



Identifying the General Ideas, Attitudes and Expectations Pertaining to Science Activities of the Teachers Employed in Preschool Education

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ABSTRACT

Being a descriptive investigation, this study aims to identify the general ideas, attitudes, and expectations regarding science activities conducted by the teachers working in preschool education organizations. The data were collected through a questionnaire made up of nine open-ended questions. The sample consisted of 50 teachers in preschool education in provincial Ankara.

The study has revealed that the teachers had difficulty in using their knowledge in science activities in practice, accessing textbooks or documents including applied examples of science activities, and developing materials to use in their science classes.

Therefore, it is suggested that teachers should be given seminars illustrating activities for science and the efforts should be directed towards increasing the number of textbooks and documents in the field.

Keywords: Preschool Education Teacher, Science Activities

INTRODUCTION

Preschool level is the period when children make the most significant progress in the development of cognitive, physical, linguistic, emotional, and social (Şahin, 2000:1). Thus, the quality of education provided in this period is of great importance. Using child curiosity and questions asked by children is the key to increase the quality of education (Bal, 1993; Şahin & Ökçün, 2000; Aktaş Arnas, 2002; Ardaç, 2003). Teaching Science during pre-school education is based upon the visual experiences of children and thus it is the type of education in which the curiosity, questioning, and investigation skills are reinforced and where children can find answers to the questions occurring to them (Çağlak, 1999; Wortham, 1998; Forman & Kaden, 1987). Science instruction in preschool education has a rich content that covers almost everything children interact with in the world they are in. Science activities help children to develop observation skills. Through science activities, children examine the changes occurring when objects interact (e.g., sand and water games), and witness such natural phenomena as sinking, floating, freezing, melting,

or evaporation. Children also develop skills to use basic tools to solve problems they face in daily life, and even they can build simple machines.

Through transferring what they have learned in science classes to what they do in daily life, children comprehend what is happening in the world about them better (e.g., plants' growth, the significance of the sun for the living things, the importance of environmental conservation, the functions of body organs etc.) (Dere & Ömeroğlu, 2001; Şahin & Çağlak; 2000; Bigelow, 2002; Macaroğlu Akgül, 2004). The children who enjoy science activities in the pre-school period are expected to develop a positive attitude towards science in their future lives (Çamlıbel Çakmak, 2006:2). In this context, the teacher plays a key role. Hence, it is important to see that the difficulties the teachers encounter during science activities should be identified so that they could be helped for the improvement of the science lessons (Şahin, 2006: 105). Following from this point, the pilot study by Ayvacı et al (2002) has revealed that teachers face certain difficulties when they conduct science activities. According to their study, among the main reasons why science instruction is not delivered effectively are teachers' insufficient subject-matter knowledge, inadequate physical conditions of the school, and limited materials and tools, little time allocated for science activities and instruction which is mostly depended on rote memorization. Moreover, it was concluded that none of the teachers (the 15 teachers of preschool education) participating in the study used such methods and techniques as concept maps, games, drama, making models out of waste materials, and problem-solving (Ayvacı, Devocioğlu & Yiğit, 2002: 4).

Karaer and Kösterelliöğlu (2005) carried out a study in provincial Amasya and Sinop to identify the techniques used by preschool education teachers to teach the concepts of science and concluded that the teachers found the science education they had received insufficient and they could not develop themselves professionally due to a number of reasons, among which they listed were that there were no seminars or in-service training activities or that they could not attend the activities. A similar study was carried out by Ayvacı, Devocioğlu and Yiğit (2002), with the result that the teachers found themselves not effective enough in conducting the science activities (quoted in Karaer & Kösterelliöğlu, 2005).

However, science education in preschool education could be made more active, more effective, and more enjoyable through a great number of activities. Although teachers learn those activities during their education, they do not use them during their science instruction in preschool. On the other hand, the science activities in the preschool education classes are underrated by the teachers due to the fact that teachers think science instruction cannot be delivered without a laboratory, and adequate equipment, and that science as a subject matter is too challenging for preschool children (Ayvacı, Devocioğlu & Yiğit, 2002: 4).

Considering the scope and related practices of science instruction, it is quite possible to provide children with enriched educational opportunities through easy techniques and affordable materials. However, it is necessary that the impediments that obstruct the smooth flow of the process whereby science activities are planned and performed be comprehensively identified and teachers' needs with respect to these problems be identified and thus a more effective science instruction delivery could be feasible. Hence, this study has been carried out to help teachers to identify the challenges and problems in science instruction in preschool education.

This study is important in that it provides teachers with the opportunity to spell out their opinions about how they could conduct science activities better. Further, it is hoped with this study that teachers will serve as the source in the development of academic works (seminars, books etc.) that will help them in their effort to plan and conduct science activities.

METHODOLOGY

This study is qualitative. The data were collected through open-ended questions. As the instrument, “The Questionnaire Form for the Identification of the Opinions, Attitudes, and Expectations of the Pre-school Teachers about Science Activities” was used. The collected data were analyzed through content analysis. Through content analysis, the questionnaire and sub-themes were formed. Considering the repetition of the sub-themes by the teachers, their frequency and percentages were calculated. The sub-themes were interpreted according to the rate of these values. The statements of the teachers were cited when the values were interpreted. All the interpretations were checked by two experts, one being a statistician and the other an expert in preschool education. In the light of expert opinion, the interpretations were revised.

a- Participants

The sample of the study consisted of the 50 randomly-selected preschool education teachers working in different districts of provincial Ankara (namely, Yenimahalle, Çankaya, Etimesgut, Sincan, Altındağ and Keçiören) in the academic year 2005-2006. All of the participants teach students of 3-6 ages. The questionnaire forms were sent to 100 teachers, but 50 returned in a proper state to be evaluated. 20 of the participants worked in private preschool education, while the other 30 were in state schools. All of the participants were female.

b- Instrument

The data were collected through a questionnaire made up of nine open-ended questions to identify the opinions of the teachers regarding science activities. After the related literature was extensively reviewed before the construction of the test items, 15 items were constructed. Expert opinions were sought from 12 experts through a 5-point Likert type scale. As a result, 9 items were found to be reliable and thus the questionnaire was formed in the light of the opinions of three other experts.

The questionnaire forms, containing 9 open-ended questions, were distributed by the researchers to the teachers. The teachers responded the items in writing.

FINDINGS AND DISCUSSION

In this section, the research questions and the participants’ responses as illustrated by frequencies and percentages are presented.

1. What do you think about the idea that science instruction is unnecessary in pre-school school and that science instruction should start in primary school?

The teachers’ opinions regarding the fact that science education should start at primary school are presented in Table 1.

Table 1. *Distribution of the teachers’ opinions regarding the fact that science education should start at primary school*

Sub-themes	f	%
1. I strongly agree that science education should start in the pre-school period after it is adapted according to the age and developmental needs of the children.	50	100

Total	50	100
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All the participants stated that science instruction was necessary and must be delivered according to age and developmental characteristics of children.

Some of the responses for this question are presented below:

Participant 1: “*The children at the ages of 3–6 need science education so that they could learn about the environment they live in, natural occurrences, and generate original ideas.*”

Participant 2: “*I believe that for science education primary school period is too late. Science education is necessary in the pre-school period for the children to improve their creativity and learn about different perspectives. Moreover, science education in the pre-school period forms the basis for the science education at primary school and that’s why it is necessary in the early years.*”

Briefly, the participants express that science instruction is important as it helps children to learn about the world, help them to improve their thinking skills and increase their creativity as well as helping them to get prepared for primary school. They also add that science instruction serves as a rich source in terms of directing children to discovery and research, satisfying their curiosity. Therefore, in their opinion, science instruction should be supplemented at home as well.

2. Can you develop the materials that you may use in science activities? Are you in need of support to do this?

The teachers’ opinions regarding materials development for science activities in the pre-school period are shown in Table 2.

Table 2. *Distribution of the teachers’ opinions regarding materials development for science activities in the pre-school period*

Sub-themes	f	%
1.I do not develop materials to use in science activities. I use ready-made materials.	3	6
2.I’m not competent enough to develop materials for science activities. I need support for this.	9	18
3.I occasionally develop materials, but still I need support.	31	62
4.I have no difficulty in developing materials for science activities.	7	14
Total	50	100

While three teachers (6 %) expressed that they did not develop any materials to use in science activities and used ready-made materials instead, nine teachers (18 %) stated that they were not competent enough to develop course materials and thus were in need of support. On the other hand, 31 teachers (62 %) explained that they occasionally developed course materials, yet still they needed guide-books, CDs, or courses to improve themselves in materials development. One of the teachers said that he had difficulty in finding proper course materials, while seven teachers (14 %) said they had no difficulty in developing materials to use in science activities.

The teachers expressed that they sometimes developed such materials as weather graphs, boards showing seasons, things for simple experiments, collection of natural scene, clocks, weathercocks, flash-cards of concepts, aquariums, and megaphones. However, it

was found that though the teachers developed such materials, most of them (86 %, n= 43) stated that they were still in need of help for material development.

Some of the teachers' opinions related to this question as follows.

Participant 1: *"I think that materials for science activities would not be a problem if enough care were taken. As far as I know, a number of materials for this purpose are available. Also, it is not necessary to buy them as we, the teachers, are able to develop them."*

Participant 2: *"With the children we build scales and weigh toys. I can make certain experiments about the earth more concrete by using such fruit as oranges. However, there are not many alternatives."*

Participant 3: *"I am able to develop new materials, but if courses to develop materials, especially for science activities, this will help our perspectives get broaden."*

3. Do you think that science teaching course during your faculty education was sufficient for your teaching? What is your expectation as to this?

30 of the teachers (60 %) said they found the course insufficient. Four teachers, while finding the course sufficient, explained that the course should be enriched. 15 teachers, graduating from vocational high schools for girls, stated that the science education which they had received at high school was not sufficient and that they did some extra work to compensate. One teacher said he "did not remember." Table 3 illustrates the teachers' opinions about whether undergraduate science education courses were satisfactory.

Table 3. *Distribution of the teachers' opinions about whether undergraduate science education courses are satisfactory*

Sub-themes	f	%
1. I do not find undergraduate education satisfactory.	30	60
2. Science education is satisfactory, but still the content of the course must be enriched.	4	8
3. We have not benefited much from the science classes offered in Vocational High Schools for Girls.	15	30
4. I do not remember	1	2
Total	50	100

The responses to this question indicate that 90 % of the teachers found the science education they had received not enough to meet their needs, pointing out the fact that most of the science course was at the theoretical level. They also emphasized that the science lessons must be enriched, focusing more on activity planning and practices.

Some of the teachers' opinions regarding this question are given below.

Participant 1: *"Science education offered at university is not satisfactory. I think comprehensive seminars about science education should be organized."*

Participant 2: *"I do not think that the courses are sufficient. Science activities are neglected."*

Participant 3: *"It is satisfactory but needs support. We cannot add more to what we learnt at university."*

Participant 4: *"Science education can be designed in such a way as to include more concrete and visual and varied examples and thus it could be more productive."*

Participant 5: “The number of the activities in science classes is too limited, and the examples studied are mostly for primary school children. What we need is to study those activities made concrete through the use of materials.”

Participant 6: “I believe that undergraduate education provides teachers with technical knowledge rather than some applied examples. I’d rather it were full of examples showing us which concept can be taught using which approach.”

In his study about identifying teachers’ attitudes toward science and science activities, Çamlıbel Çakmak (2006) has found out that pre-school teacher trainees’ attitudes toward science and science activities vary considerably. He has made some suggestions about the revision of the courses at university in terms of content, approaches, techniques and materials.

In his study about the self-efficacy beliefs of the pre-school teacher trainees about science, Alabay (2006) has concluded that the higher the academic success of the teacher trainees is, the higher their level of self-efficacy beliefs about science becomes. Alabay has also suggested that the number of the courses about science be increased and science classes be designed according to the professional needs of the teachers.

Consequently, when the results of these studies are compared with the findings of our study, it is seen that the science lessons delivered during faculty education must be enriched, focusing more on activity planning and practices.

4. Do you think that the textbooks designed to guide the teacher for science activities are satisfactory? Do you have any suggestions about textbooks?

Table 4 presents the teachers’ opinions about the books for science activities used in pre-school education.

Table 4. *Distribution of the teachers’ opinions about the books for science activities used in pre-school education*

Sub-themes	f	%
1. I find the books about science activities satisfactory.	21	42
2. Books for science activities are not varied. They are almost the same as one another.	26	54
3. Practical examples should be presented through seminars rather than through books.	1	2
4. No response	2	4
Total	50	100

While 21 of the teachers (42 %) said the textbooks were adequate, 26 of them (54 %) stated that the textbooks were not varied enough, emphasizing that the books on the market were almost the same as one another. On the other hand, most of the teachers stressed that the books were designed for primary school children and that there had been few books they could use on the market only recently. Two of the teachers did not answer this question, while one teacher explained “Practical examples should be presented through seminars rather than providing books.” The teachers who found the number of the books on science activities adequate said that the activities in the books could be enriched and varied by the teachers and used accordingly in the classes.

The teachers’ responses to this question show that more than half of the teachers were concerned about the quality rather than the quantity of the books containing science activities.

Some of the teacher responses to this question as follows:

Participant 1: “I don’t find them satisfactory. I believe that the books should provide more details.”

Participant 2: “I admit that there are fewer books in this field than in other fields. However, the number of books for those teachers interested is enough.”

Participant 3: “When compared with other books about certain activities, books including science activities are fewer. My expectation is that those working in the field should prepare books including science activities.”

Participant 4: “I certainly do not find them satisfactory. Science activities are not regarded as important as other activities. It is possible that more detail and more visual materials can be developed.”

Participant 5: “The number of books about this can be increased. I suggest that the activities teachers do can be compiled and distributed to other teachers.”

These opinions suggest that textbooks for science education in preschool should be improved in terms of both quantity and quality.

5. Do you have enough materials that you can use in your science classes in your classroom? What are your expectations about this and whom do you expect to do something?

The teachers’ opinions about whether they have enough materials for science activities are given in Table 5.

Table 5. *Distribution of the teachers’ opinions about whether they have enough materials for science activities*

Sub-themes	f	%
1. I have enough materials for science activities and science-nature corner.	11	22
2. I don’t have enough materials for science activities and science-nature corner. However, I take the necessary support from both parents and school administration.	33	66
3. The physical conditions of the classroom are not good enough to design the materials for science-nature corner. Thus, I use provisional materials when needed.	3	6
4. No response.	3	6
Total	50	100

33 of the teachers (66 %) expressed that they did not have enough materials for science activities and science-nature corner and that they tried to find the materials on their own, sometimes getting help from parents and school management. 11 of the teachers (22 %) stated that they had enough materials in the classrooms and had no difficulty finding the materials. Three of the teachers said that they were not able to set up a science-nature corner because of the physical conditions of the classrooms, but they set up this corner in a temporary fashion and thus they did not have these materials in the classrooms for permanent use. One teacher expressed that they do not get enough support as there are no laboratories in the school.

It is seen that 74 % of the teachers were in the opinion that they did not have these materials and were in an effort to obtain them with the help of the parents and the school management. On the other hand, it is interesting to note that there were teachers expressing that unfavorable physical conditions of the classrooms hindered the delivery of quality science instruction.

Some of the teacher responses to this question as follows:

Participant 1: “We don’t even have a science-nature corner in our classrooms. The physical conditions of the classrooms are not appropriate. Sometime we set up a superficial science-nature corner. However, we do not have a proper corner and permanent materials.”

Participant 2: “As we do not have a lab in our school, we cannot deliver classes effectively. I can deliver classes by using science activities but at a minimum level.”

Participant 3: “I certainly do not have the physical capacity to allow for the materials and science-nature corner in my classroom. Therefore, I have to use such experiments as those whose result can be seen immediately. I cannot conduct activities that take a lot of time. I expect the school administration and the Ministry of Education to do something for this.”

Participant 4: “Unfortunately, we have difficulty in this. I try to find materials on my own.”

Participant 5: “We have limited opportunities to find materials to use in science activities. Our school should provide us with more opportunities considering our needs.”

Participant 6: “We get enough support from parents when we need varied materials.”

Kandır and Çaltık (2006) have found that one of the most inadequate tools in preschool is science-nature corner. Similarly, Ülküer (1993) has found that science-nature corner is not in an effective state (quoted in Kandır and Çaltık,2006). Consequently, it is seen that science-nature corner in preschool should be improved and enriched.

6. Do you feel that you are competent enough to plan and conduct science activities? What kind of support do you need for this?

10 of the teachers (20 %) said that they felt they were competent enough to plan and conduct science activities and had no difficulty in that. 11 of the teachers (22 %) stated that they felt they were not fully competent.

11(22%) teachers expressed that they did not feel competent enough and they added that they need materials which will guide them in planning and application of science activities and these materials should be comprehensible, easily accessible books, CDs, seminars, in-service courses of preschool level science education. 15 (30%) teachers said that they did not feel competent in this field and they needed any help which would support them. 12 teachers (24%) mentioned that they felt competent in both planning and conducting science activities, but they even needed a support for following the latest improvements. (having an appropriate physical condition, courses, materials, etc.).

Table 6 shows the teachers’ opinions about whether they feel they are competent in planning and conducting science activities in the pre-school education.

Table 6. *Distribution of the teachers’ opinions about their competency in planning and conducting science activities in the pre-school education*

Sub-themes	f	%
1. I feel competent enough to plan and conduct science activities and have no difficulty at all.	10	20
2. I do not feel competent to plan and conduct science activities and I need support.	26	52
4. Although I feel competent enough to plan and conduct science activities, I sometimes feel incompetent. However, I still need support.	11	22

5.No response.	3	6
Total	50	100

When the given answers were analyzed, it was seen that 74% of the teachers expressed that in planning and conducting science activities, they needed books, CDs, as well as in-service training, which would guide them.

Some of the teacher responses to this question are given below.

Participant 1: *“I learn and apply new things every day. We live in an era when learning has no limit, so we have to check on the developments in the field.”*

Participant 2: *“I need support especially for the science activities on specific subjects.”*

Participant 3: *“As a teacher, I feel competent, but as for the arrangement of the physical setting and finding materials, I need support.”*

Participant 4: *“I don’t feel fully competent. I need applied examples that can be used in pre-school education.”*

Participant 5: *“I cannot perform stably when I try to combine such activities as drama and music with science activities.”*

Participant 6: *“I try to benefit from the books and my colleagues, but I think in-service training and applied courses should be offered.”*

These findings are supported by the recent studies. his study about identifying teachers’ attitudes toward science and science activities in pre-school education, Schneider (2005) cites examples from teachers demanding that in-service training and applied courses should be offered to help the teachers improve their planning and conducting skills (cited in Ünal & Akman, 2006: 255). Similarly, Ünal and Akman (2006) have discovered that as the level of education received vary, so do teachers’ attitudes toward science education. They have also found that those teachers who have received in-service training have a more positive attitude. Further, Aykut (2006) states that although teachers feel competent in biology, they do not feel so in geology, astronomy, physics and chemistry.

The fact that teachers experience problems in planning and conducting science activities may be caused by inadequate practical exercises during faculty education, limited resources to be used for preschools, and unfavorable physical conditions.

7. What are the methods and techniques that you use in conducting science activities?

The teachers’ opinions about the methods and techniques they use in pre-school education when they conduct science activities are given in Table 7.

Table 7. *Distribution of the teachers’ opinions about the methods and techniques used in science activities*

Sub-themes	f	%
1. I use all the methods and techniques but concept maps.	3	6
2. I use all the methods and techniques when necessary.	14	28
3. I use certain methods.	29	58
4. No response.	4	8
Total	50	100

While conducting science activities, 14 teachers said that they used all methods and techniques, whereas 3 teachers (6%) mentioned that they used each method and technique except concept maps. 29 teachers (58%) expressed that they used certain methods and techniques. 4 of the teachers did not give an answer to that question.

The methods and the techniques which 29 teachers (58%) used are shown in Table 8.

Table 8. *Methods and Techniques Teachers Use in Conducting Science Activities in Preschool Education*

Methods and Techniques Used in Science Activities	Frequency of Use
1. Observational visits	25
2. Picture-Question-Answer -Discussion	22
3. Team work	20
4. Drama by using Turkish Language-Arts	15
5. Project Work	14
6. Games	13
7. Experiments	12
8. Concept maps	9

When Table 8 is examined, it can be seen that teachers used visit and observe most and concept maps the least. According to a previous study about competencies for conducting science activities of 15 teachers, it was found that teachers had not used games, drama, concept map, discussion and problem solving techniques. This finding can be interpreted as the fact that teacher prefer to use traditional methods, they are not aware of the contemporary methodology, and they spend no effort to apply them even if they know such methodology. (Ayvacı, Devocioğlu & Yiğit.2002: 4). Contrary to the mentioned investigation, this study revealed that the teachers use all the techniques and methods in appropriate situations. Such a difference is thought to be caused by the fact that teachers in big cities have more access to educational resources.

8. What do you find most important when evaluating science activities?

Table 9 presents the viewpoints of teachers about evaluating the applications of the science activities.

Table 9. *The points the teachers attend to while evaluating the application of the science activities*

Sub-themes	f	%
1. I do the evaluation with the children according to the needs and interests of the children and according to whether the objectives are reached.	40	80
2. I do the evaluation considering its contribution to cognitive development.	1	2
3. No response.	9	18
Total	50	100

While evaluating the application of the science activities, 40 teachers (80%), expressed that they put into consideration whether they met the interests and the needs of the children, the children's duration of attention, and the children's interpretations. 1 of the teachers made the evaluation according to the contribution to cognitive development and 9 (18%) of them did not give any answers to that question.

At the end of the evaluation of science activities, 2 % of the teachers mentioned the contribution of the activities on children's cognitive development. Although they were few in number, this finding shows that some preschool teachers still think that the activities in their daily plans support only certain developmental areas. However, it is a fact that as

other activities in the daily plan, science activities should support all the developmental areas of a child.

Some of the teacher responses to this question are given below.

Participant 1: “I pay attention to whether the objectives are reached and whether the children participate willingly when I do the evaluation.”

Participant 2: “I pay attention to what the children get as a result of the activity and to what extent the material used is effective.”

Participant 3: “I pay attention to whether the objectives are reached by asking open-ended questions.”

Participant 4: “The attention-span of the children, their carefulness when following the activity, the questions they ask, their evaluation and interpretation of the result of the activity give me clues about whether the activity is a success or not.”

9. How often do you use science activities in your teaching?

The findings concerning the extent to which the teachers conduct science activities are given in Table 10.

Table 10. *Distribution of the teachers according to the extent to which they conduct science activities*

Sub-themes	f	%
1. I regularly conduct science activities	23	46
2. I don't conduct science activities regularly.	26	52
3. No response	1	2
Total	49	100

23 (46%) of the teachers mentioned that they regularly used science activities, whereas 26(52%) of them said that they did not. The teachers said that they could not conduct science activities regularly because of the intensiveness of the daily activities but they tried to use them once or twice a week.

The teachers' incompetence in conducting the science activities regularly shows that their problems, such as lack of knowledge about a subject, incompetence in applying what is known, or materials' being limited, affect the level of the application of the science activities. This result is the same with Ayvaci et al.'s (2002) findings. In the previous studies by Ayvaci et al. (2002) about *the competency of preschool teacher's in the application of science activities*, it was found out that the teachers could not conduct science activities regularly because of various reasons, such as lack of knowledge about a subject, incompetence in planning, or materials' being limited, although the activities were on the plan.

CONCLUSIONS AND SUGGESTIONS

This study has been carried out to identify the general ideas, attitudes, and expectations regarding science activities by the teachers working in preschools. The data collected through a questionnaire which was made up of nine open-ended questions and were classified into groups and thus analyzed. The participants expressed what difficulties they experienced during science classes and stated their expectations to improve their teaching.

According to the study, the teachers emphasized that they sometimes felt incompetent in conducting science activities because of such reasons as the difficulty in

obtaining certain materials, the obligation to get the official permission from the school administration for visit and observe activities done by the class and poor physical conditions of the classrooms, making it very difficult to set up science corners. The teachers explained that they needed practical examples in planning and conducting science activities and suggested that the adequacy of materials, such as CDs, textbooks etc. including example science activities designed for pre-school children should be increased. On the other hand, they said that the books on the market were almost the same as one another and not giving much insight to the teacher to plan and design science activities, which brought about the need for practical and accessible class materials. Stating that they had difficulty in transferring what they had learnt into real life situations, the teachers emphasized that they needed in-service training which would guide them for improvement in their teaching.

The teachers said that they were helped by parents and school management to find the materials for science activities. However, more than half of the teachers were not able to use science activities regularly in their classes and had difficulty in planning and conducting science activities.

The teachers' opinions about the causes of not using science activities regularly can be listed as:

- The education they had received at the faculties of education was mostly theoretical and for that reason they had difficulty in transferring this knowledge to the practice. Therefore, they needed courses providing them with more practical examples during the years of university education.
- Developing materials for science activities should effectively be taught during initial teacher education.
- The poor physical conditions of the working environment negatively affect the science activities practices. Thus, they cannot conduct effective science lessons.
- They cannot benefit well from the textbooks containing science activities because of their low quality in terms of design and content.

Having to teach in the classrooms where the physical conditions are poor, the teachers expressed that they had difficulty in conducting science activities because of the poor conditions (e.g., crowded classrooms, not having enough space in the classroom, etc.). Considering the fact that spacious places are of vital importance in pre-school education, it is obvious that the school environment and the classrooms should be designed accordingly. The administrators in both private and state schools should be aware of these issues and direct their efforts to improve the physical conditions in the schools. In other words, the school settings should be changed into places where the teachers could be able to put what they have learnt at the faculty into practice in classroom settings.

What this study has shown is that the teacher trainees should be provided with more practical courses rather than theoretical courses during their initial teacher education, so that they could develop their teaching skills better. Further, they should be helped to acquire the skills to develop teaching and learning materials.

In order to broaden teachers' perspectives, high quality, varied, accessible materials should be used in science classes, such as CDs, textbooks, or periodicals should be developed in the light of expert guidance for teachers to employ the ideas in their science classes.

Finally, teachers should be supported through seminars or in-service training activities directed by experienced specialists, so that teachers reach the high quality teaching level. It is seen that the teachers participating in this study had positive attitudes towards professional development. Therefore, if they are given the opportunity to renew

themselves professionally, they will benefit from such occasions and make their classes more enjoyable.

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