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INQUIRY AND PROJECT-BASED LEARNING AS AN APPROACH FOR DEVELOPING ENTREPRENEURSHIP COMPETENCIES IN PRIMARY SCHOOL HIGH-ACHIEVING STUDENTS

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Abstract. *Development of entrepreneurial capacities, entrepreneurial mindset and entrepreneurial culture among students is one of the goals of modern education. In Serbia, there is an idea and vision of entrepreneurial education in the chemistry domain, which is also regulated by the curriculum. Despite these facts, a curriculum that supports entrepreneurship and a large scope for chemistry entrepreneurship, primary schools still lack in activities that could develop competencies related to entrepreneurship in students. Within this research, a series of activities were designed with the aim to enhance students' entrepreneurial competencies. Proposed activities were based on inquiry-based learning (IBL) and project-based learning (PBL) as their characteristics support entrepreneurial education. The conducted study involved 18 high-achieving students in the chemistry domain. Data obtained from pre- and post-questionnaires confirm the assumptions of present researchers that the proposed activities could improve some students' entrepreneurial skills. The results from the second questionnaire, which examined the impact of conducted activities on the students' entrepreneurial skills and abilities, reveal that when an approach like this is used as the teaching method, some entrepreneurial peculiarities within students can be increased.*

Keywords: *high-achieving students, primary school, entrepreneurial education*

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Introduction

The challenges of the modern world are bringing the need for reinforcing the education systems and their transformation for the fulfilment of the knowledge society requirements. For adequate preparation of students for successful work and life, close cooperation between business and education is necessary. An important target of modern education is the development of entrepreneurial capacities, entrepreneurial mindset and entrepreneurial culture among individuals and society as a whole. The special attention should be devoted to the education of the gifted students, taking into account that they express characteristics similar to those detected in successful entrepreneurial individuals (Shavnina, 2012), such as the ability to generate new ideas and apply them, as well as to explore the possible solution for different problems.

Research Problem

In 2003, the European Commission pointed out for the first time the importance of entrepreneurial education (European Commission, 2003), and further promoted entrepreneurial education and entrepreneurial learning. It was noticed that there was no consensus on what the elements of entrepreneurship were, and the required competencies also were not defined. In 2015 the Study on Entrepreneurial Competence (EntreComp360) was launched to develop a common conceptual framework for Europe, which is both a reference point and an impeller for implementing a transnational policy that drives the development of entrepreneurial competence (European

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Commission/EACEA/Eurydice, 2016). In this sense, entrepreneurship education aims to support and strengthen the development of entrepreneurial thinking and behaviour in formal education (Ahmad & Siew, 2021; Seikkula-Leino et al., 2021). The curriculum reform, which requires partnerships in the learning community, is needed, focusing on the implementation of educational policy in entrepreneurial practice and their sustainability. Within the EntreComp framework, entrepreneurial competence is considered an individual and collective ability and includes three areas (ideas and opportunities, resources and into action) and fifteen competencies (opportunity perception, creativity, vision, evaluation of ideas, ethics and sustainable development, self-awareness and personal efficiency, motivation and perseverance, resource mobilization, financial and economic literacy, engaging others, taking initiative, planning and managing, resolving unclear and risky situations, working with others, learning through experience). A proposal for the application of the competence in practice and a descriptor containing key aspects of the given competence, as well as 442 learning outcomes (Bacigalupo et al., 2016) are also given.

Therefore, the focus of learning should include organizational skills, analytical approach, abstract thinking, gathering information using different media and assessing their relevance and truthfulness, presentation techniques, work on projects, interviewing techniques, time management and taking into consideration student experiences (Krželj & Polovina, 2019).

Research Focus

In the context of modern educational policy, entrepreneurship education and the importance of developing entrepreneurial competence, in the structure of key competencies for lifelong learning, is recognized in the education system in Serbia and defined as Entrepreneurship and Entrepreneurship Orientation (General standards of achievement for the end of general secondary education and upbringing and secondary vocational education and education in the field of general education subjects for the subject, 2013). However, domestic literature is still lacking in adequate research results and potential proposals in the direction of the best methodological solutions for teachers as professionals that should contribute to the development of entrepreneurial students' competencies, while equally strengthening personal entrepreneurial competencies. Although the education policy and national education frameworks in Serbia are becoming more open to meet the needs of the economy and labour market (The Law on the Foundations of the Education System in the Republic of Serbia, 2019), the development of the skills such as entrepreneurship is still at the individual level, rather than systematic (Rakićević et al., 2015; Stamatović & Zlatić, 2021; Zlatić & Stamatović, 2018). The skills such as communication, teamwork, production skills, creativity and sustainable thinking have been imposed as crucial among the competencies that should be built in the school environment for acquiring an entrepreneurship mindset (Aydogdu et al., 2020).

Chemistry as a scientific discipline is present in everyday life and it is giving numerous possibilities for the creation of valuable market products by the transformation of natural into artificial substances, creation of new substances with application in medicine, industry, etc. The proper level of functional knowledge and skills (in chemistry education) is necessary for the establishment of the entrepreneurship, and some of the inadequateness should be addressed. Bearing in mind that many schools in Serbia are not adequately equipped with chemistry laboratories and that practical work is usually limited on the individual teachers' attempts (Adamov et al., 2014), the learning of the abstract chemical concepts and practical application represents a problem for most students. There is a need for teachers to be sufficiently qualified and possess adequate knowledge for the transfer of necessary entrepreneurship skills to the students actively and effectively. In addition, the proper choice of learning methods or models for the development of entrepreneurship skills is also of immense importance. Inquiry-based learning (IBL) is an approach based on scientific activities that require the development of students' critical thinking, autonomous learning, and information literacy (Magnussen, 2000; Mäeots & Pedaste, 2014). Despite some challenges that could occur during inquiry-based learning, such as time consumption, teachers' additional efforts and students' willingness for the more active mode of learning, it still presents a valuable contribution to the entrepreneurship education, especially in the science and engineering field (Pittaway, 2009). Through IBL students have the opportunity to increase their productivity, creativity, communicational and metacognitive skills, as well as a high level of sense of accomplishment. Bearing in mind the importance of communication and collaboration as essential parts of entrepreneurship, the application of an inquiry-based approach in chemistry education is also suitable for the promotion of these competencies (Finlayson et al., 2015). In addition, inquiry-based learning (IBL) designed for the application in a laboratory environment (inquiry-based labs) is combining practical hands-on work

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with students' discussion and discovery of the concepts (Cheung, 2011; Cummins et al., 2004; Deters, 2005; Kipnis & Hofstein, 2008; Tatar, 2012). Students' experience in inquiry-based learning under the lab work circumstances could be a good starting point for their engagement in the process of transformation of functional knowledge into the products valuable within the market framework. Another effective learning approach that addresses the question of students' motivation, engagement in teamwork, as well as the development of valuable laboratory skills necessary for the connection of real life-phenomena with school knowledge is project-based learning (Chang et al., 2015; Krajcik & Blumenfeld, 2006; Robinson, 2013). In this approach, the students are gathered around the complex real-life task that requires from them to make independent decisions, solve problems, perform investigations, as well as to manage the available time and organize necessary activities (Sumarni, 2013; Vergara-Castañeda et al., 2021). To cope with the challenges of modern society, the students should be equipped with all mentioned skills and have the possibility to see how the knowledge acquired in the school system could be used in the real world.

To fulfil their potential, in school gifted students rely on enriched learning experiences that require full engagement of their teachers to ensure stimulating environment so they can utilize all their skills, such as intellectual quickness, effective use of numbers, creativity, spatial ability, language proficiency, problem-solving skills, reasoning capability, strong memories, moral judgment, and sensitivity (Maker et al., 1996), to grow and gain new knowledge. Bearing in mind that entrepreneur personality traits are in close correlation with the characteristics of gifted students, their development is of key importance in modern education systems.

The focus of this study was to assess the application of inquiry and project-based learning activities within the chemical laboratory environment as tools for the development of primary school high-achieving students' entrepreneurship competencies as a sustainable model for developing entrepreneurial skills in gifted students.

Research Aim and Research Questions

To find adequate solutions to global problems, such as the production of energy, clean water, and environmental pollution, it is necessary to make strong connections between chemistry curriculum and entrepreneurship (Confalone, 2014; Sachse & Martinez, 2016). Obviously, students require guidelines and an opportunity to think beyond the curriculum to commercialize their ideas for financial gain.

Although individuals' entrepreneurial traits could be similar, entrepreneurial behaviour does not strongly rely on them (Entrialgo & Iglesias, 2020). Entrepreneurial traits depend on environmental factors, and they can be improved and enhanced.

The aim of this research was to examine the current situation in the Serbian educational system regarding the nurture of some parts of students' entrepreneurship competencies in school and to offer the proposition for activities that could be used in a regular school environment for further improvement of entrepreneurship abilities in high-achieving or gifted students. Also, the possible impact of activities, which were designed for this purpose, on potential improvement in students' entrepreneurial skills has been analysed and explained in the paper.

According to that, questions that guided the present researchers through research were:

1. Does and to what extent school environment supports the development of students' entrepreneurial competencies?
2. Are proposed activities suitable for 8th grade primary school high-achieving students?
3. Do the proposed activities impact high-achieving students' entrepreneurial competencies and promote entrepreneurial education?

Research Methodology

General Background

This research was conducted during the December of the year 2021 using the pre-experimental design method with pre- and post-questionnaires. The study included 8th grade students from primary schools in the territory of the city of Kragujevac (Serbia) who were denoted as potentially gifted in chemistry. The territory of the city of Kragujevac is covering 22 primary schools and all of them were invited to participate in this research.

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Sample

All students included in the research sample (*N*=18) were 8th grade primary school high-achieving students (both female and male). In the area of primary education, the Serbian education system is based on eight years of education divided into two cycles. The first four grades are incorporated into the first educational cycle, while the other four grades (covering 5th through 8th grade) belong to the second one, where subject teachers teach each subject. Chemistry as a subject is taught in the 7th and 8th grades. The homogeneous purposive sampling was done by their chemistry teachers from all twenty-two primary schools from the territory of the city of Kragujevac (Serbia), based on students' engagements in the classes, achievements, grades, participation in various science competitions (mostly chemistry, biology, and physics) and science camps (Petnica Science Centre and similar). Also, all students were characterised by their teachers as potentially gifted, but were not tested for. The number of students was optimized to fulfil safety conditions for work under Covid-19 pandemic conditions. The students were working parallel in two separate laboratories, and the number of faculty teachers and students did not exceed the maximally allowed number by regulation of the Covid-19 pandemic. The main reason for this type of sampling is that we were creating activities that could serve as a model for the entrepreneurial education of gifted students. Also, we selected 8th graders as they have chemistry for two years in a row, so they have the basic knowledge of chemistry concepts and have prior knowledge related to the theme of the activities and due to their age (13 or 14 years), it could be presumed that they possess higher levels of judgment and ability of self-reflection and therefore provide more accurate responses on the questionnaires.

Instrument and Procedures

The instrument (two questionnaires see in Appendix 4 and Appendix 5) was designed to assess the presence of entrepreneurial education in schools as well as students' attitudes, beliefs, and self-beliefs regarding their entrepreneurial skills and the activities in which they were involved. Both questionnaires were composed of multiple-choice and open-ended questions. The first questionnaire, which contained eighteen questions, examined the presence of some parts of entrepreneurial education in their schools as well as students' current skills closely related to entrepreneurial personality traits. Whereas the first questionnaire examined the current entrepreneurial competencies of students, the data from the second questionnaire (fourteen questions) gave an insight into the impact that the proposed activities have had on certain students' entrepreneurial competencies. The first questionnaire was conducted before the activities, whilst the second questionnaire students filled after the activities.

The research included 3 activities grounded on topics that are in accordance with the curriculum of the Chemistry subject for the 7th and 8th grades, so students have had prior knowledge and they were ready to participate. Activities were conducted once a week, each 3 hours long, during the weekends and were counted as out of school activity. Prior to the realization of the activities, students were equipped with the necessary instructions and knowledge about chemicals, equipment and safety procedures required for the conduction of the experiments. All activities were guided and conducted by the authors of the paper at the chemical laboratories of the Faculty of Science (University of Kragujevac, Serbia). The first two activities (see Instructions in Appendix 1 and Appendix 2) were based on the inquiry-based learning principles where students were working in small groups (2 or 3 students per group). The students who were timed up in a group didn't know each other before the activities. The activities were set up to encourage team spirit through competition between groups by problem-solving tasks. The third activity (see Procedures for making New Year's decorations made by students in Appendix 3) was set on the bases of the project-based learning principles. After the first activity students were given the project task to create the New Year's ornaments and decorations from eco-friendly materials and were asked to present the ideas and project plan for next week's activity. During the week students were collaborating on a task through ICT (Information and Communication Technologies) and then after the second activity present their plans on which the third activity was prepared and set up. The student's products (see Appendix 6) from recycled paper, biopolymers and naturally occurring substances were then sold at the sales exhibition and all incomes were used to buy New Year's gifts for the protégé's of the local centre for children without parental care "Centre for Development of Social Protection Services-Kneginja Ljubica". Knowing that many schools in Serbia don't have adequately equipped chemistry laboratories, all chemical used in this research are easily available, cheap, and accessible.

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Data Analysis

The data were gathered during December 2021. Statistical tests (median, mean value, and standard deviation) were conducted for the analysis and interpretation of data (McCrum-Gardner, 2008). Detailed statistics are given in percentages. A qualitative thematic content analysis was also applied (Braun & Clarke, 2006). In-depth analyses of the collected data were undertaken in order to gain insight into its content, followed by the extraction of key meanings and grouping of information into conceptual categories that lead to the making of categories into themes through constant comparison of data (Charmaz, 2006).

Research Results

As the entrepreneurship process assumes different forms of behaviour, our research was conducted to explore some of the characteristics of the entrepreneurship process. According to that, questions 6 to 13, except 8, were conducted throughout the first questionnaire to explore to what extent students take the initiative and express and develop their creativity in school. On five questions (9 to 13), students could circle the following *always*, *never*, or *it depends*, and percentages of the number of students' answers *always* on these questions as well as corresponding median value, mean value, and standard deviation are given in the table below (Table 1).

Table 1
Analysis of Results for Selected Questions Where the Students' Answers Were "Always"; Median Value; Mean Value and Standard Deviation

Statements	%	*Mdn*	*M*	*SD*
9. I like to solve problems and tasks independently (on my own).	50.00			
10. I have the possibility to express my own opinion at school.	88.89			
11. I have the possibility to offer a solution and express creativity at school.	94.44	77.78	73.33	17.71
12. I take the initiative during learning on classes and solving tasks.	55.56			
13. I take a risk during learning on classes and try to solve tasks in my own way.	77.78			

Based on the given statistical values, the majority of students have the opportunity to show creativity and opinion (<80%). Fewer students solve tasks independently, take the initiative or on their own take an active role in the classes (≈50%) and they shared that their self-engagement depends on the type of task, the severity of the problem, subject topic, teacher initiative, and current mood. Also, it can be noticed that almost all students use their creativity and visions whenever they have the chance. Furthermore, data collected on the 6th and 7th questions bolster this assertion, and from the students' answers to these questions, it can be concluded that students often (55.56%) and sometimes (44.44%) have the opportunity to get involved in various activities where they can express their creativity and gladly participate in them (83.33%). It can be concluded that current primary education supports and improves students' creativity, but not to the same extent encourages them to take initiative, risky forms of behaviour, or self-engagement of students.

Regarding collected results from the second questionnaire, several activities, in which students were involved, contributed to the students' self-engagement. 94.44% of students, on two questions from the second questionnaire (3 and 4), indicated that they have had the opportunity to take initiative as well as to offer their opinion throughout solving the tasks during the activities. This approach clearly provided students the chance to take initiative in the learning process, according to students' responses to the corresponding questions and thus some of the entrepreneurial competencies surely could be promoted in this way. The motivational trigger for these activities probably was their playful background. It is possible that this characteristic affected the students to be more motivated, and increased their aspirations, and willingness for taking the initiative during the activities.

Entrepreneurship implies working with others and thus entrepreneurial education must create a variety of situations for development this competence within students. Answers to the 4th, 5th, and 8th questions from the first questionnaire revealed that 61.11% of students love group work, while among others (38.89%) it depends on team composition and topic. Most of them declared that they do not have many opportunities to work in a team

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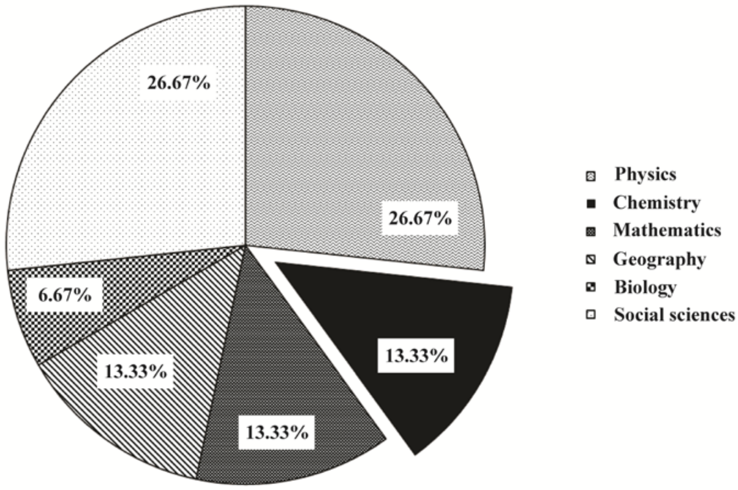
(72.22%). Figure 1 respectively presents the presence of teamwork in the classes of the natural sciences, where the Chemistry classes are second-ranked with Mathematics and Geography classes. Besides natural sciences, students cited some social sciences on which classes they work in a team, where Philology was the most common answer (10.00%).

Figure 1
Graphical Presentation of the Presence of Teamwork in the Classes of the Natural Sciences per Subject



Other questions from the first questionnaire (14, 15 and 17) provided some more information about students' attitudes when it comes to teamwork. Based on responses to the 14th question, for the 44.44% of the students, it is important that the assignment is successfully completed, *regardless of whether it is a group or individual work*, a little less (33.34%) rather choose to work in a *team* than on their *own* (22.22%). Data collected on the next question (15) show that students (77.78%) gladly present the teamwork results on the behalf of the team. Students also were asked (17th question) to share if they get into conflicts during working in a team, and the majority of them answered *sometimes* (55.56%) whereas others circled *often* (11.11%) or *never* (33.33%).

In the contrast to the situation in school and insufficient teamwork moments, throughout all activities students have had the opportunity to work in mini teams (2-3 students). Accordingly, the second questionnaire also contained questions about teamwork (6, 9, 10, 12, and 14), and no question recorded any negative answers. The sixth question was conducted to confirm the presence of team spirit and collaboration, and all students pointed out that they had enough opportunities to experience that during our activities. The next questions, 9 and 10, measured whether teamwork impacts their self-confidence within communication and teamwork under unknown environment. On the 12th question, the students were asked to share if they had difficulties during communication and solving the last task, i.e., project-based task, to find different procedures for making New Year decorations from recycled paper, biopolymers, and naturally occurring substances. The positive answers to these questions (100% for 9th, 10th, and 12th) were probably due to the working in small teams, facilitated communication via social networks, as well as the creative nature of the task, which also motivated students and required maximum engagement. Based on the data from the 14th question, teamwork contributed to the students' positive feelings through the activities (safety, satisfaction, good mood) and aroused their curiosity.

One of the greatest impacts of these activities on students is the formation of strong team spirit among individuals who didn't know each other before. The presented activities have influenced students' valuable interpersonal skills, communication skills, ethics, and critical analysis as students learn to work with others and learn from each other.

Project-based learning is a teaching approach based on the students' involvement in real-world contexts and requires students' application of knowledge and exploration of the subject matter. Accordingly, project-based

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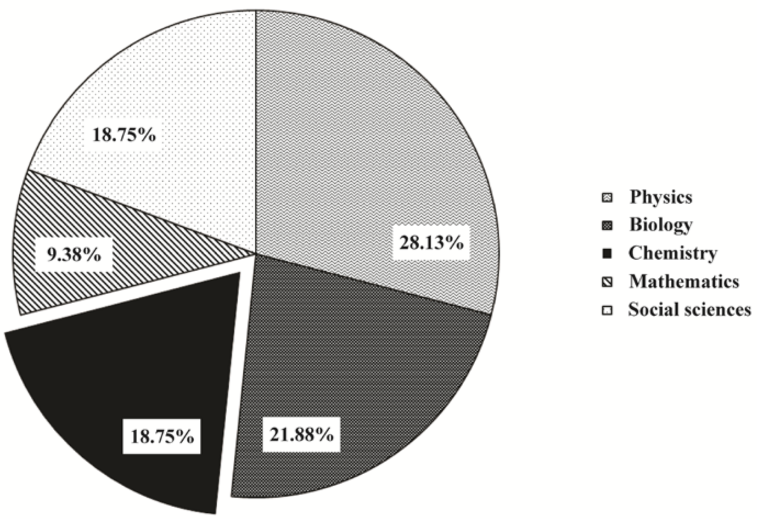
learning could promote entrepreneurial competencies, and thus, students were asked about the presence of this approach in their education. Obtained data unveiled that students equally use theoretical knowledge and practical abilities during project activities (3rd question from the first questionnaire) (83.33%), but to the responses to the first question, there is a need for more activities. Students only *sometimes* have different types of project activities (66.67%), whereas only 22.22% of students have it *often*. Figure 2, given below, represents the presence of project activities in the classes of the natural sciences. Chemistry classes are third in the number of project activities, the only ones counting fewer project activities are Mathematics classes.

Figure 2

Graphical Presentation of the Presence of the Project Activities in the Classes of the Natural Sciences per Subject



One of the aims of entrepreneurial education, as a part of primary education, implies interdisciplinary correlation, and based on collected data on the 16th and 18th questions (first questionnaire) current primary education provides this to students to a certain extent. The majority of them use the acquired knowledge from the different types of classes and courses in other classes (88.89%) but only 27.78% of students mark that they are able to use the same knowledge in real-life situations. This can be explained by non-linking chemical knowledge with daily life and insufficient involving activities based on solving life problems related to chemical issues. Linking chemistry with everyday life is an important task in achieving one of the main goals of chemistry education, namely, chemical literacy. Developing entrepreneurial competencies is one of the new goals of chemistry education due to the chemistry presence in all spheres of real life. Without the opportunity to understand the links between chemistry concepts and real-life, students might develop misinterpretations and misconceptions, so it is expected that students would not be able to apply their knowledge. Therefore, it is necessary to enhance students' conscience about chemistry and prepare them for proper use of chemistry knowledge and at the same time enabling them for long-life learning.

After the activities, students were asked, as in the first questionnaire (18th question), about the applicability of their chemical knowledge (8th from the second questionnaire). 72.22% of students marked that they will be able to apply newly acquired knowledge, both in school and out of school in real-life situations. A comparison of the students' attitudes about the applicability of their acquired chemical knowledge in school and during the activities is depicted in Figure 3 given below. It can be easily seen that there is a great increase in positive answers after the activities were implemented. After the first questionnaire, 27.78% students declared that they often used knowledge and skills acquired at school, while in the second questionnaire the percentage of positive answers was 72.22%.

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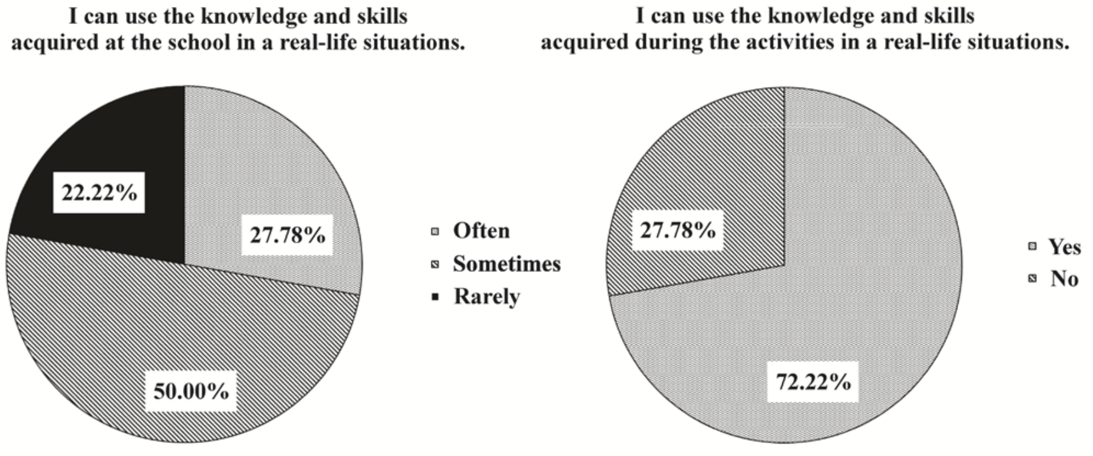
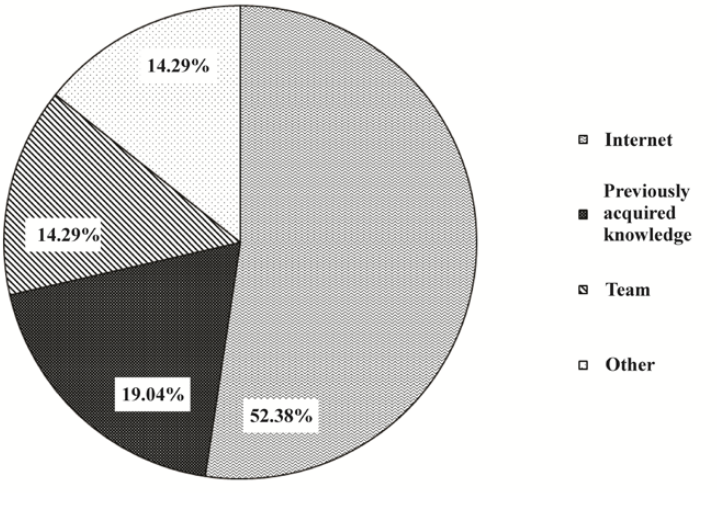
igure 3
Results of the Students' Answers to the 18th Question (First Questionnaire) (left) and 8th Question (second questionnaire) (right)



Based on answers to the 7th question from the second questionnaire, students used acquired knowledge from the other courses of the natural sciences, mostly mathematics, and also physics, and biology. A reason for this may stand in the fact that chemistry, as a subject, during various problem-solving tasks very tightly relays on the use of mathematical operations. With interdisciplinary correlation, the proposed activities could bring rounded knowledge to students and make teaching more meaningful.

During the activities, students used different sources of information respectively presented in Figure 4. One of the most cited sources on the 13th question from the second questionnaire was the internet, while some relied on previously acquired knowledge at school, then, on the team, and other (family members, teachers from the respecting school, books, and encyclopaedias).

Figure 4
Ratio of Used Knowledge from Different Courses through the Activities



The activities apparently encouraged students to search literature, and the reason for that might be the tasks and problems that awakened their curiosity and connected chemistry with everyday life. The links between chemistry and everyday life were pointed out with the last in a series of activities when students made New Year's decorations from commonly available, environmentally friendly substances. Developed activities have initiated

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students to grow innovative ideas (making decorations from recycled paper, biopolymers, and naturally occurring substances) and therefore they could be used as an example to support entrepreneurial education of high-achieving or gifted students. Also, students' thinking skills were improved by marking possibilities for chemistry implementation within the market.

The second questionnaire also contained questions (1, 2, 5, and 11) that examined students' attitudes about the activities in which they were involved. On the first in a row question, all students gave the advantage to learning through activities versus learning chemistry in the school. Based on their answers, a reason for this is the lack of experiments (100%) as well as performing experiments on their own, performing chemical reactions and visualizing chemical phenomena, etc. Similar answers were on the 11th question (second questionnaire), where students were asked to share which part of the proposed activities they liked the most. One of the answers on the 11th question was a magnetic stirrer, and from that response, it can be noticed that they surely are missing experiments, contact with laboratory equipment and laboratory in general. Also, it can be a good sign that every segment of the experiment was tempting to them. Besides that, the most common answers to this question were: everything, teamwork, and socializing with other participants. The contribution of activities to the students' confidence in their chemical knowledge is evidenced by the data collected on the second question from the second questionnaire. They all agree that the activities brought them confidence in knowledge, which was also one of the answers to the 8th question from the same questionnaire. On the 5th question from the second questionnaire, 77.78% of the students marked one more advantage of the activities, the opportunity to solve tasks and problems on their own and in a way that is different than in school. The possibility of solving tasks in different and inherent ways, brought by proposed activities, could be one way of promoting and encouraging innovative ideas as one of the most important parts of entrepreneurial education.

Discussion

The purpose of this research was to examine the effect of inquiry-based and project-based learning on the developing of entrepreneurial competencies in primary school high-achieving students as a potential example of good practice that could be used in the education of high-achieving and gifted students. The results have shown a positive effect of these learning approaches with students' competencies being broadened. The contribution of the described model of working with students was particularly reflected in their proactivity, communication, cooperation, teamwork, and creative approach in solving tasks, which is consistent with the benefits in theoretical terms (Love, 2021) and previous research (Jarrett, 1997; Löfgren et al., 2013; Özgür & Yilmaz, 2017; The Intel Corporation, 2012; Thomas, 2000).

The research also showed that project-based learning in the school is insufficiently represented, which is reflected in the inadequate development of entrepreneurial competencies in students. The representation of both is significantly determined by the pedagogical competencies of teachers because research-oriented teaching requires more thinking and proactivity from students, which is confirmed by the research results from other authors (Akrami, 2022). However, the data obtained in the initial part of this research are worrying, indicating that students do not have many opportunities to research during classes, i.e., that there are no experiments, which could affect their motivation to learn chemistry, its use in life situations and the development of vital entrepreneurial skills. This finding speaks in favour of the need for continuous work on bridging the gap between traditional education and education for the knowledge society (Confalone, 2014), to which the model presented in this paper can contribute.

The benefits from interdisciplinary connectivity have been observed in research (Lenoir & Hasni, 2016), according to the students who made up the research sample, interdisciplinary connectivity is present in primary school. An important fact is that during the project, students also used knowledge from other subjects, which according to research encourages "civic skills" (Lenoir et al., 2015) and re-emphasizes the role of teachers and their readiness for a holistic approach to learning. Namely, the interdisciplinary connection can change the way students learn, asking them to synthesize more perspectives, instead of simply accepting what the teacher tells them.

During project-based learning, students are more independent in choosing learning sources, searching for information on the Internet and literature, assessing opportunities, choosing times and places for learning, which further strengthens their independence, arouses curiosity, and develops creativity.

Earlier literature focused on the study of entrepreneurial competencies mainly from the perspective of professionals, and to a lesser extent from an educational perspective (Ng & Kee, 2018; Tehseen et al., 2019). In recent years, however, significant attention has been devoted to the development of entrepreneurial competencies from an early age, their interrelationship and relationship with learning outcomes (Ferreras-Garcia et al., 2019).

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This study has tried to contribute to the question of entrepreneurial competencies development in the educational context and point out their importance for the professional and personal students' development. Namely, our data are in agreement with previous data on the connection between subject and entrepreneurial competencies (Ferreras-Garcia et al., 2021).

Although the sample within this study could represent a limitation factor, present researchers believe that obtained data indicate the main issues of entrepreneurial education. Furthermore, the possible limitation could be the competencies of teachers, both pedagogical and competence in the content knowledge and competence in transferring the knowledge. The drawback that occurs from the proposed approach, might be the adjusting of the content prescribed by the curriculum.

Conclusions and Implications

One of the aims of this research was to explore the current situation in primary schools in Serbia regarding entrepreneurial education, and also to propose a concept for increasing students' entrepreneurship competencies that could be used in gifted students' education. All students involved in our research were characterised by their teachers as potentially gifted, and the main reason for this type of sampling is that they express characteristics similar to those detected in successful entrepreneurial individuals. According to the results from the first questionnaire, some parts of entrepreneurial education are insufficiently developed and there is a need for new activities for further progress in this field. IBL and PBL have been proved as excellent approaches for designing different activities to promote learners' entrepreneurial skills such as knowledge, creative and critical thinking, solving problem, communication, and leadership. The results from the second questionnaire, which examined the impact of conducted activities on the students' entrepreneurial skills and abilities, reveal that when an approach like this is used as the teaching method, students' general entrepreneurship characteristics can be increased. Based on the students' answers, confidence in chemical knowledge, the opportunities for solving tasks and problems on their own, and teamwork are just one of the many advantages that this way of teaching and learning brought to students versus classical learning in school. The activities introduced to students, have brought closer the concept of entrepreneurship, and have provided an idea of how to generate income from their knowledge and pursuits. As a relatively new idea in education, pointing out the benefit of the connection between chemistry and entrepreneurship and selecting certain approaches and tools in teaching could lead to the application of chemistry entrepreneurship in schools. Our research has implicated that the used approach can develop the students' entrepreneurial features and Entrepreneurial traits are very important and desirable, but they depend on environmental factors, so their development will not be entirely achieved unless both factors (traits and environment) are favourable. It is necessary to use certain educational approaches that influence the learners' entrepreneurial behaviour. Educational organizations can provide an adequate environment for developing entrepreneurial skills if a teaching approach similar to the one presented in this paper is applied. Under this approach, students could strengthen their entrepreneurial skills (knowledge, creative and critical thinking, solving problems, communication, and leadership) using their chemistry knowledge and skills.

The proposed activities also promoted teamwork, searching the literature, developing innovative ideas, enhanced students' curiosity, and at the same time gave students independence in the learning process, the incentive to actively learn, and more confidence in their knowledge, which all are aspects of entrepreneurial education.

The main contribution of the research is reflected in the fact that it provides insight into the benefits of inquiry and project-based learning on the development of entrepreneurial competencies, and at the same time erodes their importance in the educational context. It also provides relevant information on various factors that influence their development, emphasizing, in particular, the role and competence of teachers.

After all, connecting chemistry and chemical topics with daily life and thus entrepreneurship can help with the widespread problems. The development of entrepreneurship competencies from the chemistry domain is significant and cannot be neglected due to many examples of the chemistry presence in everyday life.

This study should encourage teachers to apply practical activities similar to those described in this study in their classrooms regardless of the number of students, class duration, or any other technical problems. Assistance in the form of teaching material can be of great help considering conditions and limitations present in the teachers' work (one of them has been offered in this paper). We believe, guided by the examples given in our study, chemistry teachers could get a positive experience and new ideas to apply similar tasks and experiments. Developing the road map for the practical introduction of entrepreneurial education in chemistry and bridging the ideation–action gap should be part of new teaching strategies in Serbia.

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Declaration of Interest

The authors declare no competing interest.

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Appendix 1

Instructions for the first activity

Experiment Number 1

In front of you, there are 3 bags with different substances (wheat, corn, flax). Count 30 particles from each and measure their weight.
Weight A:_________________; Weight B:_________________; Weight C:_________________
What can you realize:
____
____.

Experiment Number 2

How many grams of sodium chloride (NaCl) and how many grams of water are needed to prepare 80 g of 0.9 % saline?
Carefully measure the calculated weight of sodium chloride (NaCl) and put it in a 150 mL beaker, and then pour the corresponding volume of distilled water. If necessary, stir the contents until completely dissolved. Move the solution to bottles and mark them.

Demonstration experiment Number 1

NOTE! This experiment performs a teacher!
Pour about 75 mL of distilled water into a 250 mL Erlenmeyer flask and pour 2-3 drops of phenolphthalein solution and mix the solution on a magnetic stirrer. Put a piece of elemental sodium in this solution.
Describe the observations: ____
____.
Corresponding equation of this chemical reaction:
____.

Demonstration experiment Number 2

NOTE! This experiment performs a teacher!
Take a piece of magnesium and put it in the flame with tweezers.
The product of combustion is ____________________ (name) _______ (molecular formula).
Corresponding equation of this chemical reaction:
____.
Measure the product on the digital scale and calculate how much magnesium reacts with oxygen.
_________ grams of product were created. It reacts ________ grams of magnesium.
Transfer the product to a test tube and add about 2 mL of distilled water and a few drops of phenolphthalein.
What is the colour of the resulting solution? Why?
____
____.
Select the substance from the workplace to add to the test tube to change the colour of the solution. Explain the choice.
____
____.

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Experiment Number 3

There is a 0.1 % solution of calcium hydroxide in front of you. Pour 4 mL of this solution into a test tube and add a few drops of phenolphthalein. Using a straw, blow air into the test tube and record the number of exhalations required to change the colour of the indicator.
Exhaled gas that reacts with calcium hydroxide is: ____.
Corresponding equation of this chemical reaction:
____.
Calculate how many grams of the gas is in your breath.
The test tube contained ________ grams of calcium hydroxide.
The average breath contains ________ grams _________.

Experiment Number 4

Using only substances and laboratory equipment that are in front of you, inflate the balloon.
Corresponding equation of this chemical reaction:
____.

Experiment Number 5

An unknown inorganic white substance that contains copper is in front of you.
HINT! This substance can be obtained in reaction neutralization.
Move the unknown compound to watch glass and add a drop of water.
Describe the observations:
____.
The unknown inorganic white substance is: ____.

Experiment Number 6

NOTE! There were 4 teams, and every team had the task to make a solution with different concentrations (1 %, 3 %, 5 %, and 7 %).
Make 50 mL of a 7 % solution of copper (II)-sulphate. Mark the glass with the letter C. Try to visually arrange cups A, B, C, and D in ascending order of concentration. Put one iron nail in your glass and leave until the next experiment.

Experiment Number 7

Examine the reactivity of the 4 metals that are in front of you (magnesium, iron, copper, zinc) using the reaction with hydrochloric acid. Use test tubes and 2 M hydrochloric acid for testing.
Corresponding equations of these chemical reactions:
Test tube 1: ____.
Test tube 2: ____.
Test tube 3: ____.
Test tube 4: ____.
Order of metal reactivity: ____ > ____ >____ > ____ .

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Appendix 2

Instructions for the second activity

Demonstration experiment Number 1

NOTE! This experiment performs a teacher!
There are two white powdered substances on the desk, sugar, and kitchen salt. Use the apparatus from the desk to find out which substance is sugar, and which is kitchen salt.
The test substances differ in:

____

____.

Experiment Number 1

In front of you, there are 2 beakers. Beaker A contains 10 % sodium chloride solution, and beaker B contains 25 % sodium chloride solution. Test the conductivity!
Explain the observations:

____

____.

Experiment Number 2

On the desk, you will find the burette filled with a 10% solution of hydrochloric acid (HCl). The Erlenmeyer flask contains a solution of sodium hydroxide (NaOH) of unknown concentration. Add 2 drops of methyl orange to the sodium hydroxide solution. Titrate the sodium hydroxide solution with the hydrochloric acid solution until the colour of the indicator changes and note the volume of acid consumed. Determine the mass of sodium hydroxide (NaOH) in the sample.
The indicator methyl orange changes colour from __________ to __________.
Corresponding equation of this chemical reaction:

____.

The mass of sodium hydroxide in the sample is _____ g?

Experiment 3

Preparation of the indicator from red cabbage:
Cut the red cabbage into larger pieces. Put pieces into a beaker, pour water over it, and boil it for about 30 sec. When the solution has cooled, decant, and use the solution as an indicator.
Pour the indicator solution into six test tubes and then add a few drops of the following substances to each: 2 M sodium hydroxide (NaOH), 2 M hydrochloric acid (HCl), saturated sodium bicarbonate solution ($NaHCO_3$), 2 M acetic acid (CH_3COOH), as well as on top of a teaspoon of solid sodium bicarbonate ($NaHCO_3$) and sodium chloride (NaCl).
Repeat the procedure with the other indicators phenolphthalein, bromothymol blue, and methyl orange. After testing, fill in the table with observations by entering the colours of the indicators of the tested substances in the empty fields.

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Table A1
Students' Observations after Experiment

Indicators / Test substances	Indicator from red cabbage	Phenolphthalein	Bromothymol blue	Methyl orange

Experiment Number 4

Examine the acid/base properties of two salts: aluminium (III)-sulphate and calcium carbonate with an optional indicator.
Circle the correct answer:

The solution of aluminium (III)-sulphate is: NEUTRAL BASE ACID

The calcium carbonate solution is NEUTRAL BASE ACID

Appendix 3

Procedures for making New Year's decorations made by students

Figure A1
Procedure for Obtaining Crystals

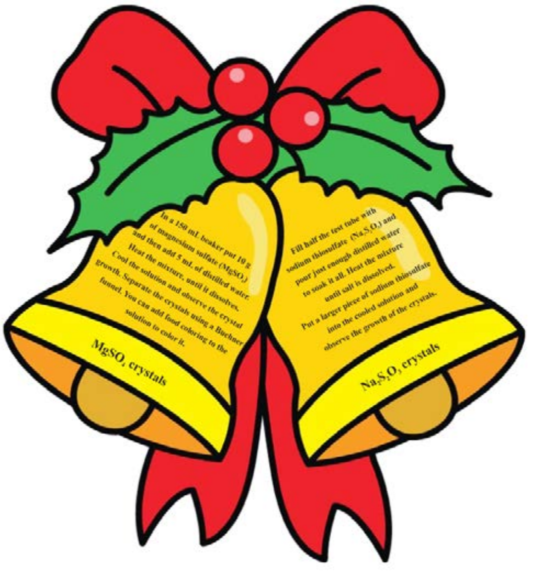

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Figure A2
Procedure for Obtaining Plastic Decorations from Milk

Figure A3
Procedure for Obtaining Plastic Decorations from Gelatine

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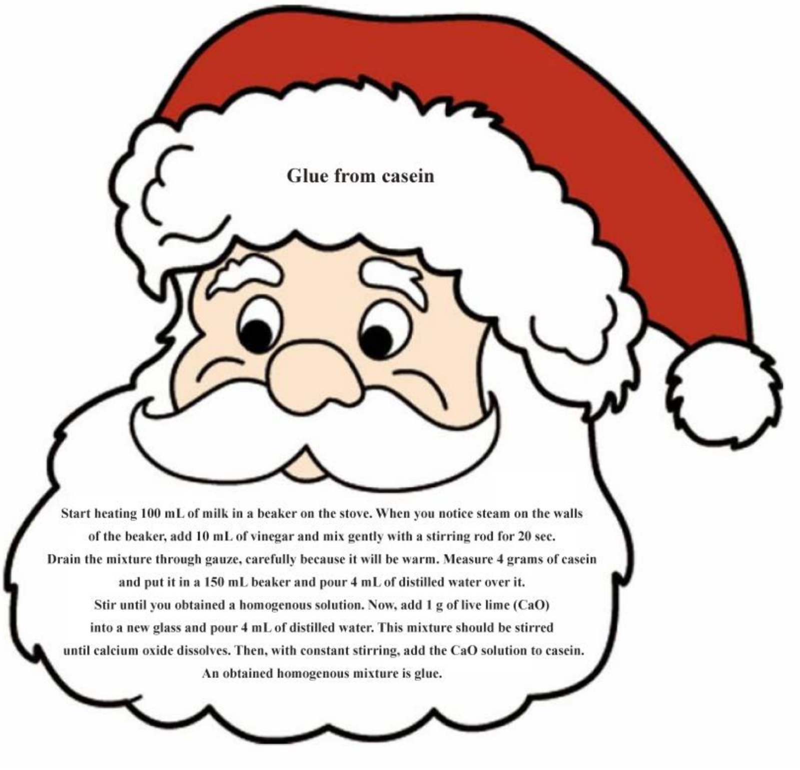
Figure A4
Procedure for Obtaining Decoration from Recycled Paper

Figure A5
Procedure for Obtaining Glue from Casein



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Appendix 4
First questionnaire

Class: ____________ School performance: ____________ Grade (Chemistry): ____________

1. At school I have the opportunity to work on projects:
a) Often;
b) Sometimes;
c) Never.

2. I have different types of the project activities in classes (cite subject/s):
____
____.

3. During solving project tasks most useful for me are:
a) Practical abilities;
b) Theoretical knowledge;
c) Both.

4. At school, I have the opportunity to learn and solve tasks in teams:
a) Often;
b) Sometimes;
c) Never.

5. Cite subject/s on which classes you work in teams:
____
____.

6. How often your school organizes creative workshops, exhibitions of arts, and sales for charity:
____
____.

7. Do you like to participate in creative workshops, exhibitions of arts, and sales for charity:
a) Yes;
b) Only on teacher's insistence;
c) No.

8. Do you like to work in a team?
a) Yes;
b) No;
c) It depends (cite reason) ____.

9. I like to solve problems and tasks independently (on my own):
a) Always;
b) Never;
c) It depends (cite reason) ____.

10. I have the possibility to express my own opinion at school:
a) Always;
b) Never;
c) It depends (cite reason) ____.

11. I have the possibility to offer a solution and express creativity at school:
a) Always;
b) Never;
c) It depends (cite reason) ____.

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12. I take the initiative during learning on classes and solving tasks:
a) Always;
b) Never;
c) It depends (cite reason) ____.

13. I take a risk during learning on classes and try to solve tasks in my own way:
a) Always;
b) Never;
c) It depends (cite reason) ____.

14. Do you like to work independently during the solving tasks or rather choose to work in a team:
a) I like to work independently;
b) I like to work in a team;
c) Equally, for me it is important that the task is solved.

15. Results of teamwork:
a) I gladly present on the behalf of the team;
b) I prefer other students to present.

16. During learning and solving tasks:
a) I use and connect with acquired knowledge from other subjects;
b) I concentrate only on that specific subject and topic.

17. I get into conflicts during working in a team:
a) Often;
b) Sometimes;
c) Never.

18. I can use knowledge and skills acquired in the school in a real-life situations:
a) Often;
b) Sometimes;
c) Rarely.

Appendix 5
Second questionnaire

1. Do you prefer to learn chemistry through activities like this or on the classical school classes and cite the reason:
a) On the classical school classes;
b) Through activities like this.
____
____.

2. After activities I have more confidence in my own chemistry knowledge:
a) Yes;
b) No.

3. During the activities I have the possibility to offer a solution and opinion:
a) Yes;
b) No;
c) It depends ____.

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4. During the activities I take the initiative in learning and solving tasks:
a) Yes;
b) No;
c) It depends ____.

5. During the activities I have an opportunity to solve tasks in a different way than usual:
a) Yes;
b) No;
c) It depends ____.

6. During the activities I have an opportunity to collaborate with other participants in order to successfully solve the task:
a) Yes;
b) No;
c) It depends ____.

7. During solving chemistry tasks through activities, I use the knowledge acquired on other classes:
a) Yes (cite subject/s) ____;
b) No.

8. I can use knowledge and skills acquired during the activities in a real-life situations:
a) Yes (explain) ____;
b) No.

9. Experiences from the activities will help me to believe more in myself and be more confident in communication and teamwork:
a) Yes;
b) No;
c) It depends ____.

10. After the activities, my self-confidence in communication under unknown environment is:
a) Bigger;
b) Less;
c) Same.

11. Which part of the activities you liked the most:
____
____.

12. Do you have difficulties during communication and solving the last task:
a) Yes (cite which difficulties);
____
____.
b) No.

13. What sources of information you did use for solving the project task:
____.

14. During teamwork and activities I felt (underline the answer that describes you):

Safe	Unsafe
Satisfied	Unsatisfied
Good mood	Bad mood
Curious	Bored

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Appendix 6
Year's decorations made by students

Figure A6
Students' works: New Year's decorations made from recycled paper (left) gelatine (middle left) milk (middle right) and crystals and gelatine (right)

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