Chapter 6

Encouragement of Entrepreneurship in Management of Preschool Learning Environment: Science Education Practices

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Abstract

Entrepreneurial characteristics are among the characteristics individuals should have in our century. Although there is an awareness of the necessity of gaining entrepreneurial characteristics at all levels of education, unfortunately, the number of studies focusing on entrepreneurship education at the preschool level is limited. For this reason, this chapter focuses on the promotion of entrepreneurship in preschool science education and it aims to draw attention to entrepreneurship education at the preschool level, the use of science activities in preschool entrepreneurship education, and guide researchers who want to work in this field and the preschool teachers who want to give entrepreneurship education. For this purpose, in this chapter, a basic framework was established for entrepreneurship education at the preschool level, and the role of science activities in preschool entrepreneurship education and the development of effective entrepreneurial preschool science activities was expressed through a non-systematic literature review. In addition, three different practical entrepreneurial preschool science activities developed by the author were introduced and suggestions were made to apply them in preschool classes.

1. Introduction

Considering today's technological, social, and economic conditions, students who will be the professionals of the future are required to have skills that can be developed with high-level thinking. The training of individuals to gain these skills is of great importance for the professional development of students and the economic development of the country. Problem-

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solving, creativity, self-management, collaboration, information literacy, productivity, technology literacy, innovation, leadership, communication, and entrepreneurship are some of these skills (Partnership for 21st Century Learning, 2019).

Thus, this chapter focuses on entrepreneurship education at the preschool learning environment management and, the use of science activities in preschool entrepreneurship education. A basic framework was established for entrepreneurship education at the preschool level, and the role of science activities in preschool entrepreneurship education were presented through a non-systematic literature review. In addition to these, three preschool science activities with their detailed implementation plans were suggested to develop students' entrepreneurial characteristics.

1.1. Entrepreneurship and Entrepreneurship Education

Entrepreneurship, one of the skills of the 21st century, has an important role in terms of increasing social development and business opportunities (Deveci, 2017). Lexical definition of the word entrepreneurship is the state of being an entrepreneur (Turkish Language Association, 2022). In the literature, different, broader and generally economic definitions of entrepreneurship are encountered. Entrepreneurship is the ability to design and plan a route for a new business venture (Achor & Wilfred-Bonse, 2013). In another definition, entrepreneurship is expressed as the process of bringing together creative and innovative ideas and discovering management and organizational skills (Hoit, 2006).

Entrepreneurship is the actual activity of entrepreneurs (Çelik, Bacanak & Çakır, 2015). Entrepreneurs are individuals who turn negative situations into positive ones, are innovative and creative, can apply their experiences to new situations, can take risks, and adapt to changing conditions (Çelik, Bacanak & Çakır, 2015). Deveci (2016) identified the most common entrepreneurial personality characteristics to be the ability to act independently, wish for success, being tolerant of uncertainty, being courageous, adapting to change, communicating effectively, seeing opportunities, being the focus of internal control, being willing, being optimistic, being determined, making decisions, self-confidence, being a leader, taking responsibility, being proactive, taking risks, being intuitive, being creative and being innovative. In another literature review, Çetinkaya-Bozkurt and Alparslan (2013) determined entrepreneurial personality characteristics as being change-oriented, developing emotional intelligence, focusing on opportunities, advanced communication skills, persistence in one's decisions, self-

confidence, proactivity, being able to solve problems easily, taking risks, being creative, being innovative and having a high motivation for success. The acquisition and development of the mentioned skills are an important necessity to keep up with the conditions of the country's economy and the current century. Entrepreneurship is both a genetic trait and can be developed in appropriate learning environments (Tağhraf & Halis, 2008). One of the main objectives of education is to enable students to acquire high-level skills and competencies (Oğuztekin, Bektaş, Karaca & Kızılay, 2022). The basic causal factors of entrepreneurship are education, culture and experiences (Lee, Chang & Lim, 2005). For this reason, entrepreneurship education has gained more importance for improving entrepreneurial characteristics.

Entrepreneurship education is a training program that aims to develop skills such as seeing opportunities for various jobs, taking risks, organization, planning, and communication, and it provides special information about the economy (Deveci & Çepni, 2014). Entrepreneurship education is mostly given in economic programs and vocational schools. However, the development of entrepreneurship should be a fundamental goal at all levels of education. Unfortunately, it is too late at the university level to gain and develop entrepreneurial skills. If the students are introduced to practices for entrepreneurship earlier, they would be entrepreneurs in the future (Wilson, 2008).

1.2. Entrepreneurship in Preschool Education

The period from the birth of the child until the age of six is the preschool education period. This period is the most critical period of life in terms of the development of personality and the acquisition of basic skills (Aksüt, 2019). During this period, brain development and synaptic connections are at their highest level, and the speed of a child's exploration and learning is affected by the opportunities in the environment (Ministry of National Education, 2013). For this reason, preschool education is accepted as the most important step of the education system (Koştur, 2019). Accordingly, the preschool learning environments will form the basis of the child's future academic, social, and emotional life.

Preschool education aims to impart many skills to children and develop them. It is thought that the most appropriate period for the acquisition of entrepreneurial characteristics is the preschool period and that children will develop a positive attitude towards entrepreneurship in this period (Axelsson, Hägglund & Sandberg, 2015). Entrepreneurship education in the preschool period enables the development of children's skills in their

future business life such as planning and regular work (Paço & Palinhas, 2011). With the entrepreneurship education to be given during this period, children who have discipline, critical thinking, problem-solving and time management skills, are self-controlled and can communicate are trained (Suzanti & Maesaroh, 2017).

The formation of an entrepreneurial spirit in children is a process that requires time and it depends on the development of the child (Suzanti & Maesaroh, 2017). The age range of 3-6 years is the most important age range for the development of entrepreneurial skills. According to Erikson's Psychosocial Development Theory, there is a confusion of guilt vs. initiative in this age range and activities that support entrepreneurship have an important role in resolving this confusion (Can, 2007). This age range is also in the preschool period; therefore, preschool teachers should develop and conduct entrepreneurial activities in and out of class.

1.3. Entrepreneurship in the Preschool Science Education

Children are exposed to many stimulants in their environment and they make observations and explore around. With these observations and explorations, children gain their first experiences with science without noticing. In the preschool period, where formal education begins, more attention should be paid to these science experiences. For this reason, science activities have major importance in the preschool period.

Preschool science activities are activities that lead children to research, inquire, explore, gain environmental awareness, pay attention, recognize life facts, and make observations (Ministry of National Education, 2013). It is aimed that children understand the universe and gain the basic skills required by the century by conducting preschool science activities (Aksüt, 2019). One of these skills is entrepreneurial skills, and science activities stimulate entrepreneurship by nature.

Entrepreneurship is a concept that has been frequently mentioned in science education in recent years and has special importance for science education (Deveci & Çepni, 2017). The number of entrepreneurship studies for science teacher candidates and science classes has increased because science education has, in terms of its features, various advantages for entrepreneurship education. For example, Deveci, Zengin and Çepni (2015) developed and assessed science-based enterprising training modules for seventh-grade students and they found that students developed creative entrepreneur ideas. On the other hand, the number of studies focusing on the preschool level has been limited and especially using science activities

to develop entrepreneur skills has been minimal. In the first example of such studies, Christianti, Cholimah and Suprayitno (2015) investigated entrepreneurship practices in early childhood with the participation of principals, teachers, and parents. According to the results of the study, all teachers and principals, and a significant part of the parents (90,79%) thought that entrepreneurship could be developed at an early age. Yetti and Azizah (2017) have determined that creativity could be developed through entrepreneurship education in early childhood. Suzanti and Maesaroh (2017) analyzed the implementation of entrepreneurship activities developed by the teachers for early childhood education and they found that some activities were effective in promoting entrepreneurial characteristics. Jufri and Wirawan (2018) developed entrepreneurial games for early childhood education and it was found that the games were effective in internalizing the entrepreneurial spirit. Hasmawaty, Syam and Saman (2020) developed role-playing-based entrepreneurial activities for early childhood and they found that activities were effective in developing entrepreneurship. As seen in the literature review, entrepreneurship in preschool science education has not been emphasized adequately.

Gaining entrepreneurial characteristics at an early age is possible with applications in science education (Bartulovic & Novasel, 2014). For this reason, preschool science activities are significantly important for entrepreneurship education at an early age. Experiments are the most basic of pre-school science activities and experiments contribute to children's entrepreneurship. By experimenting, children increase their courage and self-confidence and explore and perform creative ways to experiment. By experimenting, children develop their critical thinking and reasoning skills (Tezcan & Aslan, 2007). Another important preschool science activity is designing. Students make a plan to solve a problem in the light of their current knowledge, and in this way, they use their creative and innovative skills. Most importantly, preschool science applications are very suitable for cooperative work. By working cooperatively, students can use their entrepreneurial characteristics such as effective communication, decision making, being a leader, and taking responsibility. Therefore, an effective preschool science education will contribute to the development of entrepreneurial characteristics in children at an early age. Some application examples for preschool science activities that can stimulate the entrepreneurial characteristics of preschool students are presented in Table 1.

An effective science education depends on well-developed science activities. These activities are not about being an entrepreneur directly but they may be activities where the child can internalize entrepreneurship

within the framework of some science subjects. Although there is no clarity in the teaching process regarding the acquisition of entrepreneurial skills for students in schools (Yurtseven, 2020), a preschool teacher can create their own scope with well-designed science activities. In addition to designing a science activity, the teacher has the responsibility to effectively manage this activity in order to gain entrepreneurial characteristics in preschool. First of all, the teacher should encourage children to work cooperatively and encourage students to fulfil their individual responsibilities. During the activity, the teacher should ask correct and guiding questions, should not judge the ideas of the students and encourage them to develop innovative ideas. In activities for entrepreneurship education, children may think that they are just playing games (Rohmah, Rahayu & Latif, 2021). For this reason, the teacher should guide students while performing entrepreneurial activities.

Parents are the first teachers in a child's life. They are the most important stakeholders in the teaching process in preschool education. Family involvement is an important component of children's science achievement (Sad, 2012), and parents need to support children in science education (Perera, 2014). At this point, parents should participate in the teaching process in gaining entrepreneurial skills. According to Erikson's Psychosocial Development Theory, preschool students experience the confusion of guilt versus initiative, and the role of the family in the solution to this confusion is undeniable. For this reason, giving a role to the family in the entrepreneurial science activity developed by the teacher will be beneficial in developing the entrepreneurial characteristics of children.

Another important factor in promoting entrepreneurial skills through preschool science activities is the learning approach to be used in the implementation of the activities. Choosing the right learning approach in activities is of great importance in the development of children's entrepreneurship (Hasmawaty, Syam & Saman, 2020). Traditional approaches, in which knowledge is transferred directly and the student is passive, are insufficient in the development of many learning outcomes and do not have sufficient power in promoting entrepreneurial skills. For this reason, active learning approaches should be used in the development of entrepreneurial skills through preschool science activities. Project-based learning, inquiry-based learning and problem-based learning are some of the active learning approaches that can be used to achieve this goal.

Table 1 Some application examples for preschool science activities that can stimulate the entrepreneurial characteristics of preschool students.

Entrepreneurial characteristics (Based on Deveci's review (2016))	Application examples
Ability to act independently	Giving some tasks that increase individual responsibilities in the activity
Wish for success	Conducting teamwork with a group reward
Being tolerant of uncertainty	Exploring a solution for a problem that has not been encountered before in daily life
Being courageous	Using laboratory equipment by taking safety precautions
Adapting to change	Rotate cooperative group members
Communicating effectively	Conducting studies in cooperative groups and sharing the results of the studies with other groups
Seeing opportunities	Request to select from different alternatives and request to explain the reasons for the selection
Being the focus of internal control	Request a post-event self-assessment
Being willing	Encourage task-sharing in cooperative groups
Being optimistic	Motivate students to believe that their products designed for the activity will be useful
Being determined	Ensuring that you don't give up while solving a problem
Making decisions	Encouraging people to choose by presenting dilemma situations
Self-confidence	Experimenting individually by taking safety precautions
Being a leader	Being a leader in a cooperative group
Taking responsibility	Taking some responsibilities individually in cooperative groups
Being proactive	Encouragement to express an opinion on a problem from daily life
Taking risk	Encouragement to choose one by presenting two different alternatives never encountered before
Being intuitive	Encouragement to make predictions about the solution of a problem from everyday life
Being creative	Encouragement to solve a problem from everyday life with creative ideas
Being innovative	To add a new feature to a product and encouragement to make recommendations for improving the use of that product

1.4. Preschool Science Activities Examples for Promoting Students' Entrepreneurial skills

In this section, examples of preschool science activities developed by the author based on active learning approaches to develop children's entrepreneurial skills are presented. All activities were reviewed by a science and a preschool educator and a preschool teacher. Content areas of the activities were determined based on the classification of Saçkes (2014).

In order to develop entrepreneurial skills in each activity, it is necessary to work in cooperative groups and to determine student roles in these groups. Students should be aware of their individual responsibilities and should be supervised by the teacher whether they fulfil these responsibilities. In addition, a group leader should be chosen alternately for each activity. When making a group decision, it should be ensured that all group members express their opinions. Students can stay away from assignments that require skill and courage, especially experimenting or designing. All students in the group should take an active role during these processes. Students should also be encouraged not to give up when they make unsuccessful attempts. Students should communicate with their groupmates during the activity and with their classmates at the end of the activity. In particular, the results and the products should be presented to the whole class after each activity. Students cannot make cost or market analyses due to their age, but how the products will be introduced to other people and how the income will be used can be decided jointly with the students.

In this section, the implementation stages of the activities presented are given step by step with all their details. The reason for this is to guide the teacher in managing the implementation process of the activities. Possible and expected actions from the students and potential answers to the questions are presented in detail. The teacher should determine the students' activeness in the activity according to their educational background and readiness. If the students are ready for more open-ended practices, students can be left more freely in the implementation practices. If they do not have active learning experiences, more guidance can be provided. In addition, students can sometimes deviate from the educational objectives of activities. At this point, the teacher needs to direct the students back to the educational objectives of activities with effective classroom management and appropriate guidance.

1.4.1. A Project-Based Preschool Science Activity: "Do not be cold my dear friend"

In the presented activity, the learning process is planned under four main headings. In the implementation of these four main headings, the science-based entrepreneurship project development process proposed by Deveci and Çepni (2014) was adapted to the preschool level.

Targeted age: 5-6

Aim of the Activity: Designing a cat kennel that will be less affected by the cold

Concepts: Live, animal, hot, cold, edge, corner, inside-out

Content Area: Physical Science

Materials: Wood, nails, hammers, various insulation materials (styrofoam, cardboard, blankets, etc., according to the preference of students), glue

Entrepreneurial characteristics: Ability to act independently, wish for success, communicate effectively, being willing, being determined, self-confidence, taking responsibility, being intuitive, being creative, being innovative

Learning process: At the beginning of the activity, the teacher divides the students into cooperative groups. The main tasks in the group (group leader, spokesperson, material officer, etc.) are determined.

Stage 1. Defining the Problem

- The teacher talks to the students about pets. The teacher asks the students whether they have pets and if they do, which animal it is.
- The teacher talks to the students about the street animals. The teacher asks what these animals eat and where they sleep.
- The teacher shows the cat kennel to the students. The teacher states that animals get cold in cold weather, their feathers do not protect them enough from the cold, and when they put this kennel on the street, the street animals will be protected from the cold.
- The teacher asks the students the following question, which will also create the problem situation for the project: "This kennel can protect the cats from the cold. So, can we design a different cat kennel that will keep the cats warmer than this kennel?"

Stage 2. Planning the Project

- The teacher announces that the best-designed cat kennel will be placed in the school garden so that the cats that come to the school garden can use it. Thus, the motivation of the students for the group award can be increased.
- The students discuss how to design a cat kennel. The teacher guides the discussion and encourages all students to voice their opinions.
- Division of tasks is done to find ways to keep the cat kennel warmer.
- According to the results of the research, the necessary materials are determined.
- Everyone shares their responsibility in the project with the teacher, and the teacher follows whether these responsibilities are fulfilled during the project

Stage 3. Conducting the Project

- Each cooperative group designs its own cat kennel.
- It is ensured that all students take an active role in the design process.
- A ready-made kennel can be used or it can be made with the boards. If it is preferred to build a kennel with wooden-planks, the teacher should help with the use of nails and a hammer.

Stage 4. The accomplishment of the Project

- Each group introduces their cat kennel to the whole class. Students are encouraged to make a detailed introduction whenever possible.
- Students discuss how they choose the best kennel. For example, an online questionnaire is created by the teacher through Google Forms. Each kennel is introduced with the students' own sentences. The questionnaire is shared with the parents of the students. Each parent is told to vote for a kennel other than their child's assignment. The selected kennel is placed in the schoolyard.
- What to do with the remaining cat kennels is discussed with the students. The cat kennels are put in front of the students' homes or donated to an animal shelter.

Participation of the Parents: They will participate in the vote.

Evaluation: At the end of the activity, students can be asked the following sample questions:

- Descriptive questions: What materials did you use to strengthen your kennel?
- Affective Questions: How do you feel when you see a cat?
- Questions Regarding Educational Objectives: What is the weather like in winter?
- Associative Questions to Daily Life: Is there an animal you feed on your street?

Complementary Activity: Using cardstock paper, bird, cat and dog masks are made for all the students in the class. Students put on masks and dramatize the stray animal in the mask. Students are asked to dramatize what they feel with each change of time such as a cold winter day or a hot summer day.

1.4.2. An Inquiry-Based Learning Preschool Science Activity: "Rose Garden"

In the learning process of the presented activity, the steps of an inquiry-type experiment suggested by Hofstein, Shore, and Kipnis (2004) were adapted to the preschool level.

Targeted age: 5-6

Aim of the Activity: To obtain different colors of roses using white roses through the transport system in plants.

Concepts: Colors, Live, Plant

Content Area: Life Sciences

Materials: Coloring agent (food coloring, colored ink, watercolor, etc.), different flowers of white color (preferably rose, chrysanthemum, or carnation), knife, oversized cup.

Entrepreneurial characteristics: Ability to act independently, wish for success, communicate effectively, being willing, being determined, self-confidence, taking responsibility, being intuitive, being creative, being innovative

Learning process: At the beginning of the activity, the teacher divides the students into cooperative groups. The main tasks in the group (group leader, spokesperson, material officer, etc.) are determined.

Stage 1. Defining the Problem

- The presented activity is started with a trip to the flower garden or botanical garden, depending on the possibilities of the place where students live, so that students can learn by observing various plants and their basic characteristics. On this trip, students are allowed to observe different flowers.
- After the trip, the trip is discussed in the classroom environment. The teacher asks students what color flowers they saw. Each student is encouraged to share their observations with their classmates.
- The teacher shows a white rose and shares with the students that those plants need water like all living things, that plants have transmission pipes in their stems and that they transmit water from their roots to their flowers with the help of these pipes.
- The students are asked the following question, which will create the problem situation: "We only have white roses in our classroom. How do you think we can get roses of different colors from these white roses?"

Stage 2. Predicting the solution to the problem (hypotheses)

- Each group is asked to talk among themselves and to express group ideas. It is ensured that each student in the group contributes to the group idea. The teacher should be guided to reach a solution.

Stage 3. Planning and Conducting the Research

- The materials to obtain the colorful roses are prepared by the teacher for each cooperative group and left on the study desks.
- Students are asked to determine how they will test their solutions by using these materials under the guidance of the teacher in their cooperative groups.
- Students are asked to share tasks to test their solutions to the problem. It is requested to decide on the necessary stages for the research, such as how the roses will be colored and which colors will be preferred.
- The individual responsibilities of each student are determined and the fulfilment of these responsibilities is followed by the teacher during the activity.
- They are asked whether they have seen a rose in the color they chose before. It is evaluated whether the selected color is different from the natural rose colors (yellow, pink, red).

- Rose coloring process begins and each student is allowed to take part in the experiment.
- First of all, the roses are cut about 4 cm from the stem. The teacher does the cutting.
- Water and coloring agent are put into the glass. Roses are placed inside. It is placed in the classroom where it does not receive direct sunlight. It is observed after 1 hour and the next day.

Stage 4. Interpretation and Sharing of Results

- Each group introduces their rose and the coloring process to other groups.
- More roses are produced in groups.
- The ways to sell the roses are discussed. For example, the roses can be exhibited and sold at a bazaar at the school.
- It is decided what will be done with the income obtained. For example, the income can be used to produce new roses or donated to a non-governmental organization for children with leukemia, stray animals, etc.

Participation of the Parents: They will participate in the bazaar at the school at the end of the activity.

Evaluation: At the end of the activity, students can be asked the following sample questions:

- Descriptive questions: What color flowers have you seen in the flower garden?
- Affective Questions: How did it feel to be among so many flowers?
- Questions Regarding Educational Objectives: How do plants transmit water from the soil to their leaves?
- Associative Questions to Daily Life: What color flowers are in front of your house?

Complementary Activity: Students are asked to draw a picture of the roses they have colored on the cardstock paper. Pictures are mounted on wooden sticks covered with green crêpe paper and a rose garden is created in the classroom.

1.4.3. A Problem-Based Learning Preschool Science Activity: "A bright night"

Targeted age: 5-6

Aim of the Activity: Students design a lighting tool using waste materials

Concepts: Day and night, light-dark

Content Area: Earth and Space Science, Physical Science

Materials: Household waste, glue, lamp, electrical equipment

Entrepreneurial characteristics: Ability to act independently, wish for success, communicate effectively, being willing, being determined, self-confidence, taking responsibility, being intuitive, being creative, being innovative

Learning process:

At the beginning of the activity, the teacher divides the students into cooperative groups. The main tasks in the group (group leader, spokesperson, material officer, etc.) are determined.

Session 1: Defining the problem and making plans to solve the problem

Stage 1. Identifying the Problem

- The teacher asks the students what they do during the day. Encourages students to talk about what they do.
- The teacher asks the students what they do at night. Encourages students to talk about what they do.
- The teacher asks the students what the weather is like during the day and at night (light-dark). The teacher asks them to describe how they see ahead when it is dark at night.
- The teacher reads the following story: "When it was night and it was time to sleep, Turna would brush her teeth, put on her pyjamas, and fall asleep with her mother's fairy tale. When Turna's tale was over, her mother would turn off the light in the room and the whole room would be dark. Turna liked this darkness because she could see the stars better from the window of her room. But when she woke up at night and wanted to go to the toilet, she couldn't see ahead. She could have turned on the lamp in her room, but the switch was too high and she wasn't quite tall. Her room had to be bright so she could go to the toilet. She had to find a solution to this problem."

- The teacher asks the students, "What is the problem that Turna wants to solve?". Students are required to express the problem in their own words by asking the question.

Stage 2. Suggesting a Solution for the Problem

- Each group is asked to identify their own solution proposal for the problem. Each member of the group is encouraged to voice their opinion.
- The teacher provides guidance to students to focus on the use of a lighting tool rather than the lamp of the room.

Stage 3. Planning of the Research

- Students are asked what lighting tools they use in their homes. Until the next session, students are asked to research and photograph what lighting tools they use in their own homes and in the homes of their relatives and neighbours.
- Group members share tasks for research. The individual responsibilities of each member are determined and followed up throughout the activity.

Session 2: Sharing Research Results

- Each collaborative group shares the photos with the whole class and introduces the lighting tools.
- The teacher asks, "Which of these lighting tools can be used as a solution to Turna's problem?". The expected answer from the students is "bedside night lamps".
- Then, the teacher asks the students to design a night lamp.
- The teacher shows the students some pictures. In these pictures, there are natural resources such as forests that disappear and lakes that dry up, and also garbage heaps.
- The teacher explains to the students those natural resources are depleted, but still, a lot of garbage continues to be produced, so it is very important to make use of the waste.
- The teacher asks the groups to make the bedside night lamp they will design from their household waste. For this, students collect the waste materials (paper, metal, plastic, wood) with their families for a week.

Session 3: Problem Solving

- Each group brings their household waste to the classroom. Each group designs a bedside night lamp using the waste materials. The teacher assists in the setting of electrical equipment and the use of cutting tools.
- After the bedside night lamp is designed, each group introduces the waste they used.
- Students are asked to explain the contribution of the bedside night lamp designed by each group to the solution of the problem.
- The designed night lamps are exhibited and sold through an online exhibition. The income generated is used or donated as deemed fit by the school.

Participation of the Parents: Collection of household waste, participation in the online exhibition

Evaluation: At the end of the activity, students can be asked the following sample questions:

- Descriptive questions: Can we see the sun during the day?
- Affective Questions: How does it make you feel to watch the stars in the dark?
- Questions Regarding Educational Objectives: What do we use to light up our homes?
- Associative Questions to Daily-Life: What is your room lighting tool?

Complementary Activity: Students are asked to depict the day and night in three dimensions on cardstock paper.

2. Discussion and Conclusion

In order to adapt to the requirements of today, individuals need to have many characteristics. Entrepreneurial characteristics are the main ones among these characteristics. While entrepreneurship education was given in university programs such as Business Administration, Economics, and Engineering, today it is aimed to gain entrepreneurial characteristics at every level of education (Deveci & Çepni, 2014). Entrepreneurs rule today's world (Mathew, Olorundare & Laniyan, 2017). For this reason, the importance of sustainable and quality entrepreneurship education is increasing day by day.

Preschool education plays a key role in gaining entrepreneurial characteristics. Entrepreneurial characteristics gained at an early age contribute to the development of conscious entrepreneurs and thus society (Yurtseven, 2020). However, unfortunately, many researchers have focused on tertiary-level entrepreneurship education. This situation causes neglect of the importance of entrepreneurship education at the preschool level (Fuchs, Werner & Wallau, 2008). For this reason, introducing preschool entrepreneurship education is a major need and it is expected to provide an opportunity for researchers and teachers to become aware of the importance of this topic more deeply with this chapter.

Preschool science activities, by their nature, are highly suitable to gain entrepreneurial characteristics. As underlined in this chapter, there is a need for well-designed preschool science activities based on active learning approaches to promote entrepreneurial characteristics. For this reason, three preschool science activities based on different active learning approaches to promote the entrepreneurial characteristics of preschool students were presented.

In the presented activities, it is suggested that each activity be carried out in cooperative groups. In this way, students will both realize their own responsibilities and learn to defend their own ideas in the group, therefore, some entrepreneurial characteristics such as being a leader, ability to act independently, wish for success, communicating effectively, and being willing can be stimulated.

One of the activities includes doing an experiment and two of them are design activities. In this way, students have the opportunity to improve their self-confidence and courage and to produce creative and innovative ideas by making experiments and designs. Another important component of the activities is parent participation. Parent support is a necessity in science education (Perera, 2014) and events such as voting for the best kennel, purchasing the produced roses, and participating in the exhibition are carried out with the participation of parents in the present activities. Students carry the activities out of the classroom with the participation of their parents, and they receive the reinforcement of their parents for their initiatives in these activities. Due to the education level of the students, entrepreneurial activities such as making costs and market analyzes are not included in the activities. However, some practices that familiarize students with entrepreneurship, such as introducing their product in the exhibition, selling this product at the bazaar, and deciding where to use the income, were presented. Daily life examples are the basic elements that should be

included in the activities for the development of entrepreneurship (Deveci, 2017) and another strength of the activities presented in the chapter is that they require students to take the initiative to solve a problem on daily life. In the first activity, it is requested to design a cat kennel with innovative ideas to protect a stray animal from the cold. In the second activity, it is requested to produce roses of different colours from the roses seen in daily life in the light of innovative ideas. In the third activity, it is requested to design a lamp so that a child is not afraid of the dark, and to use waste in their design for contributing to the protection of natural resources. Thus, by performing these activities, students both carry out a series of research to solve a problem from daily life and see how the information they learned in the lesson is transferred to daily life. Entrepreneurship education provides a useful breakthrough in daily life (Heinonen & Poikkijoki, 2006) and the activities are designed to provide this.

The presented preschool science activities are supported by three different active learning approaches that have been proven to have a positive effect on many learning outcomes in the literature. It is also emphasized by the studies in the literature that the traditional approach is insufficient in many respects. For this reason, approaches that can contribute to the development of entrepreneurial characteristics at the highest level have been selected for the activities. The first activity is a project-based preschool science activity. With this activity, the students designed a project to improve the housing conditions of stray animals. While providing this, they made innovative and creative designs in their cooperative groups. Project-based learning contributes to the training of children who produce unique products and manage the learning process autonomously in the preschool period (Kaya, 2019). Moreover, students' abilities such as managing time, cooperation, coordination, and being a leader, which create their entrepreneurial spirit are improved by using this approach (Sousa 2018). The second activity was developed based on an inquiry-based learning approach. In this activity, students questioned the ways of producing a different colour rose from daily life with an innovative perspective. Comprehension of the importance of science through improving students' inquiry skills is vital (Deniş-Çeliker & Dere, 2022). With inquiry-based learning, children gain experience in communication and designing a new product or model (Öztürk & Tulum, 2021). Inquiry-based learning provides children to learn improving their several ability (Qamariyah, Rahayu, Fajaroh & Alsulami, 2021). In addition to this, they can develop several scientific skills as well as can learn scientific concepts by inquiring (Borrull & Valls, 2021). Inquiry-based learning requires suggesting creative and innovative research ways to test hypotheses

for solving the problem and working together in this process, thus this approach contributes to the development of many entrepreneurial skills in students. The last activity was prepared within the framework of problem-based learning. While solving the problem in this activity, the students use their daily life experiences and conduct comprehensive research around them. They use waste in their designs and make creative and innovative designs. Problem-based learning is important in terms of entrepreneurship education (Deveci, 2016). Conducting a problem-based learning activity requires some characteristics such as taking responsibility for problem-solving, communicating, being determined, and suggesting creative and innovative ideas, just like project-based learning and inquiry-based learning activities. Using these characteristics provides an opportunity for the development of entrepreneurial characteristics.

As a result, the presented chapter has detailed the development of entrepreneurial characteristics of preschool students with science activities through a non-systematic review. It is hoped that this chapter will contribute to researchers and teachers who will conduct entrepreneurship education at the pre-school level. In the light of the presented chapter, it is recommended to design more entrepreneurial activities for pre-school science subjects and make them available to pre-school teachers.

3. References

Achor, E. E., & Wilfred-Bonse, K. (2013). The need to integrate entrepreneurship education into science education teachers' curriculum in Nigeria. *Journal of Science and Vocational Education (JSVE), 7,* 111-123.

Aksüt, P. (2019). Erken çocukluk döneminde fen eğitimi nedir [What is the science education at the early childhood]. In P. Aksüt (Ed.) *Erken çocukluk döneminde fen eğitimi [The science education at the early childhood]* (pp. 1-19). Ankara: Nobel Yayınevi.

Amos, A., & Onifade, C. A. (2013). The perception of students on the need for entrepreneurship education in teacher education programme. *Global Journal of Human-Social Science Research, 13*(3), 75-80.

Axelsson, K., Hägglund, S., & Sandberg, A. (2015). Entrepreneurial learning in education: Preschool as a take-off for the entrepreneurial self. *Journal of education and training, 2*(2), 40-58.

Bartulović, P., & Novosel, D. (2014). Entrepreneurial competencies in elementary schools. *Obrazovanje za poduzetništvo-E4E: znanstveno stručni časopis o obrazovanju za poduzetništvo, 4*(1), 83-87.

Borrull, A. & Valls, C. (2021). Inquiry laboratory activity: investigating the effects of mobile phone on yeasts viability. *Journal of Turkish Science Education*, *18*(2), 176-191.

Can, G. (2007). Kişilik gelişimi [Personality Development]. In B. Yeşilyaprak (Ed.) *Eğitim Psikolojisi [Educational Psychology]* (pp. 117-151). Ankara: Pegem Akademi.

Christianti, M., Cholimah, N., & Suprayitno, B. (2015). Development of entrepreneurship learning model for early childhood. *Asia Pacific Journal of Multidisciplinary Research, 3*(3), 65-70.

Çelik, H., Bacanak, A., & Çakir, E. (2015). Development of science laboratory entrepreneurship scale. *Journal of Turkish Science Education. 12*(3),65-78.

Çetinkaya Bozkurt, Ö., & Alparslan, A. M. (2013). Girişimcilerde bulunması gereken özellikler ile girişimcilik eğitimi: girişimci ve öğrenci görüşleri. *Girişimcilik ve Kalkınma Dergisi, 8*(1) 7-28.

Deniş-Çeliker, H., & Dere, S. (2022). The effects of the problem-based learning supported by experiments in science course: students' inquiry learning and reflective thinking skills. *Journal of Science Learning, 5*(1), 14-27.

Deveci, İ. (2016). *Fen bilimleri öğretim programıyla (5-8) bütünleştirilmiş girişimcilik eğitimi modüllerinin geliştirilmesi, uygulanması ve değerlendirilmesi [The development, implementation and evaluation of entrepreneurship training modules integrated with middle school science curriculum]* (Unpublished Doctoral Dissertation). Uludağ University Educational Science Institute, Bursa.

Deveci, İ. (2017). Fen bilimleri öğretmen adaylarının girişimci özellikleri ile ilgili öz değerlendirmeleri [Self-assessments of prospective science teachers about entrepreneurial characteristics]. *Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi, 44*, 202-228.

Deveci, İ. & Çepni, S. (2014). Fen bilimleri öğretmen eğitiminde girişimcilik [Entrepreneurship in science teacher education]. *Journal of Turkish Science Education, 11*(2), 161-188.

Deveci, İ., & Çepni, S. (2017). Studies conducted on entrepreneurship in science education: thematic review of research. *Journal of Turkish Science Education, 14*(4), 126-143.

Deveci, İ., Zengin M.N., & Çepni, S. (2015). Fen tabanlı girişimcilik eğitimi modüllerinin geliştirilmesi ve değerlendirilmesi. *Eğitim Bilimleri ve Uygulama (EBULİNE), 14*(27), 59-80.

Fuchs, K., Werner, A. & Wallau, F. (2008). Entrepreneurship education in Germany and Sweden: what role do different school systems play? *Journal of Small Business and Entreprise Development, 15*(2), 365–381.

Hasmawaty, H., Syam, H., & Saman, A. (2020). Validity, practicality, and effectiveness: The last step in development of entrepreneurship education-based role-playing for kindergarten. *Universal Journal of Educational Research, 8*(12B), 8092-8101.

Heinonen, J., & Poikkijoki, S. (2006). An entrepreneurial-directed approach to entrepreneurship education: mission impossible? *Journal of Management Development, 25*(1), 80–94.

Hofstein, A., Shore, R., & Kipnis, M. (2004). Providing high school chemistry students with opportunities to develop learning skills in an inquiry-type laboratory: A case study. *International Journal of Science Education, 26*(1), 47-62.

Hoit, D.H. (2006). Entrepreneurship New Venture creation. New Delhi: Prentice Hall Limited.

Jufri, M., & Wirawan, H. (2018). Internalizing the spirit of entrepreneurship in early childhood education through traditional games. *Education+ Training*.

Kaya, G. (2019). Erken çocukluk dönemi kullanılan yöntem ve teknikler [Method and techniques at the early childhood science education]. In P. Aksüt (Ed.) *Erken çocukluk döneminde fen eğitimi [The science education at the early childhood]* (pp. 149-200). Ankara: Nobel Yayınevi.

Koştur, H. İ. (2019). Erken çocukluk eğitiminde fen eğitimi ve önemi [Science education at the early childhood education]. In Ş. Ünlü Çetin (Ed.) *Erken çocukluk fen eğitiminde temel konular ve güncel yaklaşımlar [Basic issues and current approaches at the early childhood science education]* (pp. 1-15). Ankara: Nobel Yayınevi.

Lee, S. M., Chang, D., & Lim, S. B. (2005). Impact of entrepreneurship education: a comparative study of the US and Korea. *The International Entrepreneurship and Management Journal, 1*(1), 27-43.

Mathew, B. A., Olorundare, J., & Laniyan, B. E. (2017). Entrepreneurship in Science Education as Panacea to Nigeria's Development in the 21st Century. *International Journal of Social Sciences and Conflict Management, 2*(4), 199-212.

Ministry of National Education (2013). *Okul Öncesi Eğitim Programı [Curriculum of Preschool Education]*. Ankara.

Oğuztekin, E., Bektaş, O., Karaca, M., & Kızılay, E. (2022). Türkiye'de fen eğitiminde girişimcilik ile ilgili yapılan çalışmaların analizi: Bir meta-sentez çalışması [An analysis of studies on entrepreneurship in science education in Turkey: A meta-synthesis study]. *Türk Eğitim Bilimleri Dergisi, 20*(1), 86-106.

Paço, A. D. & Palinhas, M. J. (2011). Teaching entrepreneurship to children: a case study. *Journal of Vocational Education & Training, 63*(4), 593-608.

Partnership for 21st Century Learning. (2015). Frameworks & Resources. Retrived from http://www.battelleforkids.org/networks/p21/frameworks-resources (04.05.2022).

Perera, L. D. H. (2014). Parents' attitudes towards science and their children's science achievement. *International Journal of Science Education, 36*(18), 3021-3041.

Qamariyah, S. N., Rahayu, S., Fajaroh, F., & Alsulami, N. M. (2021). The Effect of Implementation of Inquiry-Based Learning with Socio-Scientific Issues on Students' Higher-Order Thinking Skills. Journal of Science Learning, 4(3), 210-218.

Rohmah, L., Rahayu, D. P., & Latif, M. A. (2021). Spiritual-based entrepreneurship education for early childhood: lesson from Indonesia. *Jurnal Pendidikan Islam, 10*(2), 159-180.

Saçkes, M. (2014) How often do early childhood teachers teach science concepts? Determinants of the frequency of science teaching in kindergarten. *European Early Childhood Education Research Journal, 22*(2), 169-184.

Sad, S. N. (2012). Investigation of parental involvement tasks as predictors of primary students' turkish, math, and science & technology achievement. *Eurasian Journal of Educational Research, 48,* 135-154.

Sousa, M. J. (2018). Entrepreneurship skills development in higher education courses for teams' leaders. *Administrative sciences, 8*(2), 18.

Suzanti, L. & Maesaroh, S. (2017). *Entrepreneurship learning for early childhood - a case study of children age 4 – 5 in TK Khalifah Ciracas Serang*. In Proceedings of the 2nd International Conference on Economic Education and Entrepreneurship (ICEEE 2017), pages 403-410.

Syawaludin, A., Prasetyo, Z.K., Jabar, C.S.A. & Retnawati, H. (2022). The effect of project-based learning model and online learning settings on analytical skills of discovery learning, interactive demonstrations, and inquiry lessons. *Journal of Turkish Science Education, 19*(2), 608-621.

Tağraf, H. & Halis, M. (2008). Üniversitelerdeki girişimcilik eğitiminin "girişimsel öz yetkinlik" algısı üzerindeki etkisi: bir araştırma [Effect of entrepreneurship education at universities on entrepereneurship self-perfection perception: A research]. *Girişimcilik ve Kalkınma Dergisi, 3*(2), 91–111.

Tezcan, H., & Aslan, S. (2007). Lise öğrencilerinin çözeltiler konusunu kavramaları üzerine laboratuar destekli öğretim yönteminin etkisi [Effect of the laboratory supported method on the understanding of solutions subject of high school pupils]. *Gazi University Journal of Gazi Educational Faculty, 27*(3), 65-81.

Turkish Language Association (2022). Güncel Türkçe Sözlük [Current Turkish Dictionary]. Retrived from https://sozluk.gov.tr/ (04.05.2022).

Wilson, K. (2008). Entrepreneurship education in Europe. In J. Potter (Ed.) *Entrepreneurship and higher education* (pp. 119-137). Paris: OECD Publishing.

Yetti, E., & Azizah, S. A. (2016). *Improved creativity in early childhood through entrepreneurship education. In 3rd International Conference on Early Childhood Education* (ICECE 2016) (pp. 399-403). Atlantis Press.