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A Task-based learning application in Higher Education, for future teachers of primary and preschool education

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Abstract. Task-based learning is a technique often applied in language classes to enhance language acquisition in learners. We show that the same method has several benefits when applied to other subject of learning, having a very formative component by being a student-centered technique. The present study was conducted with high education undergraduate students studying didactics of mathematics, in the program that prepares teachers for primary and kindergarten education. By conducting various tasks, students have perceived the importance of the subject, have constructed applications that can be used in the teaching activity and have discussed which teaching methods are best applied in the topics that are taught in primary and preschool education. The finds show that tasks are enjoyable, well perceived by students, engaged multiple emotions and developed much needed skills for a 21st century teacher. In addition, by working in groups, discussing the best way to conduct tasks, motivation can be boosted and support the learning processes.

Keywords. homework, task-based learning, student-centered learning

Introduction

In every culture and as much back as we, as humans, can remember, learning was always done by teaching a material and preparing some form of homework. As early as the Sumerians, wrote on clay tablets, that survived to this day, learners had to conduct some kind of homework to understand and repeat the concepts, notions, and techniques that they had to learn.

This practice had such a positive action on learning that all the teachers kept it for millennia. By conducting a task at home, students practice what they learned in class, and is believed that improved performance. The literature on the subject is somehow contradictory, thus scientists are still conducting research on the benefits of homework in relationship with the act of learning and



developing new abilities. A study in this sense finds that “pupils belonging to the upper part of the socioeconomic scale perform better when homework is given, whereas pupils from the lowest part are unaffected. At the same time more disadvantaged children get less help from their parents with their homework. Homework can therefore amplify existing inequalities through complementarities with home inputs.” (Rønning, 2011).

Another study on 140 undergraduate students finds that conducting “homework benefits and supported students’ learning although it had some psychological impacts on their learning and affected their free time management.” (Songsirisak & Jitpranee, 2018)

More studies have shown the benefits of homework have been conducted for many years. Some of these studies say that homework help students to develop study skills and enhance the performance of learning (Muijs & Reynolds, 2011), others focuses on the self-regulatory behaviors of the students, and building motivation for learning, in addition to development of cognitive and metacognitive skills (Ramdass & Zimmerman, 2011). The study conducted by Bembenutty and White (2013) suggests that the use of homework logs serves as an important educational tool that educators can use to enhance their students' self-regulation of learning and motivation.

So, there are two ways of thinking about assignments being conducted at home. In our country, there were a series of experiments evolving school without homework and the studies show that the students that had self-discipline kept doing some kind of work at home and got better or same grades and the ones that didn’t conduct any extra work had difficulties in maintaining the same grades as before the experiment had begun.

Studies also show that the homework can be stressful and can lead to anxiety for many students, although it has many benefits on the learning process. (Institute of Education Sciences, 2017)

Educating the next generation preschool and primary school teachers, we need some kind of work to be done so our students can practice what they learned before heading into the workplace. We’ve constructed a series of tasks which were carried out in groups, which mapped the hole curriculum and made students interested in the material by applying it. Thus, the task-based learning method had been used in a different environment than the one of learning languages. By carrying out the tasks, students have constructed a series of materials/products which will be helpful in their career, and they also had to read the lectures, thus improving the learning process.

Although, the method we have developed is often used in learning languages, it can be especially useful in other domains as well, as it will be proven in the following research.

1. Task-based learning. Presentation and literature review

In the manual of Learner-Centered Teaching Manual (Harakchiyska & Pessoa, 2018), the task-oriented learning (TBL) is presented as an active method of teaching, often used in languages classes.

Long gives a definition of the task as follows „A task is a piece of work undertaken for oneself or for others, freely or for some reward. Thus, examples of tasks include painting a fence, dressing a child, filling out a form, buying a pair of shoes, making an airline reservation, borrowing a library book, etc. In other words, by „task“ is meant the hundred and one things people do in everyday life, at work, at play and in between” (Long, 1985) Keeping in mind this definition, a task in education can be writing a paper, constructing an example, presenting some finds,



conducting a role play or everything in between. So why is the task-oriented learning only referred to in learning languages? Can we use it in other contexts? Studies show that we can.

The main principle of TBL is to put students in situations that resembles to the authentic real-life ones and confront them with idea that they must come up with a plan to manage that kind of situation. Being developed for languages studies, the situations discussed in the literature are of course language challenges, but language challenges can be found in other studies. Future teachers that are afraid of speaking in public, having to prepare a speeches and lessons, producing a solution to an unexpected situation in the classroom, these are all language challenge in the mother tongue. So TBL can be adapted to help with this kind of issues.

These are shown also in numerous studies, which states that using TBL has been used to improve students' critical thinking disposition after completion of the task-based learning model in chemistry experiment teaching. (Zhou, et al., 2013)

Jane Willis lay down the foundation of TBL and defined the types of tasks that could be used during the method. (1996) She indicated six types of tasks as follows

1. *Listing*. By listing, learners tend to generate new ideas and draft a mind map of the concepts are learning about. Of course, listing is present in all the classes and subjects that are taught in formal education and usually involve processes like brainstorming and asking and answering questions. Even working in groups to find an answer or to complete an assignment often implies talking, listening, and exchanging ideas.

2. *Ordering and sorting*. This task involves classifying items in diverse ways, categorizing them in groups, ranking them on specific criteria and sequencing them in a logical or chronological way. It's easy to see, that isn't a task that is only used in languages learning but could be well adapted to other subject as well, because we can find many applications of ordering and classification in education sciences, for example, where methods and techniques are classified and sorted in various ways depending on the subject at hand.

3. *Comparing*. Willis (1996, p. 27) refers to perform a comparison between information of similar nature from different sources and identify the common point and differences. By her acceptance, the processes involved in these tasks are matching to identify specific points and relate them to each other, finding similarities and the differences between to sources of information. These tasks are often used in producing research papers, where students are required to find sources of information in books, on the internet, in articles and they must decide which one is more reliable and worth mentioning. So, this too is a task which do not necessarily refers to the study of languages alone but is suitable for all types of subjects where students conduct research on their own and present the findings.

4. *Problem solving*. These types of tasks involve intellectual and reasoning processes and are more challenging as they engage more skills and are often more complex. As students are given a real-life problem, they must formulate the hypotheses, describe the experiments, compare alternatives, and evaluate the finds. As problem solving tasks are used in various subject, as mathematics, physics, chemistry, social studies and many more, this task can also be applied in other subjects. Studies have shown that students are very motivated to solve real-life problems that can relate and refer to project-based learning models. (Ikhsan, 2020) Moreover, social problem-solving ability is important in the adjustment of the university student body and, beyond



influencing student adjustment in academic contexts, it could also provide tools for various situations in students' daily life. (Fuente, et al., 2023)

5. *Sharing individual experiences.* Encouraging students to talk about themselves and share their experiences leads to also express feelings on the subject in discussion and the emotions can enhance the learning process because learners can remember the feelings and emotions and the context in which they had experiences them. Here, it is worth mentioning that cognitive imbalance is a well know factor of strong emotions that can lead to learning experience (Zeigarnik, 1938). Other studies have proposed that in science learning, students' academic emotions will change with the learning process, and they will acquire knowledge with their movement in the quadrant and spiral up along the knowledge axis. (Kort, et al., 2001) The task is also applicable to many subjects of learning and can be well speculated by a gifted teacher. So, learning can be very well linked to emotional imbalance or cognitive imbalance that will be resolved by gaining knowledge or skills.

6. *Creative tasks.* Are often perceived as projects, and involve a team effort, by organizations, planning, getting the task done and presenting the final product. These tasks are combining the other tasks we already discussed and, often, use a range of skills that are transferred form other than subject of study, for example, music, art, literature, or digital skills. There for they are suited for various type of studies and can be well adapted to social studies, mathematics, sciences, history, or languages.

The methodology of applying TBL following the tree main phases: pre-task, task-cycle, and post-task.

As Jane Willis (cited in Harakchiyska & Pessoa, 2018) suggests, in the pre-task stage the teacher presents his/her expectations in the next stage. So here could be defined the objectives of the task, the focus, or the relevance for the learners. In this stage, the traditional theory includes a task preparation stage, in which the learners perform a series of exercises, discuss implications of the task or are given indications on how to conduct the task.

The task-cycle is the stage in which the students produce/perform/present their task. This stage could be performed in the classroom or at home, depending on the nature of the task. For example, if the task in hand is a role play it will be conducted in the classroom, but if the task given is to construct something using the source material given by the teacher and some other materials not found in the classroom, then the task will be conducted at home and will be presented in the next meeting.

This stage has tree components in the literature:

- the completion of the task, by working individually, in pairs or in small groups to achieve a goal;
- the planning component that involves the construction of a report or a presentation that maximizes the learning opportunities;
- the report or the presentation of the finds in front of the class where a discussion takes place.

The last stage is the post-task in which feedback, or an evaluation can be made. The teacher can discuss the realization of the task, suggest improvement, and correct some learning errors. Also, learners can reflect upon task realization and discuss the relevance of the task, whether they enjoyed doing it and receive peer suggestions, as well.



Being student-oriented learning method have been wildly adapted in the last years, regarded as “a wealth of pedagogical, cognitive, communicative, comprehension-oriented, and other opportunities” for learning. (Neubrand, et al., 2013) Based on Neubrand et al. vision or the task-based learning process, Müller and Brown structured the learning process as in figure 1.

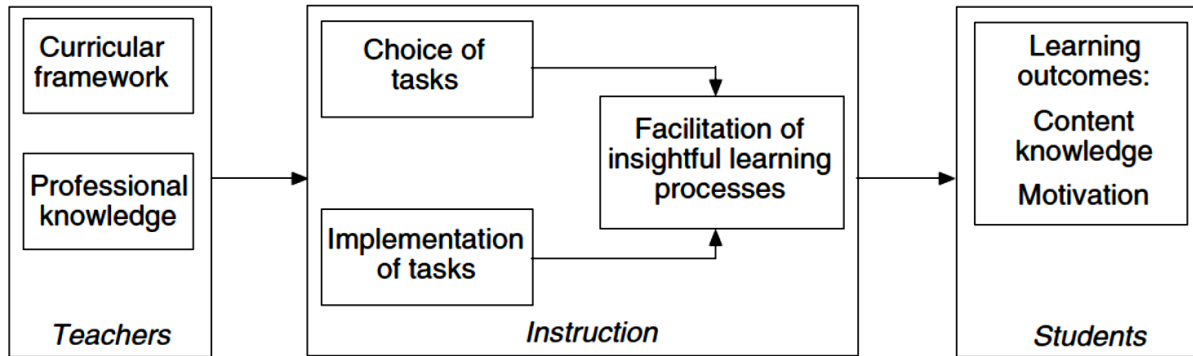


Figure 1: Tasks as the basis of opportunity structures for insightful learning processes (Müller & Brown, 2022)

As it is shown above, all the tasks theorized by Willis are well suited for other types of subjects. In fact, multiple studies have been conducted with TBL application on sciences. (Khalaf & Altea, 2022) (Zhou, Huang, & Tian, 2013) (Müller & Brown, 2022) (Tekkumru-Kisa, et al., 2020) (Silver & Herbst, 2007)

Some of the benefits of the TBL approach, include a higher interest in the subject taught and an improvement of the knowledge acquired during the semester (Khalaf & Altea, 2022). Moreover, it has been shown that there is a “positive effect of the task-based learning strategy on raising the level of deductive thinking for first-grade intermediate students in comparison with the traditional method”. (Khalaf & Altea, 2022) Müller and Brown also reached the conclusion that TBL applied in science classes encourages mastery and fluency by deepening understanding of concepts, can help students achieve different views of the subject and make the contextual embeddings to facilitate learning transfer, thus constructing a larger framework of learning, and boosting motivation and self-conceptualization. On the other hand, teacher can improve their feedback, can have a decisive influence by guiding inquiries, and can better connect with the problems of the classroom, by reducing the gap between teachers’ and students’ perceptions of the relevance of the task. (Müller & Brown, 2022)

2. Method of research

2.1. Research Objectives and design

Our research consists in an active research focusing the objective to find out whether the methods applied are the best for the materials that had to be learned and whether the activities performed were enjoyable. In addition, we are interested in students’ perception on the relevance of the tasks given and the usefulness of the methods in knowledge acquisition. Lastly, we took an interest in the transversal competencies that students had developed or perfected in conducting the tasks, such as digital competencies or language improvements, communication skills and social skills, as all of them worked in groups.

2.2. Context

We have applied the TBL method in the first- and second-year courses in Didactics of mathematics for primary and preschool education. Students received various task: conducting research on students-oriented method of teaching and presenting their finds in class, planning lessons on topics discussed in the lectures, role-playing as teacher, and performing sequences of lesson on their peers, constructing examples of learning activities following the structure given in the materials and constructed games with mathematical content to be played by pupils. The tasks were conducted in groups of five students, making it essential to collaborate with other, share ideas and building social bounds.

2.3. Participants

We based our finds on fifty-six students of the Pedagogy of Primar and Preschool Education program, in the Department of Psychology and Science of Education, of the “Ovidius” University of Constanța, Romania, who were given a series of task to be performed in class or at home, with or without a week notice. All activities took place in the 2022-2023 school year.

Questionnaire analysis is done on the 56 answers of the students. Even though not all students who work on the task-based learning experiment didn’t wish to express their thoughts in the matter, the results yield a valid point of view.

The composition on the lot is shown in figure 2, with a background of high school studies as depicted in figure 3. The lot is well balanced between the two years, where the method of task-based learning was applied. Also, the figure 3 shows that the sample respects the structure of our students’ background studies.

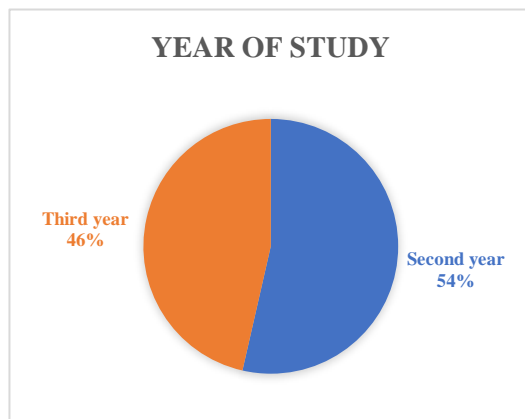


Figure 2. Lot of respondents

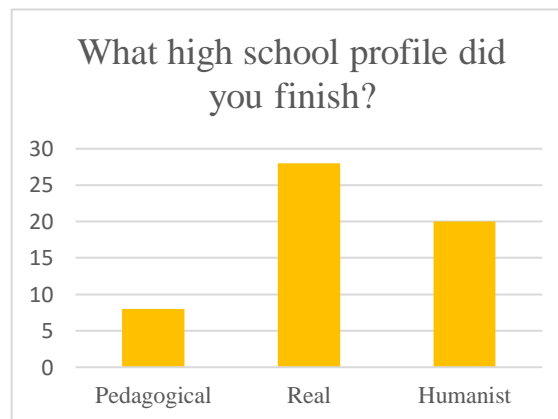


Figure 3. Highschool background

2.4. Instruments of research

By using an online questionnaire, students answered 15 questions about how they perceived the last year’s activities, how much they learned conducting them, how helpful they think they were for their future career. The questionnaire did not collect data, so the answers are antonyms so they could be as sincere as possible, thus the study complying with international ethical norms



regarding the confidentiality of the data collected in the study, as well as the safety of the participants.

Moreover, participation was voluntary, with students having the option to withdraw from study at any time without any negative consequences.

2.5. Data analysis

Being asked „The approximate percentage of seminar activities you carried out?“, 14 % of the students answered less than 30%, the same percentage, between 30-50%. The remaining students approximated, in equal amounts, a 50% to 75% or more, the completion of the task given to them.

To the question: “Do you consider that the tasks were necessary for the acquisition of teaching skills?”, 68% answered positively, 20% answered that sometimes they founded necessary for the content taught, 5% answered negatively and 7% didn’t answer to the question. This shows that most of the students acquired new competences in teaching by conducting various tasks like preforming teaching activities, searching for examples of good practices, discussing with colleagues, and role-playing as teachers with their peers.

In addition, 73% of the respondents think that the practical applications they had to prepare for the seminar led to a better understanding of the teaching techniques and methods to be applied in mathematics classes, and 20% said it helped, but it was too much work. The others gave negative answers or thought that the tasks could have been skipped altogether, remaining to be done when they had gone into practice, or they could have learned what was needed without carrying out any task.

It is obvious, form the answers that most students saw the benefits of practicing teaching before taking on a position, and enjoyed the act of learning by doing. As usual, not all students are happy with the techniques, and some would prefer to skip the work or postponed it.

Figure 4 shows that students believe that in preparing for the final exam they combined all tree forms of studying, suggesting that by task-based learning we cannot exclude the traditional ways of learning, but we could enhance the comprehension of the material. Note that some tasks evolved some individual study and research, finding useful examples in the bibliography or on the internet.

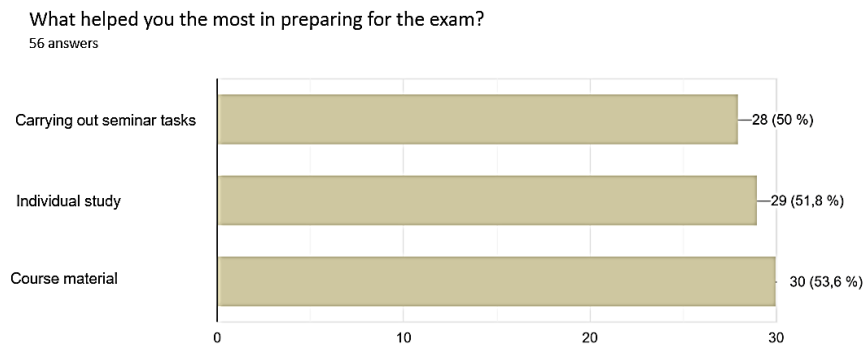


Figure 4. Preparing for the exam



Considering the extent on which the students consider that the achievement of seminar tasks (research of active learning methods, didactic design, and role play) were appropriate methods for the discipline studied, 78,6% of them said it was a very fitting or appropriate method of teaching, and the rest were either neutral (14,3%) or didn't see the method appropriate at all (7,1%). This could lead to the fact that most of them liked applying what they learned into various tasks and found that it had benefits on their development.

This fact can be seen in the next question where 80,6% of the respondents think completing these seminar tasks helped their professional development. The other eleven respondents gave neutral or negative answer.

At the question "Do you/Have you managed to assimilate more knowledge by solving seminar tasks?" respondents answers can be seen in figure 5. By nearly 80% of the respondents, task completion was viewed like a way to gain knowledge and better understanding the material.

The tasks were conducted in small groups, and each students perform a specific task, or they were able to discuss the best strategies for solving the assignment. We have asked if they found working in groups useful, and 75% of them concluded that by communicating ideas within the team, they have consolidated some knowledge and fixed some errors in understanding concepts. The others weren't that happy to work in groups because they found it hard to communicate or they just would have preferred to work alone. This indicates that some of them didn't choose the right team members for them, or that they work better alone, without having to consult others.

Overall, many benefited from the group-work as it is shown by the answers to the question "Did the seminar assignments you worked on help you pass the exam?" The question was for the third-year students who already taken the exam, so we only have 34 answers. 58,82% of the respondents remembered the tasks and used them in the exam, 32.35% said it was partially helpful, remembering the discussions with colleagues and those at the seminar and managed to build the learning activities required in the exam, and 8,82% said they came up with example on the spot, so they didn't use the tasks conducted in class. However, constructing examples of learning activities so quickly suggest a very good understanding of the subject, or a lot of practice, mainly by conducted the tasks in class.

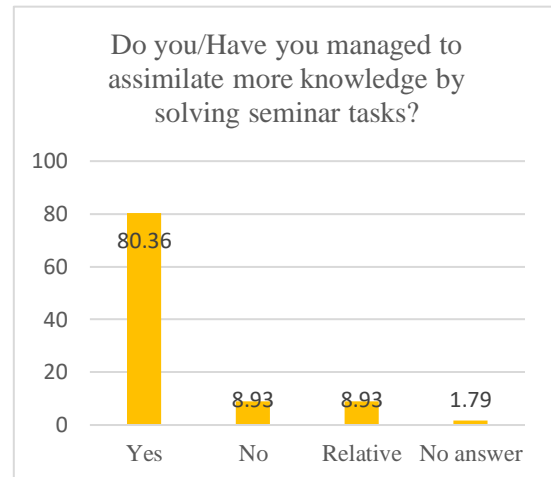


Figure 5. Managing to acquire knowledge by solving task



Referring to the future teaching career of our students, we have asked if they think the topics worked on in the seminar will be used in your professional activity and to what extent were seminar tasks used in pedagogical practice. Figure 6 and 7 shows that students believed that the task conducted can be useful in their future career or in the pedagogical practice.

To what extent do you think that the assignments worked on at the seminar will be useful in your professional activity?
56 de răspunsuri

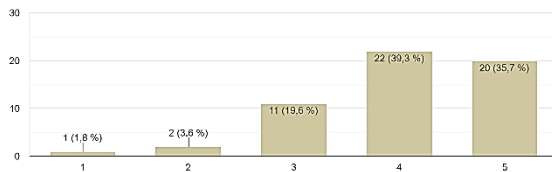


Figure 6. Usefulness of the tasks in professional career.

To what extent were the seminar assignments used in the pedagogical practice activity?
52 de răspunsuri

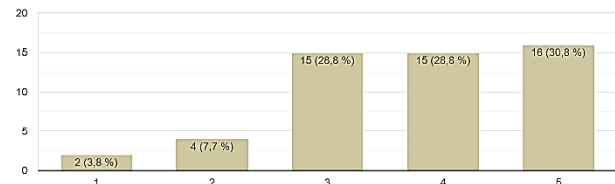


Figure 7. Usefulness of the task in practice activities in college

Being asked to give an argument of the decisions, some of them said, to quote a few:

- “The tasks at the seminar helped me a lot in the pedagogical practice activity because I remembered the important notions, I acquired interesting methods that I can apply in teaching mathematics, useful didactic games, suitable for any age category.”
- “In pedagogical practice, I applied what I conducted in seminars.”
- “The didactic projects I carried out at the seminar helped me to realize more easily the didactic project for pedagogical practice. Plus, the lesson sequences I did and debated at each seminar developed my creativity and I managed to come up with new ideas for practice activities.”
- “Regarding the organization of the lesson sequences, I was helped by the information received at the seminar. The time allocated to each stage was also streamlined thanks to the advice received at the seminar.”

Thus, most of them realised that the tasks could be used and had meaning for their future career, even though at times seemed too much work and only an exercise to further understand the content in the lectures.

Figure 8 shows which other skills have you developed/perfected in solving seminar tasks. Many of the students identified multiple skills that were combined while completing the assignments, which indicates a strong formative nature of the task-based learning method, combining multiple techniques and developing skills need for the future adult at the working place. We have identified the skills as research skills – by searching and filtering information from books, specialist articles and the internet, communication skills - through presentations and content transmission using the

What other skills have you developed/perfected in solving seminar tasks

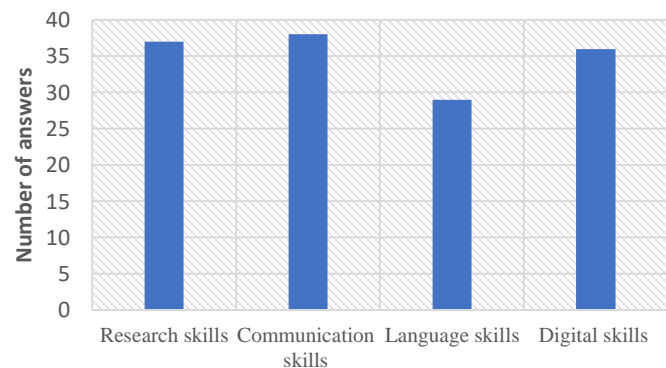


Figure 8. Skills developed or perfected by conducting task-based learning



appropriate language for the target group of the courses, language skills - by using discipline-specific languages, and digital skills - using lesson, paper and presentation writing software.

The final question involved the motivation that drove the students in conducting the tasks. They had to choose between:

- Intrinsic motivation - I wanted to learn, to improve, I liked to solve tasks to develop
- Extrinsic motivation of peer pressure type - I felt responsible to my colleagues in the group in which I worked to solve tasks with them
- Self-centered extrinsic motivation – I worked because it was necessary to pass the exam
- Ambivalent motivation – I wanted to contribute to solving tasks because it helped me and to help others

The answers can be seen in figure 9. More than one answer could be chosen, which is why most of the students identify two types of motivation. A more detailed analysis shows that 40% of the students wanted to learn and improve, and, at the same time, felt the peer pressure of the group.

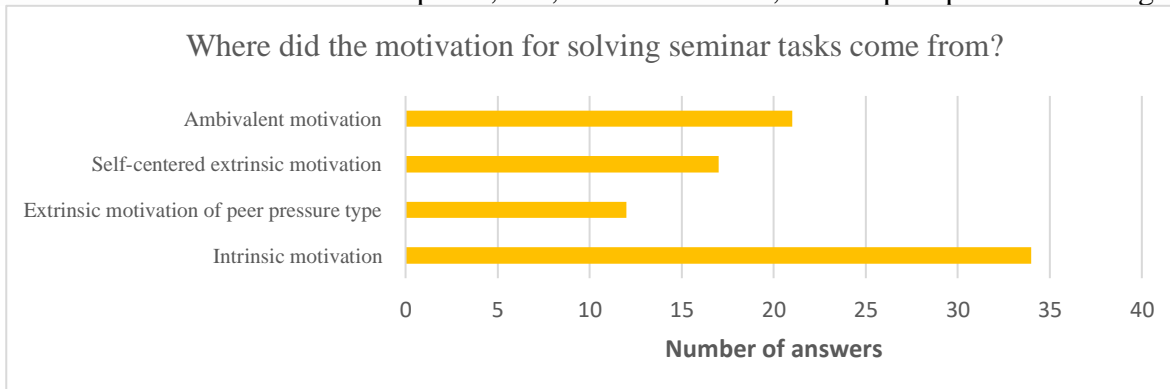


Figure 9. Motivation chart

2.6. Finds and discussion

As the data analysis shows the methods applied have been suited to nature of the lectures, but the tasks were too many for some students who felt overwhelmed. They had no serious objections to the task-based learning, saying that they enjoyed the work most of the time, but some of the tasks were exceptionally long and took too much time to complete.

From all the answers, we can conclude that students viewed the tasks given as useful for the future career and helped the in acquisition of knowledge, being required to read the material and find or construct new examples on the topic of the week. In addition, 3-4 students requested more role-playing activities in which they could apply the examples. This was not an activity thought about in the second-year course, because they began the pedagogical practice in schools where they could use the activities constructed thru task-based learning. The requirement suggests that these students, and many more as can be seen form the data analysis enjoyed these types of activities, because is a fun and easy was to learn by doing, and even thought the preparation for this task was greater than the others, the playfulness of the activity were more remembered. We could say that due to the emotions involve in the role-playing tasks, these ones were very powerful in the students' minds, making the topics learned more memorable.



Regarding the skills developed when the task-based learning, we conclude that all the major skills needed to be developed or perfected in an educational process were present. This has been done by working in groups, developing social, communication and language skills. By role-playing students also performed the same skills, ensuring the good transmission of the topics from teacher to pupils, in the future teaching position. Having to construct various example of learning activities for preschool and primary education, they worked with technologies, making use of IoT as much as possible, by searching images, modifying them to suit a specific topic, researching the best example for the task, and combining all the results of the search with the materials from the lectures. All this developed the research skills, need in the third year, where they will conduct didactic research. In addition, digital skills are very important for any future teacher which will have to relay on technologies in their activities, educating the digital natives.

Moreover, the formative nature of the task-based learning is verified by all the finds so far, including the principle of learning by doing and developing much needed skills for any student.

Regarding the motivation in learning, we did see a higher motivation of intrinsic type, which help students better themselves, achieving a higher level of understanding and being proud to perform a task as better as they can.

Conclusions

TBL is a powerful student-centered learning technique that can enhance learning opportunities in various subjects of study. It can boost motivation by working in pairs or groups and it also gives the opportunity to apply the theoretical background of any subject by conducting various tasks. The task needs to be relevant for the students, but also achievable.

From our finds, the tasks must be enjoyable and creative. An open task is more desirable, due to the creative part involved in the process, and the emotions felt by the learners when working on the assignment. Students remember better the feelings they experienced when talking to colleagues in the group and when presenting the finds (the “stage” emotions, the contradictory views, the examples discussed, and the feelings involved in deciding on a solution). These findings are consistent with other studies that “showed that positive academic emotions improved some aspect of learning effects” (Tan, et al., 2021) and that using emotional data could greatly improve the performance when applying students-centered learning techniques (Shen, Wang, & Shen, 2009).

As other studies on TBL had shown (Mäkiö & Mäkiö, 2023) (Al Kandari & Al Qattan, 2020), by conducting tasks students learning easier and process the materials taught in a useful manner, applying their knowledge in various context. This helps shape students’ perception by the subject and provides practical applications, boosting critical thinking as well.

Lastly, by a task-based approach, students improve their 21st-century skills, digital competences, communications skills, filtering information, and of course language skills. All this is consistent with the previous studies conducted in languages learning and other subjects. (Zhou, et al., 2013) (Ikhsan, 2020) (Mäkiö & Mäkiö, 2023) (Costa, 2016)

All these findings support the formative nature of TBL in all subjects, provided by a carefully selected tasks that orientate students to the main goals of the subjects and incorporate the little details needed to carry out the assignments. Working in groups is beneficial for discussing



the various approaches that can be taken into conducting the tasks and provides a well distributed task vs. material and time management ratio.

As a limitation of TBL, we state that in providing the tasks, a teacher that wants to map out all the materials taught could overwhelm the students with a very large number of tasks. This could be avoided by performing a minimum number of tasks by each student, so they don't feel pressured into conducting all tasks. By giving too much to assignments, students lose motivation and change perspectives over the whole process. Considering that all the findings will be presented in class at one point helps the learning process, even though not all the students work all the tasks. Another factor that helped the students was that they all had access to the findings of other workgroups, and they could consult those findings in preparation for the exam.

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