispersed and lack systematicity, but they are important to improve the previous types of resources and to improve teaching skills. (Wang et al, 2019) |
| | 2 Tools Software Learning Resources |
| | It refers to resources that effectively help to promote, evaluate learning, improve teaching-learning performance, and facilitate the design of activities. This type of resource has high technical content and many digital learning functions and resources that the virtual simulation system supports. (Wang et al, 2019) |
| | 3 Network Platform Class Digital Learning Resources |
| | Platform resources. Create spaces for teaching, learning and innovation. It has a complex structure and high technical content. It can record data, support analysis and can include digital educational resources including an interactive platform and network resource platform. (Wang et al, 2019) |
| | 4 Virtual Reality Learning Resources |
| | These resources can reflect a real situation and interact with the virtual world through portable devices. Resources of models of the universe, cells, resources for spatiotemporal reproduction of |

| Subcategory | Categories |
|---|---|
| | historical events, landscapes and buildings, ecosystems, among others, can be presented. (Wang et al, 2019) |

*Note*. Adapted from "Research on the evolution and classification of digital learning resources," by J. Wang, M. Han, and W. Wang, 2019, *Proceedings of the international conference on education, economics and information management (ICEEIM 2019)*

**Autonomy**

Human autonomy usually distinguishes between personal, moral, and political autonomy. Human autonomy can be explained as the combination of three skills: discovering something about yourself, evaluating it, and changing it if necessary. In other words, an opinion, attitude or activity is first identified and schematized. Then a reflection on what has been identified is warranted, creating an assessment of one's own actions or opinions. Finally, it is determined if a change is necessary –in opinion, attitude, or activity– and how it would be achieved. (Gottschalk - Mazouz, 2019)

In this way, Zimmerman (1998) and his study on models focused on self-regulation processes can be included. "Self-regulation can be defined as self-generated thoughts, feelings, and actions for attaining academic goals." (p. 73) Self-regulated learners are distinguished by their view of academic learning as a proactive activity that requires motivation and behavior that arises from one's own initiative. The type of goals, the precision of their oral self-control and the ingenuity of their thinking allow students to become controllers of their learning experiences. (Zimmerman, 1998)

Student autonomy is a very important factor in the learning process, and it is from the teaching models that students can initiate processes that lead them to generate self-regulation.

The elements and the teacher can promote these experiences by generating motivation through their own interaction and the promotion of educational activities and resources that meet these characteristics.

## Methodology

The study contemplates the principles of the pragmatic approach, considering the intent to demonstrate competency of an educational electronic resource. The recognition of the interconnectedness of experience and inquiry as an experiential process are two main principles applied in the research project. The first one involves the relation between the population who shares their own role perspectives of their experience with the research object. These are teachers and students who exhibit what Patton (2008), cited by Kelly and Cordeiro (2020) "calls 'the personal factor', a trait recognizable in 'people who personally care about… evaluation and the findings it generates" (p.6)

This is a proposal that contains qualitative and quantitative research design in which the researcher participates in the classes and the implementation of the tool in the population. Mixed methods may be defined as 'research in which the investigator collects and analyses data, integrates the findings and draws inferences using both qualitative and quantitative approaches or methods in a single study' (Tashakkori and Creswell,2007, cited by Doyle et al, 2009, p. 176)

As a type of qualitative designs, the participatory action research (PAR) pretends helping a community take into account the philosophy and the social sciences and analyzing the data and the actions the community takes through an instructor.

Maguire (1987) states that the social reality changes as a purpose of participatory research and the latter one assists in the developing of skills –in collecting, analyzing, and utilizing information– and the capacity to participate in the world as creative actors. Stringer (2007) finds that the objective of an action research project is to make a difference in a specific

way, enhancing the lives of the people who are engaged with it. Any failure to do so is to be classified as a negative outcome.

"Descriptive research is a quantitative research method that attempts to collect quantifiable information to be used for statistical analysis of the population sample." (Manjunatha, 2019, p. 864) As a convergent mixed methods design, information will show the criteria and the feedback given by the academic community. The information seen in the visualizations of the educative resource will be described under a quantitative research method and qualitative methods through open commentaries.

Teachers of English as a foreign language of UNAD, teacher of English as a foreign language from different language institutions in Germany and students of cycle V of SINEP are the selected population. Due the difficulties to achieve the whole population a convenience sampling as a type of a non-probability sample is selected. The students sample involves those who participate voluntarily in the accompaniment sessions carried out by the researcher. Considering that the students universe receives distance education and includes individuals of non-school age; gender, geographic location, age, social or economic condition will not be taken into account. The teachers sample include individuals who have a high English level, education in this field, an intricate knowledge of learning tools and experience teaching English as a foreign language. As well as the students no other conditions will be considered as an obstacle.

The instruments for data recolection include a checklist –yes-no marking option, an evaluation rubric –rating scale: absent (0), weak (1), strong (2) or exemplary (3) and an open option to collect comments, a complementary open-close questionnaire –include 8 close-ended questions and 2 open-ended questions, which will be send via e-mail or when necessary,

aditional communication tools. An open-closed question questionnaire made it in google forms will be shared during the online session through the communication tool –skype– to the students. As a complemetary instrument the information obtained by Genially Report that is an analytic tool included as a service of the platform where the educational electronic resource was programmed. In this way, it is possible to control the time teachers needed to learn about the resource and the interaction teachers achieve –slides viewed, answers sended, among others– with the educational electronic resource. Figure 1, presents the planning of research activities planned.

**Figure 2**

*Schlange Cycle*

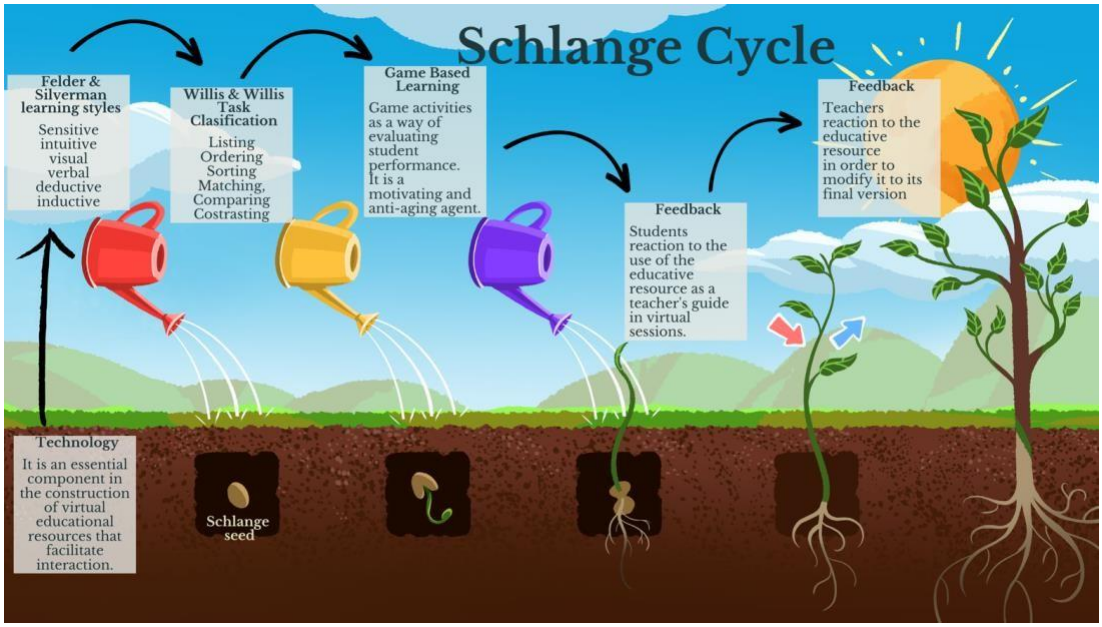


**Table 16**

*Research Activities Carried Out*

| What Significant Activities Were Carried Out? | |
|---|---|
| Activity | Description |
| Didactic Sequence | The didactic sequence includes 5 independent resources on 5 different topics specific to the course. |
| Sessions | Online sessions for students of SINEP to apply the educational resources created by the researcher and object of validation. |
| Questionnaire | The design, application and recollection of the information shared by the students are relevant to show the importance of this research. |
| Instruments | Search and selection of a checklist and rubric |
| Genially Analytics | Activation of Genially analytics |
| Resource' evaluation | The sending of rubric and checklist via E-mail and Signal –alternative communication tool– to teachers of English as a foreign language from UNAD and language institutes in Germany. |

**Table 17**

*Time and Place the Activities took Place in*

| When and Where was It Done? | |
|---|---|
| Activity | Description |
| Didactic Sequence | In online environments, from 29.03.2023 to 01.05.2023. Some educational resources were modified and created. |
| Sessions | The application of the first sequence was on 17.04.2023 and the last two sessions on 20:05.2023. |
| Questionnaire | It was applied in April via online to 7 students, 4 responses arrived. |
| Resource evaluation | In December 2023 the access link to the resource, the rubric and the checklist were sent via E-mail and Signal to 14 teachers of English |

as a foreign language.

**Table 18**

*Procedure of application of activities*

| How Were They Done? | |
|---|---|
| Activity | Description |
| Didactic Sequence | The resource is completely made by the researcher using technological tools ans applications as Canva, Wordwall, Powtoon, and Genially –it was necessary to get a paid plan or subscription to get access to all its designing options and benefits. Movavi as well was purchased to be able to edit pronunciation and short-story audios. |
| Sessions | Via Skype in different hours. The communication was most of the time using the microphone and when it was needed the chat. |
| Questionnaire | Created in google formulars. The link was send using skype. |
| Resource evaluation | The access link to the resource, the rubric and the checklist were sent via E-mail and Signal to 14 teachers of English as a foreign language and they send them back, when the process was completed. |

**Table 19**

*Design Participants*

| Who Participated in the Design? | |
|---|---|
| Activity | Description |
| Didactic Sequence | Researcher and a voice actor. |
| Sessions | Researcher as a teacher. |
| Questionnaire | Researcher. |
| Resource evaluation | Researcher and Maximilian Josef Duchow. |

**Table 20**

*Activities' Goals*

| What Goals Did They Have? | |
|---|---|
| Activity | Descriptions |
| Didactic Sequence | Create an educational didactic sequence resources that includes interaction and a game . |
| Sessions | To review the grammatical topics needed in the course. |
| Questionnaire | Recollection of data concerning what students think about the use of the educational resource in the online session. |
| Resource evaluation | The validation of the educational resource |

**Table 21**

*Activities' achievements*

| What Results Did They Achieve? | |
|---|---|
| Activity | Description |
| Didactic Sequence | Production of a set of educational resources. |
| Sessions | To review grammatical topics and learn knew vocabulary.<br>It was introduced the game as a motivational factor. |
| Questionnaire | The answers of 4 students of 7 students were recollected. |
| Resource evaluation | The evaluation results of 9 of 14 teachers. |

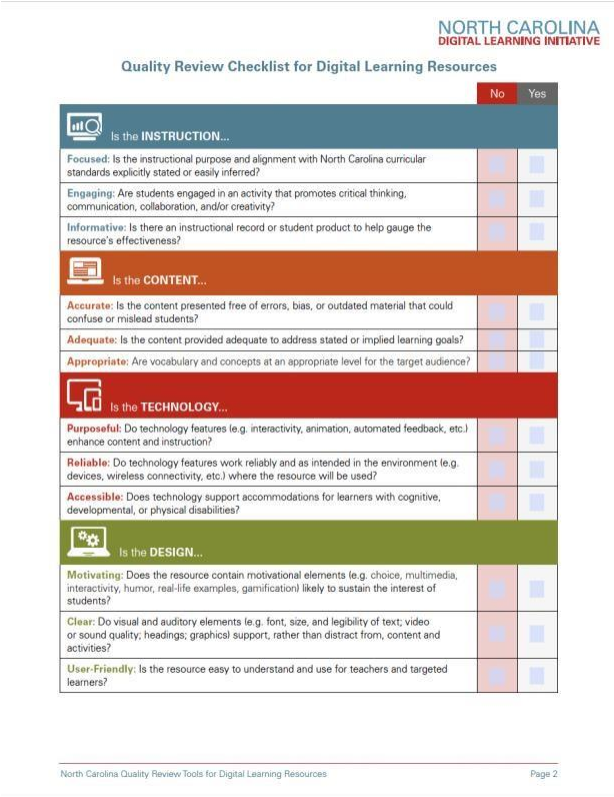
In this project the idea of how Schlange helps the process of teaching is given by a triangulation between two instruments applied to the knowledge of the teacher and one instrument to the perception of the students.

**Instrument 1 - Checklist (quantitative instrument)**

The checklist is part of a quality review tool for digital learning resources design by North Carolina Department of Public Instruction (NCDPI) and Friday Institute at North Carolina (NC) State University.

**Figure 3**

*Checklist Sample*



NORTH CAROLINA
DIGITAL LEARNING INITIATIVE

**Quality Review Checklist for Digital Learning Resources**

| | No | Yes |
|---|---|---|
| **Is the INSTRUCTION...** | | |
| **Focused:** Is the instructional purpose and alignment with North Carolina curricular standards explicitly stated or easily inferred? | | |
| **Engaging:** Are students engaged in an activity that promotes critical thinking, communication, collaboration, and/or creativity? | | |
| **Informative:** Is there an instructional record or student product to help gauge the resource's effectiveness? | | |
| **Is the CONTENT...** | | |
| **Accurate:** Is the content presented free of errors, bias, or outdated material that could confuse or mislead students? | | |
| **Adequate:** Is the content provided adequate to address stated or implied learning goals? | | |
| **Appropriate:** Are vocabulary and concepts at an appropriate level for the target audience? | | |
| **Is the TECHNOLOGY...** | | |
| **Purposeful:** Do technology features (e.g. interactivity, animation, automated feedback, etc.) enhance content and instruction? | | |
| **Reliable:** Do technology features work reliably and as intended in the environment (e.g. devices, wireless connectivity, etc.) where the resource will be used? | | |
| **Accessible:** Does technology support accommodations for learners with cognitive, developmental, or physical disabilities? | | |
| **Is the DESIGN...** | | |
| **Motivating:** Does the resource contain motivational elements (e.g. choice, multimedia, interactivity, humor, real-life examples, gamification) likely to sustain the interest of students? | | |
| **Clear:** Do visual and auditory elements (e.g. font, size, and legibility of text; video or sound quality; headings; graphics) support, rather than distract from, content and activities? | | |
| **User-Friendly:** Is the resource easy to understand and use for teachers and targeted learners? | | |

North Carolina Quality Review Tools for Digital Learning Resources Page 2

*Note.* The checklist consists of four evaluation dimensions and their respective criteria. It is designed by NCDPI and Friday Institute at NC State University. Under a CC BY-NC-SA 4.0 legal code. https://creativecommons.org/licenses/by-nc-sa/4.0/

**Table 22**

*Teachers and Student's Role According to each Evaluative Dimension*

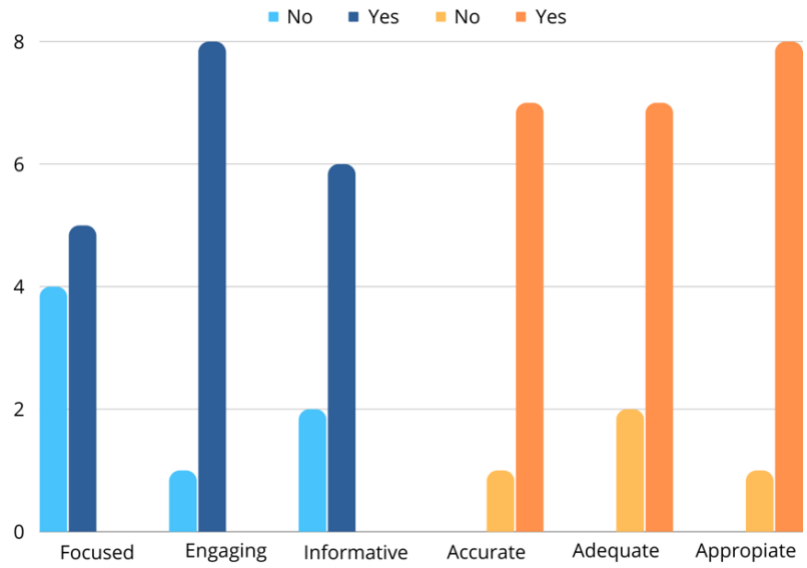
| Questions | Teacher's Role | Students´ Role |
|---|---|---|
| Is the instruction focused, engaging, and informative? | Instruction will be provided by the teacher who is in charge of planning and selection of resources appropriately. | Doesn´t apply |
| Is the design of the resource motivating, clear, and user-friendly? | Awareness of the students' requirements, creativity, knowledge, and technological abilities will support the design or selection of fitting resources. | Doesn´t apply |
| Is the content presented accurate, adequate, and appropriate? | Content is selected by teacher who has the knowledge of the whole process. | Doesn´t apply |
| Are technology features purposeful, reliable, and accessible? | Technology is a two-bias responsibility, it is like an agreement. | Technology is a two-bias responsibility, it is like an agreement. |

*Note*. Each question contains the three criteria that belong to an evaluative dimension. The table specify the role that teachers and students play according to the evaluation criteria presented in the checklist.

Teacher is in charge of 3 aspects mainly of 4 which are related to design, selection and use of the resources. Students will just agree on the technology means selected or worked.

***Figure 4***

*Instruction and Content Results in Checklist*




*Note.* This figure shows the results of the first two dimension presented in the checklist. The bars in blue and light orange belong to the negative responses, while the blue and dark orange bars belong to the positive ones.

The instruction is represented by bars in blue, they include the criteria (focused, engaging and informative).

The content is represented by bars in orange, they include the criteria (accurate, adequate and appropriate).

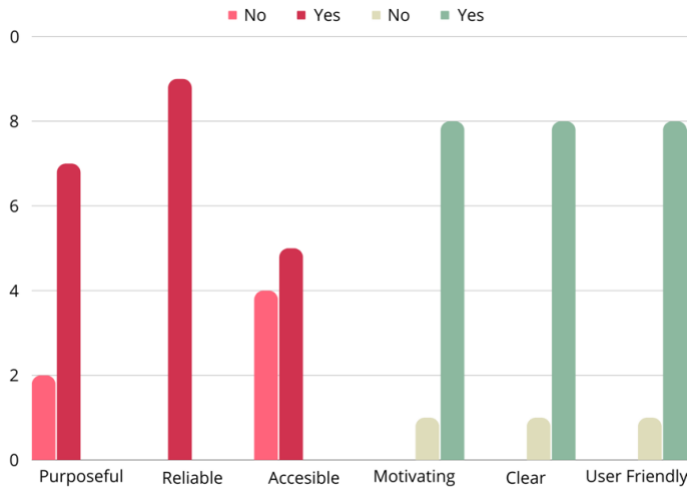
Eight of nine teachers find the resource engaging and appropriate. Seven of nine teachers find it accurate and adequate. It shows a well selection of the content with the purpose to achieve the goals of the session. Even if six of nine teachers find the resource informative and five of nine find it focused, more information is necessary to understand why four of nine teachers' gives a negative answer.

It is also important to review the focused criteria in the evaluation rubric and the qualitative results of the teachers to find what must be improved.

Figure 4 shows the results of the checklist on the two last dimensions evaluated.

**Figure 5**

*Technology and Design Results in Checklist*




*Note.* This figure shows the results of the last two dimension presented in the checklist. The bars in pink and beige belong to the negative responses, while the red and green bars belong to the positive ones.

Technology is represented by bars in pink and red, they include the criteria (purposeful, reliable, and accessible).

The content is represented by bars in beige and green, they include the criteria (motivating, clear and user friendly).

Although the resource is totally reliable, since nine of nine teachers answer positive, almost half –four of nine of the teachers– find that the resource needs modifications to be appropriate for people with physical, cognitive, and developmental disabilities. It would be

appropriate to review the reasons why few teachers –two of nine– evaluate the purposeful resource negatively.

The design of the resource is highly rated –eight of nine teacher give positive answers– showing that teachers find the activities and the use of different forms of information and presentation motivates and the resource is easy to follow.

**Instrument 2. Evaluation Rubric (quantitative instrument)**

The evaluation rubric selected is a quality review tool for digital learning resources design by NCDPI and Friday Institute at NC State University. The rubric consists of 4 pages with the dimensions and evaluation criteria.

**Figure 6**

*Evaluation Rubric Characteristic, Description and Scale*

*Note.* This figure shows a sample of the descriptive section of the evaluation rubric used in the research.

Each dimension of evaluation is related to a color –blue is instruction, orange is content, red is technology, green is design. Each dimension has three main criteria and a scale of four options – 0,1,2 and 3.

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**Table 23**

*Teachers and Students Responsibilities Considering the Evaluation Criteria*

| Criteria | Question | Teacher's Responsibility | Student's Responsibility |
|---|---|---|---|
| | | Instruction | |
| Focus | is the instructional purpose and alignment with… standards explicitly stated or easily inferred? | Control the understanding of the class objectives and reinforce the contents from your speech by using the resource as a facilitator. | Engage with their learning processes and use the opportunities presented by the resource and the teacher. |
| Engagement | Are students engaged in an instructional task that promotes the four C's? | The selection of effective pedagogical strategies, the ability to shape the learning environment and a positive relationship with the students. | Awareness of their role in the learning process and take action, actively participating and using all the available resources. |
| Evaluation | Is there a resulting instructional record to help evaluate the resource's effectiveness? | Observation and monitoring the use and results of the different activities proposed by the resource to complement the formative evaluation. | Recognize their improvement of their performance, understanding of the contents, feelings such as motivation or increased confidence. |

| Criteria | Question | Teacher's Responsibility | Student's Responsibility |
|---|---|---|---|
| | Content | | |
| Accuracy | Is content free of errors, biases or stereotypes, and outdated material that could lead to confusion or misunderstanding? | Review and correction of errors that may appear in the resource. | Communicate errors that may appear in the resource and ask for explanation if confusing content is found. |
| Adequacy | Is the content presented adequate to address stated or implied learning goals? | Planning and selection of adequate resources. | Doesn't apply |
| appropriateness | Are vocabulary and concepts appropiate for the target audience? | Planning and selection of adequate content. | Doesn't apply |
| | Technology | | |
| Purpose | Are technology features purposeful, enhancing content and instruction and serving in support learning goals? | Planning and selection of adequate tools to support the learning goals. | Doesn't apply |
| Reliability | Will it reliably work as intended in the context where it will be used? | Identification of group and student context and needs allows an assertive planning and selection of adequate tools and resources to support the learning goals. | Doesn't apply |
| Accessibility | Does technology support accommodations for learners with cognitive, developmental, or physical disabilities? | Use of technological resources to facilitate the participation of people with some type of disability. | Doesn't apply |
| | Design | | |

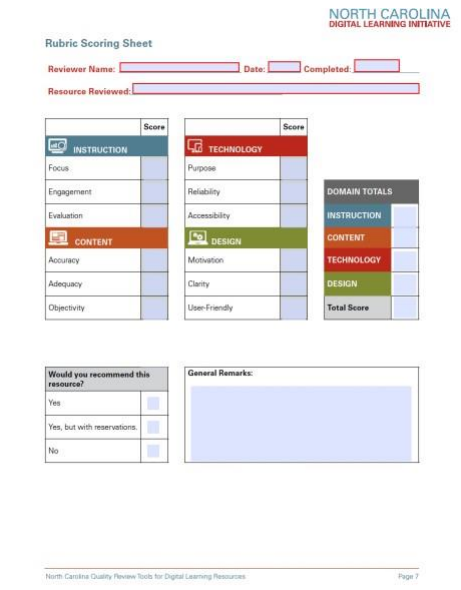
| Criteria | Question | Teacher's Responsibility | Student's Responsibility |
|---|---|---|---|
| Motivation | Does it contain a motivational element likely to sustain the interest and engagement of students? | selection of a variety of activities to motivate the students while they improve their learning skills. | be open to participating in different types of activities and take advantage of it. |
| Clarity | Are visual and auditory elements presented clearly, concisely, and attractively? | Selection of different types and ways of presenting content, integrating verbal and visual learning styles, as well as inductive and deductive. | Commit to the learning process, taking advantage of the different modalities presented. |
| Usability | Is the resource easy to understand and use? | Choice of resources and tools that challenge the student to learn the contents of the course and improve their skills in the use of technology. | Improvement of the technological abilities. |

*Note.* This table shows the responsabilities the students have to success in their learning process, according to the evaluation criteria of the rubric.

The last page of the rubric is the Rubric Scoring sheet with general written remarks to include qualitative information collected.

**Figure 7**

*Evaluation Rubric Scoring Sheet Sample*




*Note.* This figure shows a sample of the Evaluation rubric scoring sheet.

It has space to grade each criterion of each dimension and a final closed question as part of the quantitative results.

On the other hand, the space for the General remarks will be used to collect the comments about the resource to be used as qualitative results.

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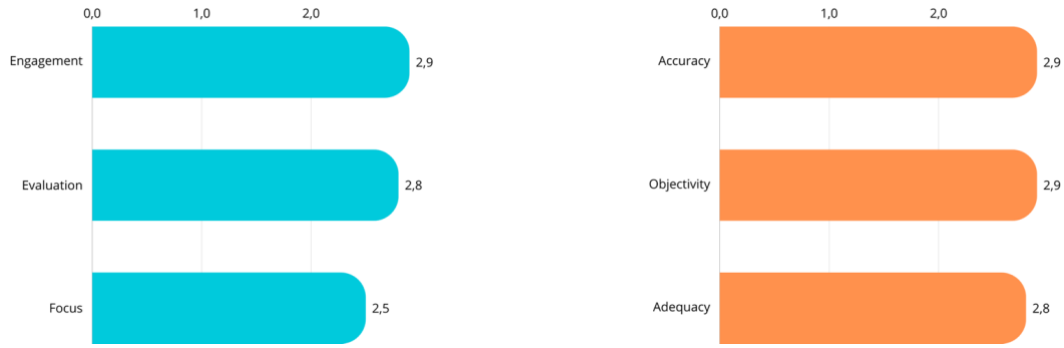
**Figure 8**

*Grades on Instruction and Content (Evaluation Rubric Results)*



*Note.* This figure shows the results of the first two dimension presented in the evaluation Rubric. The bars in blue represent the grades of each instruction criteria, while the orange bars represent the grades of each content criteria.
The sale has four grades: absent (0), weak (1), strong (2), exemplary (3). the average between all the grades obtained in each criterion is shown. The average for dimension is: 2,73 for instruction and 2,86 for content.

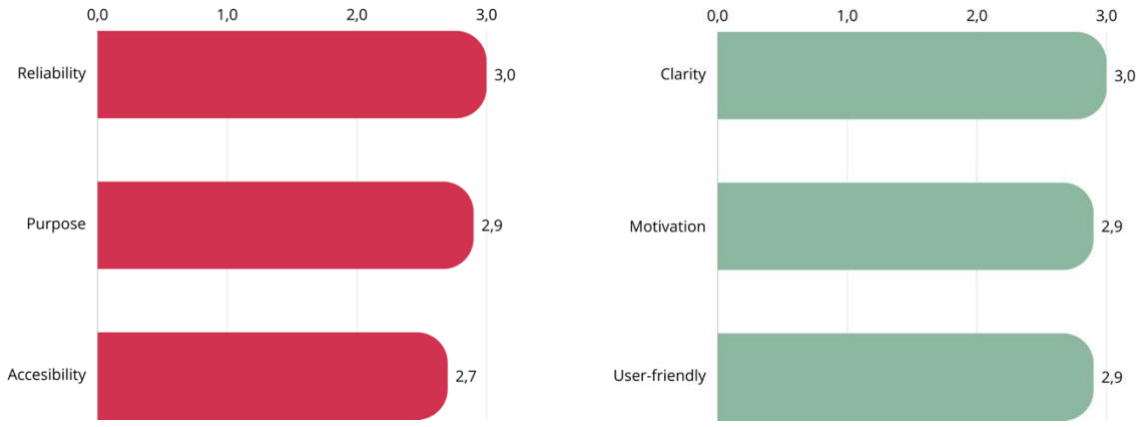
The high rating shows that teachers find that the resource includes activities that enable the development of creativity or problem solving as well as quizzes and ways to evaluate students' performance. 2,8 and 2,9 are closer to an exemplary rate in the scale than a strong 2.

Teachers find the resource with minimal errors, and it generates little confusion, in addition to content that is appropriate for the teaching level. For this dimension (content) 2,8 and 2,9 and 2,9 are closer to an exemplary rate.

Focus criteria is the lowest graded –2,5, but even the lowest grade belongs to strong.in the scale position. It is necessary to review the criteria and the qualitative results to improve the resource.

**Figure 9**

*Grades on Technology and Design (Evaluation Rubric Results)*



*Note.* This figure shows the results of the last two dimension presented in the evaluation Rubric. The bars in red represent the grades of each technology criteria and the green bars represent the grades of each design criteria.
The evaluation rubric presents four grades: absent (0), weak (1), strong (2), exemplary (3).
The average for dimension is: 2,86 for technology and 2,93 for design.

3.0 grades in reliability and 2,9 in purpose show that the resource contains different technological options that enable interaction.

Most teachers think that the use of technology favors a personalized and self-controlled experience.

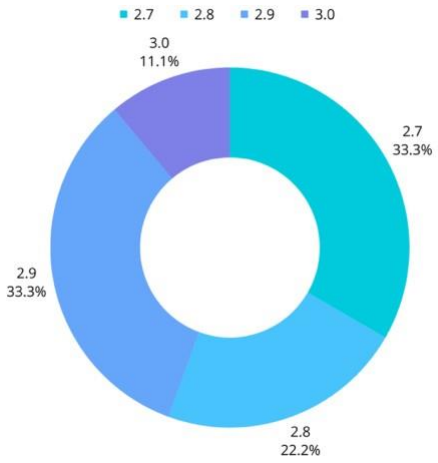
Since accessibility is graded with a 2,7 would be important review how can the resource be improved to provide more options of accessibility to student with cognitive, physical or developmental disabilities.

Likewise, the grades are closer to exemplary than strong, maintaining the evaluation in a high level.

Majority of the teachers find that the design of the resource is clear, the set of its activities motivates, and the resource is easy to access and manage. Two criteria were graded 2,9 and one with 3 being on the scale of exemplary.

**Figure 10**

*Schlange Total Average Results*

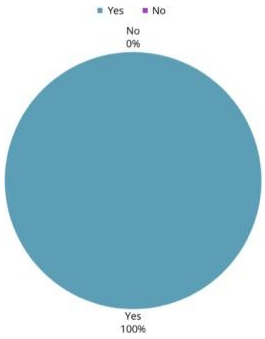



*Note.* This figure shows the average grade of the educational resource per teacher.

The ratings are quite positive. From an individual perspective, only 11.1% of respondents rate the resource 100%. Most reviewers rate the resource 2.7 or 2.9. It is impossible to recognize the causes, which demonstrates the importance of the results of qualitative instruments such as open-close questionnaire. The average rating of the resource is 2,8.

**Figure 11**

*Resource Recommendation Results*



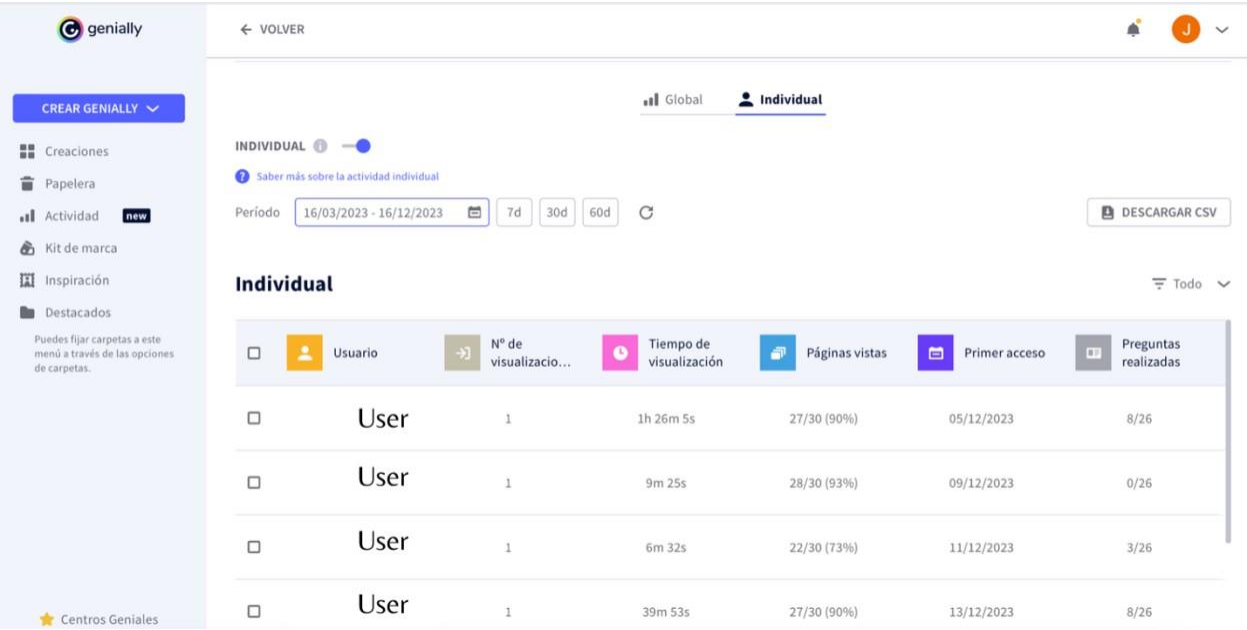

Teachers unanimously recommend the resource without reservation, which instills confidence in the quality and design of the resource.

**Instrument 3 Genially Reports**

Genially, which is the platform on which the interactivity of the resource is programmed, offers its own activity reports –global and individual. The data that can be collected are the username or nickname, dates, and amount of income. Pages viewed and interaction with the platform's own activities and written or closed responses to facilitate teaching monitoring if it is activated.

**Figure 12**

*Genially individual report*

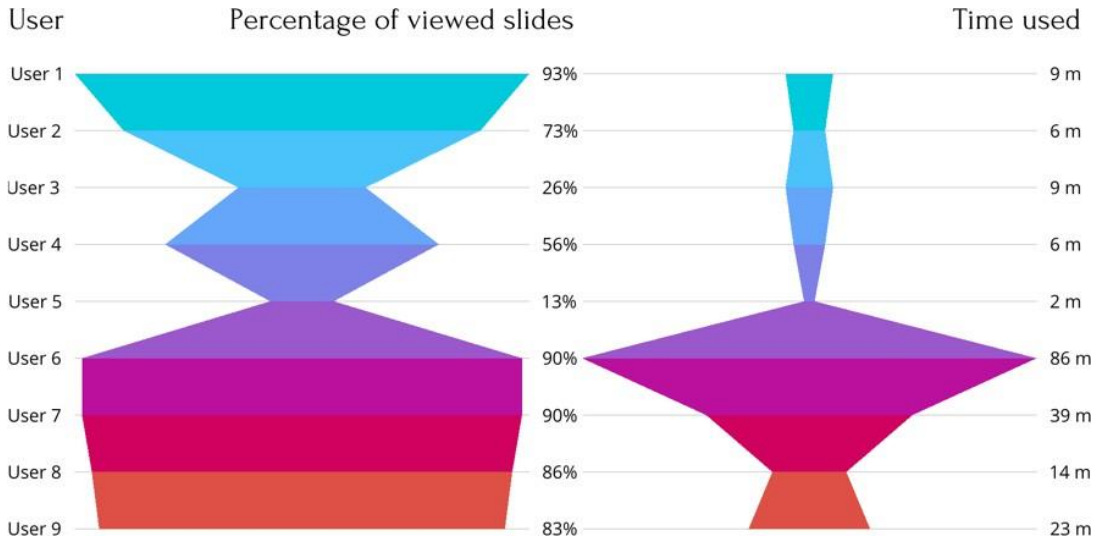



*Note.* This is the administrtor view of Genially Report. There are two options of view: the global, which indicate the general interaction and visits without discrimination, and the individual which reports users and its visits, time of interaction, viewed slides, first access and then all the reports per question and interaction that has being programed through Genially.

From “Julie Herrera, option Actividad,” 2023. Genially Records. https://app.genial.ly/analytics/655c1c6f2572d00011521e4e?analytic_tab=genially_analytics

**Figure 13**

*User percentage of view and time of view*




*Note.* User is the nickname used in this figure; it refers to the 9 teacher evaluators of the resource.

The figure shows each user percentage of viewed slides –in the middle of the figure and the time they spend knowing and interacting with the resource.

7 of 9 evaluators viewed more than 50% of the resource. This result indicates can be trusted because they were able to go through the most of the content and activities.

The result represent the friendly use of the tool and the resource, since most of the teachers needed few time to complete the view of more than 50% of the resource's pages.

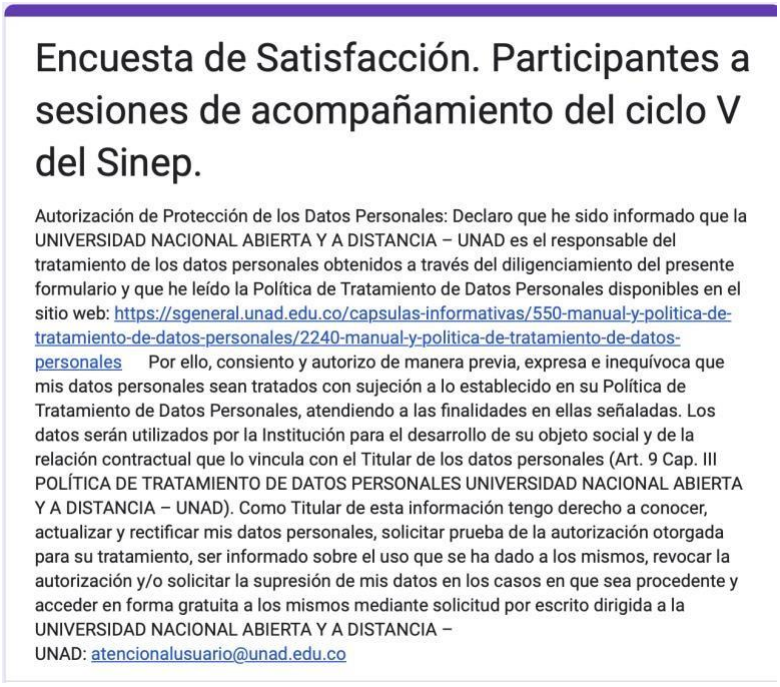
**Instrument 4 Open-Close Questionnaire**

Open-closed questionnaire was designed as an instrument for collecting information from the students who participated in the online sessions in which the teacher used Schlange as a guide and presentation of the topics.

It includes eight closed questions –part of quantitative results, and two open questions – part of the qualitative results.

**Figure 14**

*Open-Close Questionary: Informed Consent*



Encuesta de Satisfacción. Participantes a sesiones de acompañamiento del ciclo V del Sinep.

Autorización de Protección de los Datos Personales: Declaro que he sido informado que la UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA – UNAD es el responsable del tratamiento de los datos personales obtenidos a través del diligenciamiento del presente formulario y que he leído la Política de Tratamiento de Datos Personales disponibles en el sitio web: https://sgeneral.unad.edu.co/capsulas-informativas/550-manual-y-politica-de-tratamiento-de-datos-personales/2240-manual-y-politica-de-tratamiento-de-datos-personales Por ello, consiento y autorizo de manera previa, expresa e inequívoca que mis datos personales sean tratados con sujeción a lo establecido en su Política de Tratamiento de Datos Personales, atendiendo a las finalidades en ellas señaladas. Los datos serán utilizados por la Institución para el desarrollo de su objeto social y de la relación contractual que lo vincula con el Titular de los datos personales (Art. 9 Cap. III POLÍTICA DE TRATAMIENTO DE DATOS PERSONALES UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA – UNAD). Como Titular de esta información tengo derecho a conocer, actualizar y rectificar mis datos personales, solicitar prueba de la autorización otorgada para su tratamiento, ser informado sobre el uso que se ha dado a los mismos, revocar la autorización y/o solicitar la supresión de mis datos en los casos en que sea procedente y acceder en forma gratuita a los mismos mediante solicitud por escrito dirigida a la UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA – UNAD: atencionalusuario@unad.edu.co

**Table 24**

*Questions and Criteria of Open-Close Questionnaire*

| Criteria | Research Question | Item on Survey |
|---|---|---|
| attendance/ permanence | 1 How many accompaniment sessions did you attend?<br>8 Would you like to have more sessions that include additional topics to the course? | 1, 8 |
| Improvement Perceptions | 2 Do you think that the accompaniment session(s) were favorable to your learning process?<br>6 What skills or knowledge helped you strengthen the accompaniment session(s)? Speaking, Reading, Writing, Listening or/and grammar.<br>9 Write briefly. What factors favored student participation during the accompaniment sessions? Open question | 2, 6 and 9 |
| Stimulation / boredom | 3 Do you think the accompaniment session(s) were entertaining?<br>5 What was the most interesting thing about the accompaniment session(s)? Presentation of the information, Exercises, Short story, Audio, The teacher, Final game.<br>7 Complete the statement according to your discretion. The use of digital tools during accompaniment sessions can... motivate students, interest students, facilitate the learning process, create participative environments, create more interaction.<br>10 Write briefly. How specifically did the use of digital tools during the coaching sessions influence your performance and participation? | 3, 5, 7 and 10 |

| Criteria | Research Question | Item on Survey |
|---|---|---|
| Content | 4 Do you think that the accompaniment sessions in their entirety covered the topics of the course? | 4 |

The open-close questionnaire was answered by 4 of 7 attendees of the sessions of the didactic sequency. The quantitative results collected are listed below.

**Figure 15**

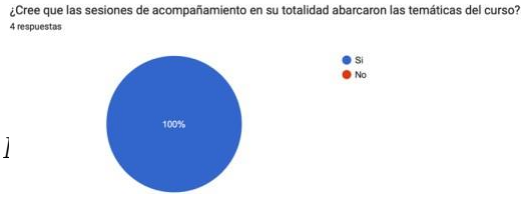
*Attendance / Permanence*


*Note.* The question number 1 –to the left– collect information about the attendance and permanence of the students in online sessions where the educational resource was applied. The question number 8 –to the right– shows if students would like to have more online sessions.

Most of the participants attend to 3 sessions and they would like to have more with other content. It shows they were motivated to assist and stay during this kind of sessions.

**Figure 16**

*Student's knowledge about the Course Syllabus Related to the Session Content*

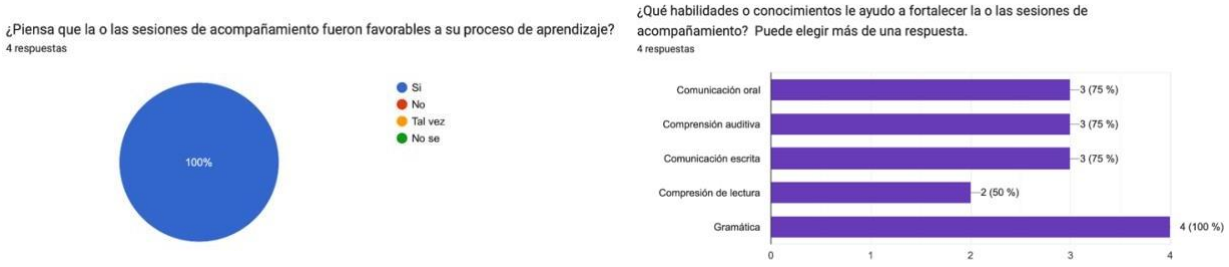



*l*

100% of the participants think that the content is appropriate to the course, it could mean not just the content is appropriate for the level or the expectative they have of the session, but the contents are consistent with the general contents of the course presented in the syllabus.

**Figure 17**

*Improvement perceptions:*

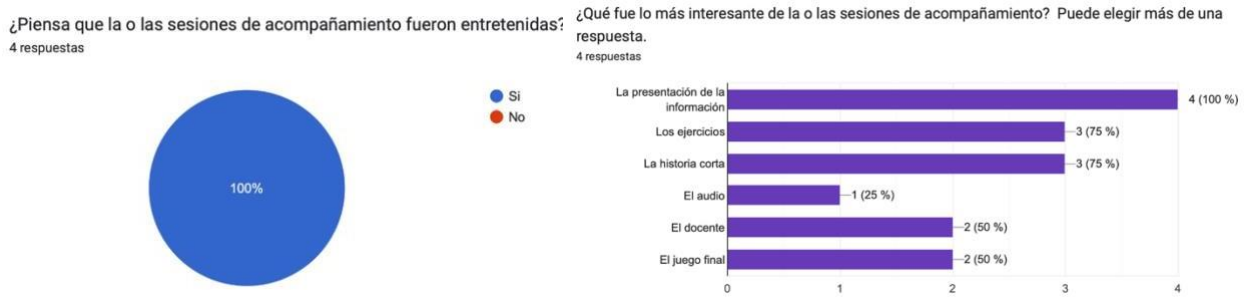



*Note.* The question number 2 –to the left– collect information about what the students think regards the favorability of the session in their learning process. The question number 6 –to the right– shows which skills where improve in the online session.

All students found that the sessions favored their language learning process, having ideas of improvement in terms of grammar. 75% of those surveyed also found that their speaking, listening, and writing improved. Half of the population (50%) has the perception that their reading comprehension improved.

**Figure 18**

*Stimulation / boredom 1*



*Note.* The question number 3 –to the left– collect information about what the students think regards pleasantness of the sessions. The question number 5 –to the right– shows what the students found interesting in the online session.

100% of students found the sessions are entertaining, specifying that the presentation of the information was one of the factors of interest. Likewise, 75% found the exercises and the short story interesting. 50% found the final game and the teacher as interesting factors. On the other hand, just the 25% of the students found the audio interesting.

**Figure 19**

*Stimulation / boredom 2*


*Note.* The question number 7 shows what the students think about the benefits or consequences of the use of digital tools during the online sessions.

100% of the students perceive that the use of digital tools during online sessions motivates and facilitates the student's learning process. Showing the need to continue implementing them in class planning. 75% think that they create an environment of participation and 50% of the students assure that they call the students attention and create greater interaction.

***Qualitative results of instrument 2***

**Table 25**

*Evaluators comments (Evaluation Rubric)*

| User | Comments |
|---|---|
| 1 | In general terms, your resource is clear complete, and appropriate for the aimed learners. The resources created are original and engaged directly with the topic. I would include a title on the first page, with the name of the resource, as well as a page with instructions on how to interact with the resource, you might have users that are newies to technology and would need a little support there. |
| 2 | No comments |
| 3 | The resource exposes a rigorous exercise of the application of the model as well as of the structure of a class applied to the cycle according to the topics. |
| 4 | It is good material, I think it should have more teaching resources and some slides have many images. But it is a good resource, it is clear and easy to access. |
| 5 | Clear and usefull resource, especially designed according to the population it aims. |
| 6 | Very well-done material that is engaging and lovely to use. |
| 7 | It would be helpful if the instructions for the warm-up exercise state how many times one is supposed to spin the wheel and consequently how many stories or ideas one has to write. This little criticism notwithstanding, I consider this material to be of value for any teacher or learner and would recommend it. |
| 8 | All the buttons are in Spanish. It would also be nice to have a little more explanation as what one has to do. The presentation is very good and encourages the student to continue learning. It is a useful tool to study by oneself. |
| 9 | There are two audios that jump immediately to the next screen, therefore not allowing a thorough reading. The design of the material itself, though, is very well-done and invites the student to participate. One can tell that the author of the material has poured her heart into it and has given it her best. Barring the aforementioned snafu, I recommend it. |

*Note.* The user is the evaluator teacher. The comments are taken from the open comments box of the evaluation rubric. The original documents are attached.
Users 1 to 5 represent the sample from UNAD.
Users 6 to 9 represent the samples of languages institutes in Germany.

***Dependent variable***

Considering the Table 22 (teachers and students' role according to each evaluation criteria), the teachers are the ones who are in charge of all of the actions involving instruction, content and design. Technology is the only one in which the role of the student is contemplated.

For its part, in table 23 (teachers and students responsibilities considering the evaluation criteria) shows that students share responsibilities to carry out a good learning process.

Returning to the comments of the teacher evaluators, a dependent variable can be found in the framing –which refers to the construction of a vision that a subject may have about something– teachers have when they are in the evaluation exercise. It is notable how the comments of some teachers have a strong inclination to visualize the deficiencies or benefits from the role of the teacher, while others will direct their comments to the practicality and use of the resource from the responsibility of the student. Consequently, framing is the dependent variable, since we have no control over it, and it can be directed towards the role of the teacher or the student responsibility.

***Independent variable***

Considering that the independent variable is controllable by the researcher, the characteristics of the evaluating professors were investigated, establishing that the UNAD professors share their position as lecture professor, which implies administrative, pedagogical,

and curricular activities of the institution. For their part, international language teachers carry out instructional work –instructors, which is more directed towards pedagogical work applied to the classroom. Thus, their cultural contexts and experiences in teaching English as a foreign language generate different filters that affect the perception and focus of the evaluation. The above is projected in the framing used for the evaluation of the electronic educational resource. Becoming teacher's institutional responsibilities as the independent variable of the research.

***Qualitative results of instrument 4***

**Table 26**

*Students' qualitative results*

| Student | What factors favored student participation during the accompaniment sessions? | how specifically did the use of digital tools during the coaching sessions influence your performance and participation? |
|---|---|---|
| 1 | las sesiones favorecen la creación de materiales, desarrollo de habilidades orales y escritas mejora la experiencia laboral. | el uso de las herramientas digitales es indispensable en el excelente desempeño de las actividades virtuales, ya que motivan a desarrollar e interactuar mientras se aprenden los conceptos. |
| 2 | la docente se aprende los nombres de todos y nos motiva a participar. también, hace trabajos grupales | la profesora manera muy bien las herramientas tecnológicas, todo fue muy visual y atractivo. igualmente, todas las actividades fueron dinámicas. |
| 3 | la motivación presentada por la docente que favorecieron a la interacción entre los participantes | fue una gran ayudo debido a la disponibilidad de tiempo, y el tiempo que se implementa para el desarrollo de la clase. |
| 4 | el horario de sesión y el | mejorando la recepción de la información en |

| | | |
|---|---|---|
| Student | What factors favored student participation during the accompaniment sessions? | how specifically did the use of digital tools during the coaching sessions influence your performance and participation? |
| | acompañamiento. | la aplicación y desarrollo de las actividades. |

The factors that favor students' participation in online sessions include the possibility of interacting with other participants, developing their oral and written skills; other factor is the motivation generated by group work and the teacher as well as the support in their learning process. On the other hand, the digital tools present an influence on students' motivation, interaction, and learning of concepts by energizing the sessions and captivating the student with the various forms of information presentation, causing a sensation of a rapid passage of time.

## Results and Discussion

The research began looking for the validation of an educational electronic resource, nevertheless, the results lead to a realization of the fact that teachers carried the weight of the teaching-learning process, leaving the student with a minimal responsibility when the students' role is reviewed. It is underlined in the results obtained through the qualitative instrument added to the evaluation rubric. Due to this, it is reflected in the framing that just the instructors evaluated the educational electronic resource with a focus on the responsibility of the student.

The resource is designed from and for its use in technological environments, including aspects of the teaching-learning styles which are responding to each of the learning styles by Felder and Silverman. And using aspects from game-based-learning to offer an educational resource that facilitates its use in sessions under teachers control as well as the autonomous way by way of the existence of motivational aspects that technology, interaction, use of games and the different ways of presentation can provide.

Another point to consider is that long distance education implies autonomous learning and through that the role of the student has to be active, it means the student must comply with the majority of the responsibilities in the learning process. In line with the results obtained through the qualitative instrument applied to the students, factors as such as motivation and the interest in the development of their linguistic communicative skills can be promoted using technological tools and the above-mentioned aspects of the anterior paragraph.

The quantitive results themselves indicated an acceptance by the evaluators, keeping in mind the two existing framings which were projected in the unanimous recommendation of the and the high grade of the educational electronical resource. Through this, the results present

themselves as adequate and appropriate for use by the teacher in online sessions as well as autonomous study by the student on his own, which comply with the initial expectations of the investigation.

## Conclusions and Recommendations

The existence and effectiveness of a real learning process implies the active role of the student assuming the responsibilities indicated by his role and understanding that the teaching-learning-process is a fifty-fifty workshare.

Schlange fulfills the requirements of evaluation as an educational electronic resource with the purpose of improving the teaching-learning-process with the promotion of autonomous learning and as a facilitator of the teacher's work.

In the evaluative process of educational resources is it recommendable that the evaluators have different institutional responsibilities. For the purpose of having different points of view from different framings, which guarantees a more complete overview needed in the evaluation.

Further research about the awareness of the students related to their responsibilities in the learning process are recommended in order to complement the results achieved in this research and to find ways to promote and support it

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