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Scaffolding in the development of learning and innovative skills (4Cs): An action research study in a Chilean teacher education program

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ABSTRACT

Situated in an action research study, this investigation describes the impact of scaffolding on the perceptions of preservice teachers of English. An action plan was developed for this group of preservice teachers as they showed concern for some of their communication, critical thinking, creativity and collaboration skills known as learning and innovative skills or 4Cs. The action plan comprised the use of scaffolding as the main means of instruction, which was executed by the design of various evidenced-based scaffolds including group discussions, note-taking, summarizing, comparing, hypothesizing and problem-solving. The group of preservice teachers included 11 students, 4 male and 7 female, aged 20 and 38 of an English education program in a private university in Ñuble, Chile. Data was collected in three main stages using an open-ended questionnaire before, during and after the implementation of the action plan. Findings showed that the use of scaffolding increased participants' perceptions of their overall 4Cs skills, being critical thinking the most salient area of change. It is hoped that English teacher education programs can incorporate scaffolding as a potential instructional method in the development of academic and crucial skills for future teacher generations.

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1. Introduction

Today's rapidly evolving technological landscape has resulted in the incorporation of 21st-century skills into the teacher education programs of various contexts around the globe. From an English language teaching (ELT) perspective, 21st-century skills are pivotal to equip learners with the necessary tools and competencies to succeed in the modern world by using the target language in different contexts (Armstrong & Warlick, 2004). Considering this relevance, a vast amount of research has been conducted on 21st-century skills in English as a foreign language (EFL) contexts during the past five years (e.g. Eryansyah, 2019; Hosseinnia, 2018; Motallebzadeh & Saleh, 2019; Şahin & Han, 2020; Tang, et al. 2022). Beyond 'skills for life' or 'skills for the future', the literature

seems not to point to a universal definition of 21st-century skills; what is known is that these skills emerged from a convergence of factors, namely, knowledge work, thinking tools, digital lifestyles and learning research (Trilling & Fadel, 2009). Today, educational institutions have a regulatory framework for the integration of the 21st century, known as '21st-century student outcomes' put forward by Partnership 21st century skills in 2009. The framework, which takes a rainbow shape, is meant to be used with some critical factors supporting the classification of the skills, including standards, assessments, curriculum and instruction, professional development and learning environments. The skills, on the other hand, are grouped into three categories: i) learning and innovative skills, ii) information, media, and technology skills, and iii) life and career skills (Partnership 21, 2015).

Specifically, this study addresses the category of learning and innovative skills, encompassing communication, critical thinking, creativity and collaboration known as the 4Cs. Based on the literature, these skills are key for thriving in academic and personal life; Saxena (2015) presents the 4Cs as the 'super skills' that "help develop the qualities that students need to possess in the 21st century for success in college, career and citizenship (p.1)". Hence, this action research study focuses on these skills. Furthermore, our study aims to contribute to the limited body of literature on 21st-century skills in EFL teacher education within the Chilean context.

To address the 4Cs and meet participants' needs, this study used scaffolding as the main instructional strategy. Scaffolding is not a novel approach in education; Jerome Bruner, the American cognitive psychologist, pioneered its use in educational contexts. Based on Bruner (1957), scaffolding involves providing temporary support or assistance to learners to help them acquire new skills or knowledge. In the context of education, Bruner's scaffolding approach emphasizes the importance of a knowledgeable teacher or more competent peer providing guidance and support to a learner as they progress through a learning task. Wood et al. (1976) assert that scaffolding is a cognitive support construction that learners adapt to their needs. Research on scaffolding is closely linked to the development of learning and innovative skills; current literature has explored scaffolding and critical thinking (e.g. Brown et al., 2017; Mohammed Qadir & Yousofi, 2021) creativity (e.g. Ivcevic, Hoffmann & McGarry 2022; Sanders, 2006; Sharma & Hannafin, 2005); communication (e.g. Liboiron & Soto, 2006; Nfor, 2020; Rasmussen, 2001) and collaboration (Ertmer & Glazewski, 2015; Griesemer & Shavit, 2023; Hsieh, 2017; Rojas-Drummond & Mercer, 2003).

Although scaffolding has been vastly investigated, especially in ELT contexts, (e.g. Chen, 2020; Choi, et al. 2019; Johnson, 2023; Nasr, et al., 2018; Xu, et al. 2023) its study in teacher education has not been sufficiently covered. The few research studies found (e.g. Bunch & Lang, 2023; Schutz et al., 2019; Sleeter, et al., 2004) were of great use in this action research study, shedding light on how scaffolding provides student teachers with opportunities to enhance their teaching practice. Sleeter et al. (2004), based on critical pedagogy, describe scaffolding as a practical pedagogical tool that not only has an impact on student teachers but also on their learners as scaffolding facilitates teaching and learning, and complex reflexible processes. Bunch & Lang (2023) offer valuable insights from preservice teachers' understanding of scaffolding that point to a useful tool that teachers employ to activate learners' prior knowledge and help dissect the main components of tasks.

Based on this context and preservice teachers' need to improve their learning and innovative skills, an action plan that considered scaffolding as an instructional strategy was designed to strengthen teachers' 21st-century skills. Since this study took place in a teacher education program, the investigation is addressed to the teacher education community to reflect upon student teachers' concerns and explore ways to tackle those situations in a practical way. The leading questions were the following:

General question:

- What are EFL preservice teachers' perceptions of scaffolding in promoting communication, critical thinking, creativity and collaboration?

Subsidiary questions:

- What do EFL preservice teachers know about scaffolding prior to the action plan?
- What are the perceptions of EFL preservice teachers about their communication, critical thinking, creativity and collaboration before, during and after the action plan?
- What are the benefits and difficulties, from the perspective of EFL preservice teachers, of using scaffolding in the classroom?

2. Method

This is a qualitative action research study, grasped as a systematic procedure in tackling real-world issues within educational institutions and classrooms (Creswell, 2015). Since a problem was identified in a university classroom and the instructor aimed to enhance the skills of preservice teachers, action research emerged as the most fitting methodology to address and document the issue. The teacher-researcher, a TESOL instructor, collaborated with three student assistants (hereafter research team). The study involved a cohort of 11 preservice teachers enrolled in an English education program in Ñuble, Chile, comprising 4 females and 7 males, ranging in age from 20 to 38. These participants willingly volunteered to take part in the study and were informed about the anonymous handling of their data. This was clarified in the informed consent provided during the initial stage of the data collection process. It is important to note that both the study and data collection received approval from the Scientific Ethics Committee of the university where the research was conducted.

The problem was identified at the beginning of the first semester of 2023 while the participants were enrolled in the 'Methodology and Didactics of English Language Teaching' module. This issue surfaced during informal classroom discussions, where teacher students expressed concerns about their readiness to foster critical and creative thinking skills in school learners if they had not fully developed these skills themselves. Additionally, the participants reflected on their knowledge gaps and social skills deficits resulting from the remote learning scenario during the Covid-19 pandemic. After listening to the students' challenges, the research team developed an action plan that entailed various methodological actions, which were categorized into six procedures, as summarized in Figure 1.

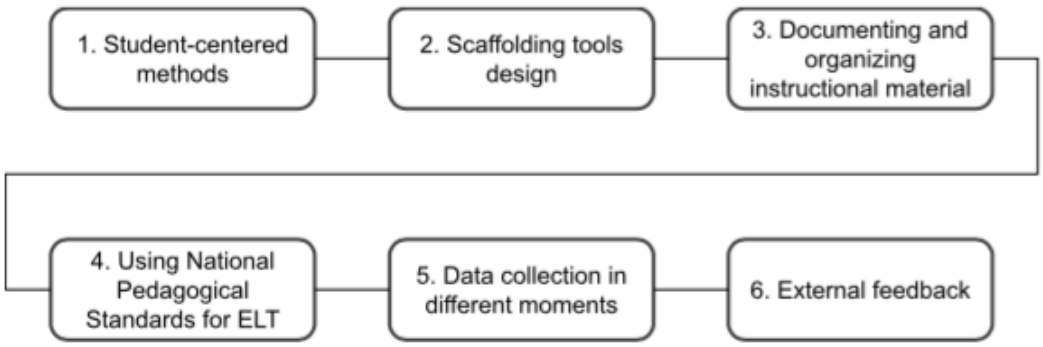
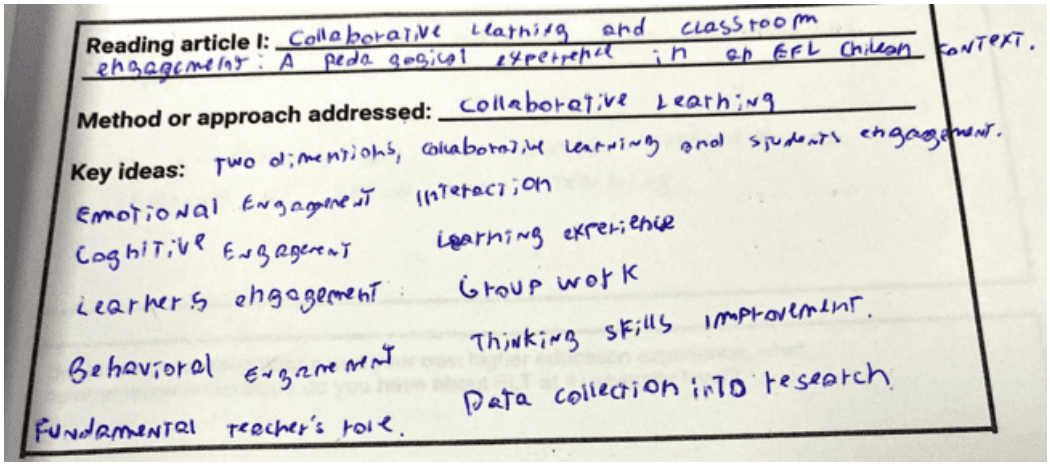


Figure 1. Methodological actions comprised in the action plan

First, the participants needed to experience fully student-centered teaching methods; therefore, lessons were planned including the use of problem-based learning, flipped learning and task-based learning. Second, every lesson would require the completion of evidenced-based scaffolds to promote deep learning. These scaffolds were constructed based on McTighe & Silver's *Teaching for deeper learning: tools to engage students in meaning-making (2020),* which comprised activities such as discussions, note-taking, summarizing, comparing, hypothesizing and problem-solving. All these scaffolds were always used with oral and written instructions on a self-guiding document that would engage participants in the step-by-step process of the outcome sought in every lesson. For instance, if participants were to read study material, they were given a tailored scaffold to complete including questions and information required for the reading (see Figure 2). This approach ensured

that all participants had equal opportunities in the reading process and subsequent discussion of the material.



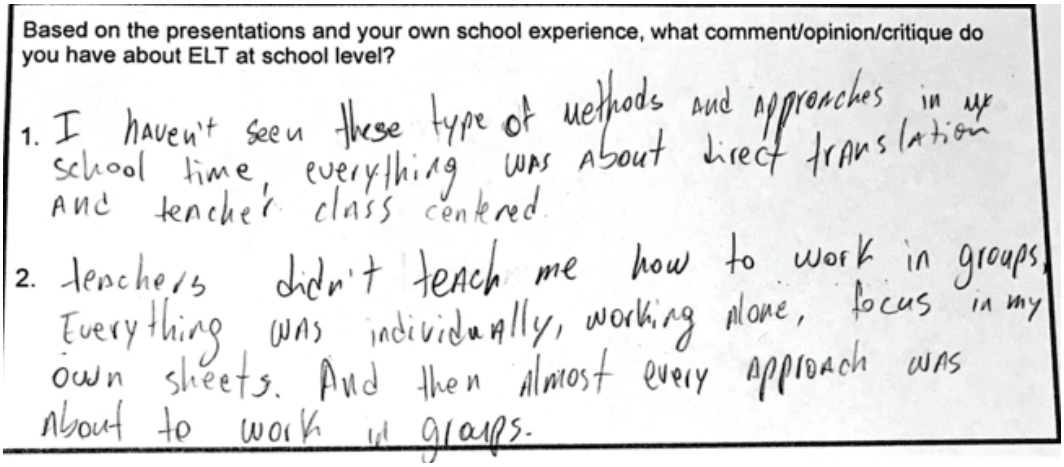


Figure 2. Participants' sample of scaffolds of the action plan

Third, participants were encouraged to document all their work resulting from the provided scaffolds, notes and assessments in a folder. Fourth, the 4Cs would be appraised based on the conceptualization of the Pedagogical Standards for Teachers of English (Mineduc, 2021) as described below; it is worth noting that participants were also presented with this information when data was collected:

-*Communication*: "The teacher of English communicates ideas accurately and effectively, mastering the fourth language skills: listening, speaking, reading and writing. The teachers possess knowledge that allows her/him to present, explain and model abilities and linguistic components of the English language in various contexts" (personal translation based on Mineduc, 2021, p.79)

-*Critical thinking:* "which implies understanding and expressing the meaning or relevance of various experiences, situations, data, events, judgment , agreements, beliefs, norms, procedures or criteria" (personal translation based on Mineduc, 2021, p.13)

-*Creative thinking:* "understood as the one used in the creation or modification of something, introducing new elements to generate new ideas that have the potential to develop or modify something already existing" (personal translation based on Mineduc, 2021, p.13)

-*Collaboration*: "to solve shared problems or tasks through the development of abilities and attitudes that allow the mutual construction of knowledge in a trusting environment of joint collaboration" (personal translation based on Mineduc, 2021, p.13)

Fifth, data collection would take place in three different moments: before, during and after the action plan using an open-ended questionnaire elaborated by the research team, and documenting relevant information in a research journal. Sixth, to ensure rigorous work and procedure, the action plan underwent discussion and refinement based on the feedback of two external academics.

2.1 Data collection and analysis

As previously mentioned, data collection occurred at three distinct points through an electronic questionnaire distributed to participants via their institutional email addresses. These questionnaires were completed during instructional hours to ensure uniform timing and conditions for all participants. The first questionnaire served as a threshold for the study since, up to that point, the research team had only collected informal data through conversations, which was not sufficient to establish a rigorous reference point. Therefore, the initial questionnaire consisted of 5 open-ended questions covering the two leading dimensions of this study: scaffolding and 4Cs. The second stage of data collection occurred after six weeks of implementation using scaffolding and was very similar to the initial questionnaire as the research team wanted to focus on the progress or possible changes from the perceptions of the participants. The third questionnaire was different as it sought to unpack the impact of scaffolding on 4Cs and participants' future teaching practice specifically. From these three questionnaires, the research team obtained a data corpus that underwent thematic analysis. The three questionnaires were initially managed separately; participants' answers were organized on a spreadsheet and were coded using colors whenever themes emerged. This process was repeated in each questionnaire. Afterwards, codes and themes were arranged onto another spreadsheet that comprised the three moments of data collection. This process allowed the research team to identify the changes from the perception of the participants. The research team determined to present the results showing the contrast of participants' perceptions per each skill of the 4Cs, using graphs and direct quotes from the participants as presented in the following section.

3. Results

The findings described in this study stem from data collected at three different moments of the action plan that involved two leading dimensions, namely, scaffolding the 4Cs. Therefore, prior to the implementation of the action plan, and by means of the initial questionnaire, it was of utmost importance to explore participants' perceptions on each of the dimensions. In terms of scaffolding, it was possible to establish that all the participants either did not know or did not remember about scaffolding, even when including the concept in their first language.

Regarding the 4Cs, it was possible to determine that participants, in general, showed confidence and preparation in their creative thinking and collaborative work. Nevertheless, in the areas of communication and critical thinking, participants' responses revealed less preparation. These initial results match learners' comments gathered in informal conversation and served to determine their progress during the action plan.

The second stage of data collection indicates an increase in all the 4Cs, including the areas of concern. To illustrate this progress, each area is presented separately.

3.1 Communication

It is worth pointing out that during the implementation of the action plan, and with the various scaffolding activities participants' disposition to learning changed favorably. As each assignment required the use of tailored scaffolds, participants seemed to enjoy engaging in the activities. Participants' perceptions of their communication skills were coded using the labels: *prepared*, *partially prepared*, *more or less prepared*, and *not prepared*. As seen in Figure 3, participants' evaluation of their communicative skills was lower compared to the perceptions they had during the implementation of scaffolded activities. Participants' answers during the action plan resulted in three

labels in which the majority of the participants stated to have developed their communication skills. Participants commented that the action plan helped them to express themselves effectively. For instance, in the participants' words:

> "I think that they [scaffolds] have helped me in communicating effectively because of the emphasis placed on expositions, debates and communication instances" (Participant 1)
>
> "The round table discussions have been good to talk about different topics which have helped to an better communication" (Participant 2)
>
> "...these tools [scaffolds] have been of great help at the moment of sharing our answers with our classmates" (Participant 5)
>
> "I think that all the scaffolds have helped me to develop my communication because they are all very practical. In some of them I have to write my ideas, in others we have to write our points of view, improving my written communication. This has helped me in keeping my ideas organized" (Participant 10).

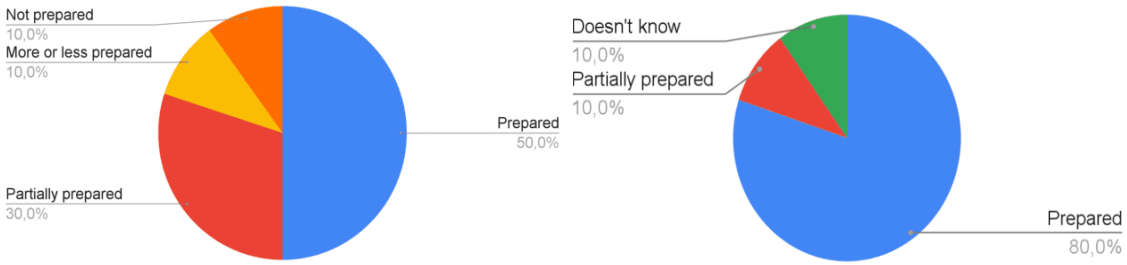


Figure 3. Participants' perceptions of communication skills before and during the action plan.

3. 2 Critical thinking

In addition to communication, critical thinking was another skill of concern for participants. The initial questionnaire yielded a lack of preparation as most of the participants claimed to be partially prepared in terms of critical thinking. Compared to the questionnaire administered during the action plan, it was possible to establish a significant change in participants' perceptions towards their critical thinking skills. Figure 4, displays this contrast, in which 91 % of the participants claimed to be prepared for this skill. In this sense, participants explained the following:

> "i'm sure that the scaffolds given in the exercises of case study and providing an opinion/critique helped me improve my critical thinking skills" (Participant 6).
>
> "...I remember that in one activity we had to write questions for the author and to the teacher about a text we were reading, and that was new for me and it was an opportunity for questioning and making comments about it [the text]" (Participant 7)

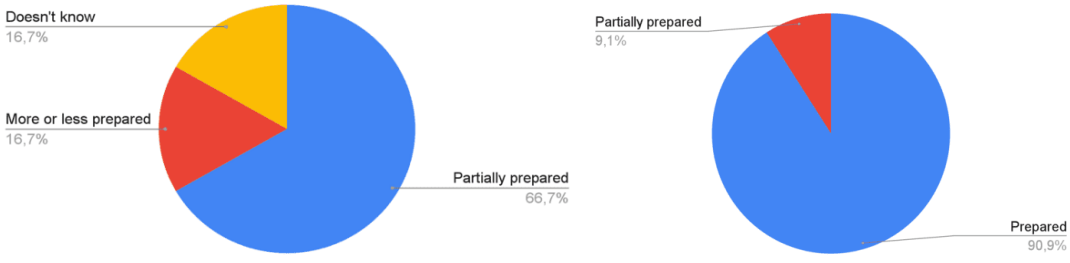


Figure 4. Participants' critical thinking skills before and during the action plan

3. 3 Creative Thinking

While creative thinking was not initially identified as a critical skill requiring attention, participants' initial assessments were categorized into three main groups: *prepared* (66, 7%), *partially prepared*, (11, 1%) and *not prepared* (22,2%). As seen in Figure 5, during the action plan, participants' appreciation towards their creative thinking skills increased from 66,7 to 90,9% of preparedness. Some of the comments of the participants stated the following:

> "i believe that they [scaffolds] have provided a significant contribution because although they are guiding tools, at the same time they makes us think, and start elaborating new ideas in a creative way as it is needed" (Participant 1).
>
> "yeah, the participation in hypothetical situations has helped me to develop my creative thinking because I have to think in activities for these contexts" (Participant 2)
>
> "yes, this is the area in which I struggle the most, but these tools really challenged me to think 'out of the box'" (Participant 10).

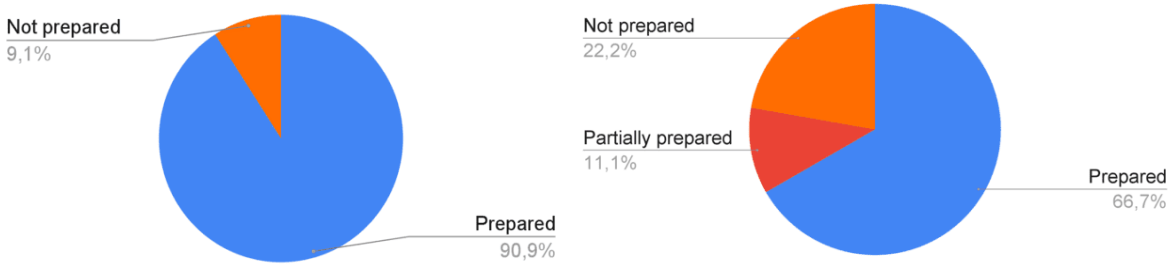


Figure 5. Participants' creative thinking skills before and during the action plan

3. 4 Collaborative work

Collaborative work was another aspect that did not appear to be a significant concern during informal conversations among the participants. However, in the initial stage of data collection, several participants expressed that they were not fully prepared in this regard (see Figure 6). Some participants provided explanations, stating:

> "in this aspect [collaborative work] i'm not really prepared because not many times i have had to work on something like this [constructing knowledge together]..."(Participant 8),
>
> "honestly, collaborative work is something hard for me because I am a little stubborn and it is also difficult to delegate work" (Participant 9).

During the action plan, all the participants showed full preparedness in their collaborative skills.

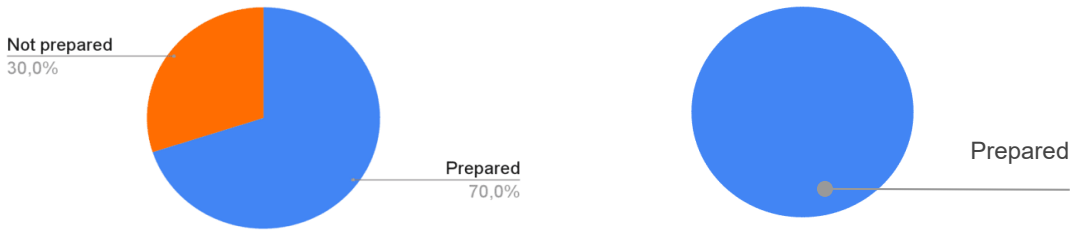


Figure 6. Participants' perceptions of their collaborative skills before and during the action plan

3.5 Scaffolding and the 4Cs

Participants' perceptions of scaffolding in the development of the 4Cs were favorable as all the participants showed satisfaction with the various scaffolding tools used throughout the action plan. As seen in Figure 7, most of the participants maintained that critical thinking, 31,6%, and creative thinking 26,3%, were the skills that they developed the most during the implementation of the action plan. In this respect, some comments are presented below:

> "critical thinking mainly because there were many instances for reflection and analysis where i used this skill to reflect about teaching" (Participant 1)
>
> "to develop my creative and critical thinking, scaffolding was what helped me the most…. the latest activity, assessment tools, has helped me think 'out of the box' and judge what i should use and what not… these type of skills will be highly useful in teaching" (Participant 3)
>
> "i think that communication and critical thinking were the abilities that i developed the most, and the scaffolding activities like group conversations and discussions helped to find other strategies for studying and in that way i felt more confident" (Participant 8)
>
> "I think that creative and critical thinking because I had that skill gap from the beginning. Every lesson, each scaffold helped me develop these skills…" (Participant 9)

Figure 7. Scaffolding in the development of the 4Cs based on participants' perceptions

In terms of the procedural aspects that allowed the participants to develop their 4Cs, the research team identified three themes, being the most salient *organization*. The participants expressed that all the actions embedded in the action plan (e.g. classroom arrangement, activities, assignments, instructional material and teaching methods) required a systematic organization. Seemingly, participants also valued having scaffolded activities with written guidelines, steps and checklists. For instance, in the participants' words:

> "it [the intervention] helped me out to organize my studies and also have an organization in my readings and documents because i keep them in my folder" (Participant 7)
>
> "it was new and surprising for me to see such detail instructions provided by Teacher J because at least i had never seen activities explained in that way…. this has had an impact on my mental organization, meaning that now I follow the instructions point by point which is something important to do well" (Participant 11)

Another theme connected to the organization was *autonomy*. Participants' answers reveal that during the action plan, they gained autonomy as many of the instructional activities were explained extensively, allowing them to make progress at their own pace. It also seems that the novel

component of the action plan and its methodological approach contributed to the positive appreciation of preservice teachers as they expressed that:

> "they [scaffolds] made a difference, since they promoted self-learning in a module, and this is also the first time that in one class 21st century skills are developed in such a short time and in such effective way…" (Participant 1)

> "...scaffolds have turned out to be very interesting, there are more instances to work step by step different contents. it is very meaningful and different from our normal classes… this class involved creativity, investigation and autonomy which are very important…" (Participant 6)

A third theme that seems to have contributed to participants' perceptions in their development of the 4Cs using scaffolding was *feedback*. Participants' comments in this theme underscore: the moments their activities were corrected, the help the instructor provided, and the feedback provided prior and after the assessments.

In terms of the difficulties that participants faced during the implementation of the action plan, all the participants stated that the scaffolds did not pose further challenges for them. Given the frequency and numerous tools that participants received, just 1 participant added that although the scaffold materials were not complex to tackle, some of them could turn 'complex' as they required more development and lots of thinking.

3.6 Scaffolding in the classroom

Although all participants' responses reveal benefits for using scaffolding in their EFL classes, they signaled different reasons. Some of these reasons were grouped under the same category as shown in Figure 8. The category that comprises most of the reasons was named *Facilitate learning* as the participants expressed that they would use scaffolding to leverage mixed-ability groups and to provide equal learning opportunities for all learners. Based on our participants' answers, it was possible to establish that they see scaffolding as a useful tool for making sustained progress in the classroom. The most frequent reason is portrayed as *4Cs/21st century skills* since participants commented that they would use scaffolding to specifically focus on these skills that help learners in their studies and life. *Organization and guided learning* was the third most frequent reason, for participants believe that scaffolding can be key in providing organization and learning success.

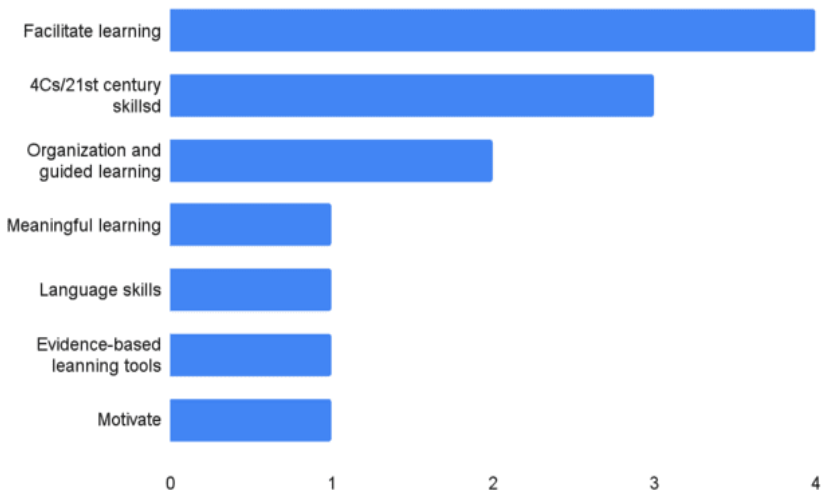


Figure 8. Participants' reasons for using scaffolding in the EFL classroom

4. Discussion

This study has addressed an education issue that emerged from the concern of EFL preservice teachers. The findings of this study reveal that, from the perspective of a group of preservice teachers, they did not feel fully prepared in terms of their learning and innovative skills. After implementing an action plan based on a number of methodological procedures in which scaffolding was the main instructional approach, participants' perceptions showed more satisfaction in the development of their 4Cs. In particular, participants expressed more consolidation in the areas of critical and creative thinking. This, to some extent, can be explained by the nature and quantity of scaffolds designed for developing these skills. Counting the number of scaffolds that would contribute to the development of each of the 4Cs was out of our scope. Therefore, future studies may consider this to minimize bias. Despite the marked development in critical and creative thinking, it has to be noted that participants' perceptions increased in all the 4Cs as they declared to be more prepared after their scaffolded-based instruction. These results match the benefits of scaffolding addressed in the literature not only to promote learning and innovation skills (Griesemer & Shavit, 2023; Hsieh, 2017; Ivcevic, Hoffmann & McGarry 2022; Mohammed Qadir & Yousofi, 2021; Rasmussen, 2001) but also to provide student teachers experiential learning as addressed by Awadelkarim (2021) Participants' favorable views toward scaffolding align with their intentions to incorporate scaffolds into their future teaching practices

A finding that turned out to be surprising was the fact that none of the participants declared to know what scaffolding is prior to the implementation of the action plan. Considering that scaffolding is a well-established teaching strategy, it raises concerns that future teacher generations are not familiar with this type of inherent processes in English language teaching. It also calls to our attention the fact that participants had appreciated and benefited from detailed oral and written instructions in their instructional material. This finding serves as a warning regarding methodological and didactic knowledge that instructors and teachers programs should heed. While student teachers are adults, they are still learners who require quality practices and models to take to their future classrooms.

5. Conclusion

This study has established that scaffolding used as a primary instructional strategy significantly enhanced the perception of EFL preservice teachers regarding their learning and innovative skills, particularly in critical and creative thinking. These student teachers hold highly positive views about the regular use of scaffolding, considering it a valuable tool they intend to incorporate into their teaching practice. Likewise, it is important to highlight that through research and action, the research team recognized the potential of methodological changes to empower teacher candidates, not only in the attainment of language skills but life skills acquisition.

This study faced some limitations that future researchers and practitioners may consider. Designing instructional materials and documenting participants' information lesson by lesson was time-consuming and required a team of researchers. Additionally, handling a large data corpus was challenging; future research may explore alternative data collection techniques.

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Declarations

Author contribution : The first author was responsible for the design and implementation of the entire action research study. She also led the writing of the manuscript, data collection and analysis processes. The second, third and fourth author participated in the data collection and transcription as well as text revision. The completed manuscript was accepted by four authors.

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Conflict of interest : The authors declare no conflict of interest.

Ethics declaration : We as authors declare that this work has been written based on ethical research that conforms with the regulations of Universidad Adventista de Chile, and that we have obtained permission from the relevant institute when collecting data. We support English Language Teaching Educational Journal (ELTEJ) in maintaining high standards of personal conduct, practicing honesty in all our professional practices and endeavors.

Additional information : No additional information is available for this paper.

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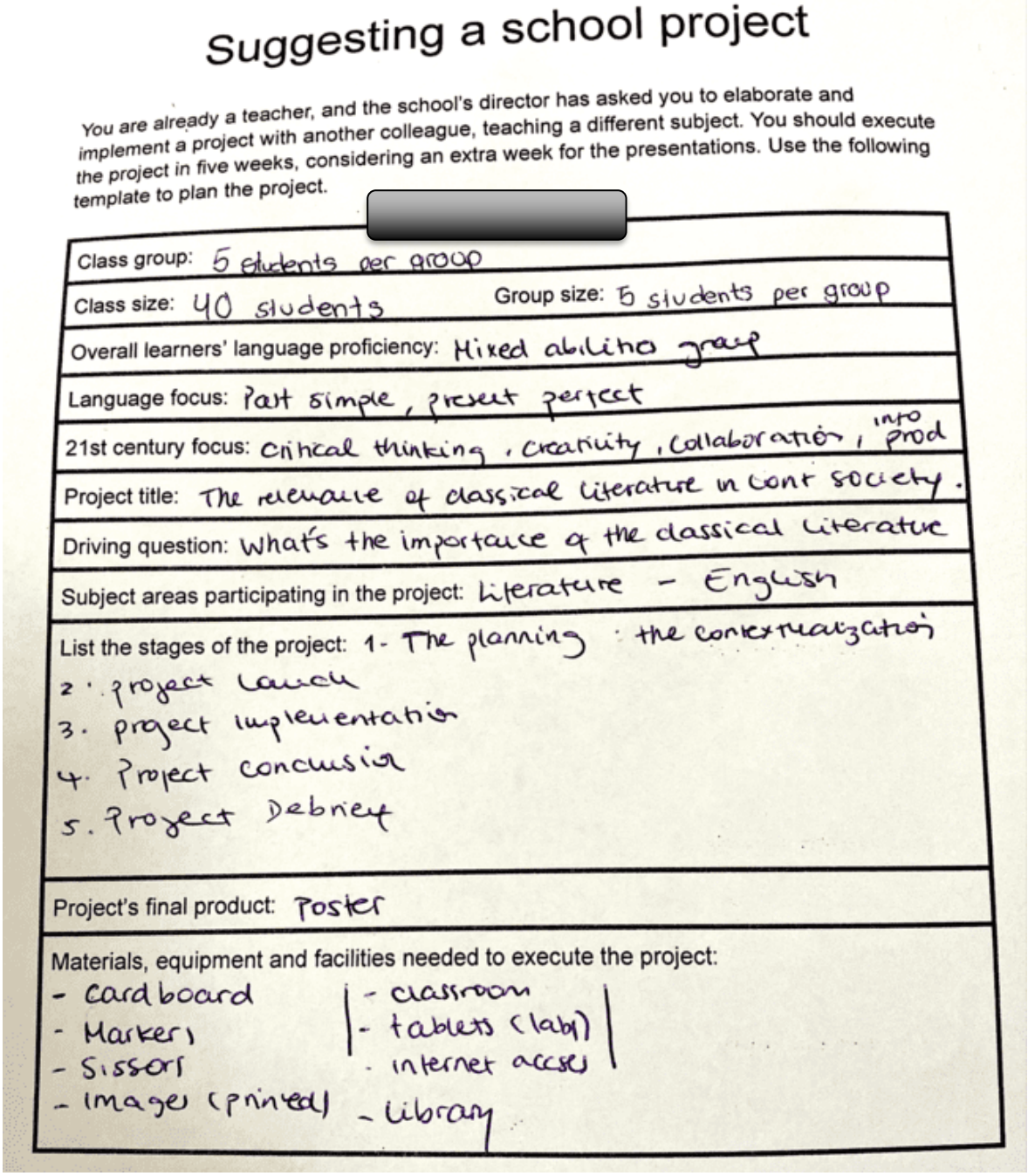
Appendix

Participants' sample completion of scaffolds



Suggesting a school project

You are already a teacher, and the school's director has asked you to elaborate and implement a project with another colleague, teaching a different subject. You should execute the project in five weeks, considering an extra week for the presentations. Use the following template to plan the project.

Class group: 5 students per group

Class size: 40 students Group size: 5 students per group

Overall learners' language proficiency: Mixed abilities group

Language focus: Past simple, present perfect

21st century focus: Critical thinking, Creativity, Collaboration, into prod

Project title: The relevance of classical literature in cont society.

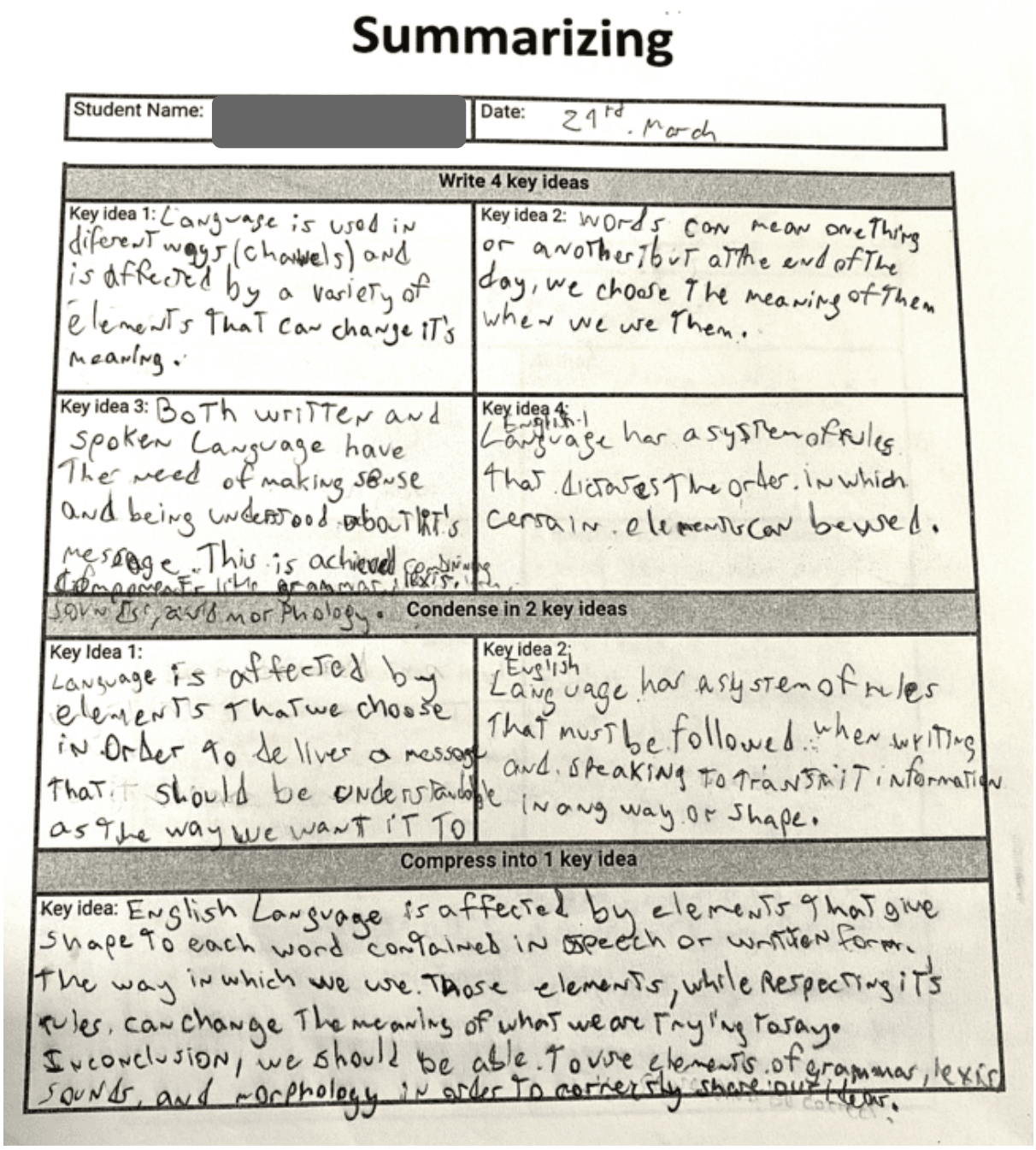
Driving question: What's the importance of the classical literature

Subject areas participating in the project: Literature - English

List the stages of the project: 1- The planning : the contextualization
2. project launch
3. project implementation
4. Project conclusion
5. Project Debrief

Project's final product: Poster

Materials, equipment and facilities needed to execute the project:
- cardboard
- Markers
- Sissors
- Images (printed)
- classroom
- tablets (lab)
- internet access
- Library



Summarizing

Student Name: [redacted] Date: 21rd. March

Write 4 key ideas

Key idea 1: Language is used in diferent ways (channels) and is affected by a variety of elements that can change it's meaning.

Key idea 2: words can mean one thing or another, but at the end of the day, we choose the meaning of them when we use them.

Key idea 3: Both written and spoken Language have the need of making sense and being understood about it's message. This is achieved combining elements of the grammar, lexis, sounds, and morphology.

Key idea 4: English Language has a system of rules that dictates the order in which certain elements can be used.

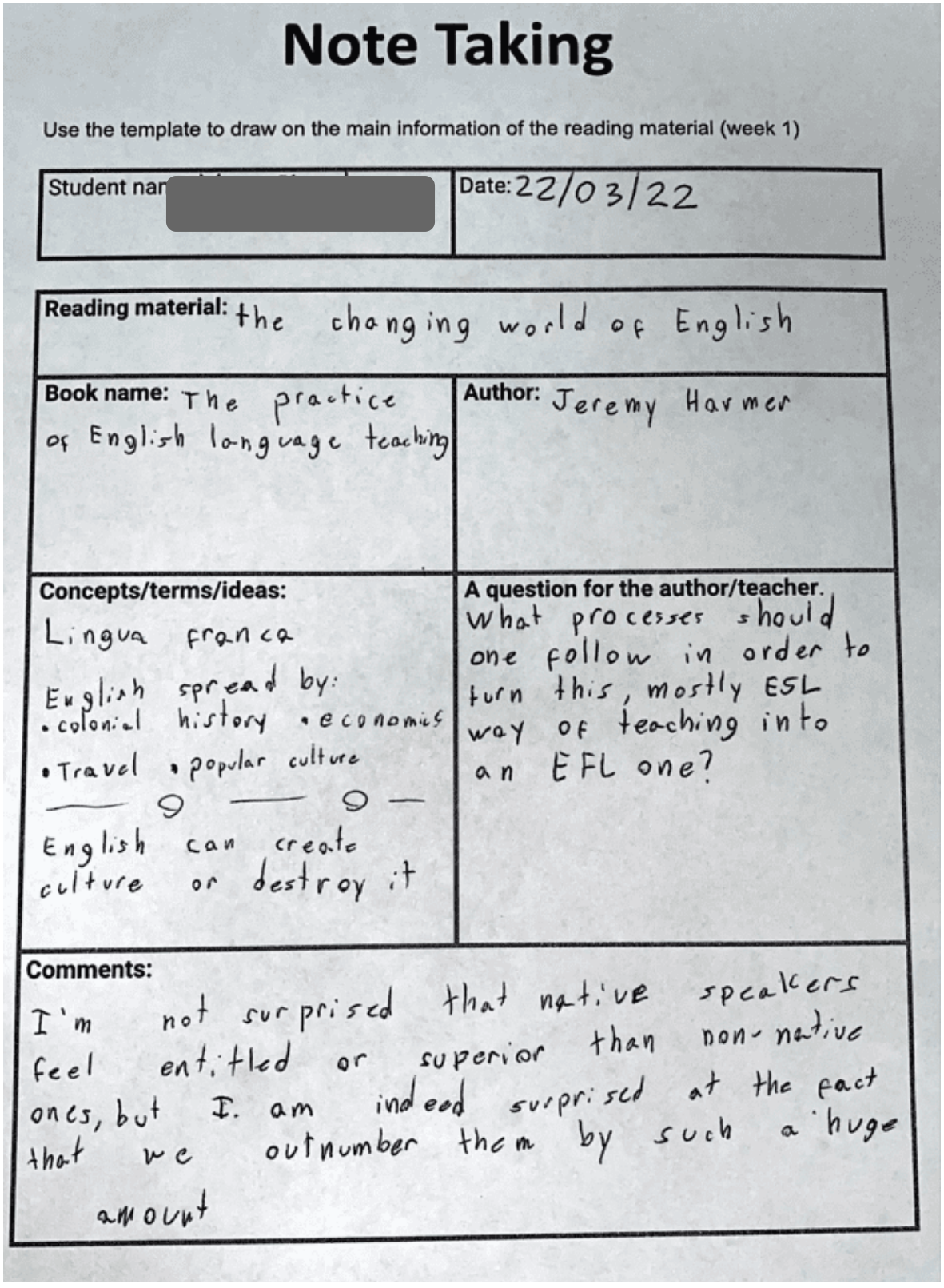
Condense in 2 key ideas

Key Idea 1: Language is affected by elements that we choose in order to deliver a message that it should be understandable as the way we want it to

Key idea 2: English Language has a system of rules that must be followed when writing and speaking to transmit information in any way or shape.

Compress into 1 key idea

Key idea: English Language is affected by elements that give shape to each word contained in speech or written form. The way in which we use those elements, while respecting it's rules, can change the meaning of what we are trying to say. In conclusion, we should be able to use elements of grammar, lexis, sounds, and morphology in order to correctly share our ideas.



Note Taking

Use the template to draw on the main information of the reading material (week 1)

Student nar [redacted]	Date: 22/03/22

Reading material: the changing world of English

Book name: The practice of English language teaching	**Author:** Jeremy Harmer

Concepts/terms/ideas:	**A question for the author/teacher.**
Lingua franca English spread by: • colonial history • economics • Travel • popular culture English can create culture or destroy it	What processes should one follow in order to turn this, mostly ESL way of teaching into an EFL one?

Comments:

I'm not surprised that native speakers feel entitled or superior than non-native ones, but I. am indeed surprised at the fact that we outnumber them by such a huge amount