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The awareness levels of pre-school education teachers regarding science process skills

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Abstract

In this study, of the developmental domains in Pre-school Education Program 2009 for Children 60-72 months of age, inclusion frequency of science process skill attainments in cognitive domain in the daily lesson plans practiced in a year and the awareness levels of the pre-school teachers regarding science process skills are examined. In respect to this, to determine the awareness of the pre-school teachers regarding science process skills, an Interview Form was prepared. From qualitative research techniques, content analysis and descriptive analysis were applied to the interview forms. According to the analysis results, it is concluded that teachers do not give much place to the science activities in pre-school education and awareness levels of teachers regarding science process skills are remarkably low.

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Keywords: Pre-school Education; science education; science process skills; awareness levels regarding science process skills; daily lesson plan.

1. Introduction

One of the recent approaches regarding giving science education more efficiently aims at teaching science process skills to the children. Basically, to teach about the science, the science process skills benefit from the ways that the scientists pursue while doing science. “It is better for children to learn to do science than to learn the facts, concepts, generalizations, theories and laws someone else has concluded; that it is far more important for children to master the process skills than to learn facts; and that children should do science the way scientists do science” (Martin, 1997, p: 57). Science process skills are the skills that we internalize through our experiments and that we use to solve the problems that we come across (Bentley, Ebert E, Ebert C, 2000). Educational purpose is by teaching the children these skills help them grow as individuals capable of accessing to information and understanding information.

Science process skills are classified by many researchers (Martin, 1997; Bentley, Ebert E, Ebert C, 2000; Johnston, 2005; Peters, Stout, 2006). Martin and Bentley, Ebert E. and Ebert C. Classified science process skills as follows;

- Basic science process skills: observation, classification, communication, measurement, prediction, inference,

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- Integrated skills: defining and controlling variables, formulating and testing hypotheses, defining operationally, experimenting, interpreting data, formulating models.

Peters and Stout classified these skills as observation, classification, measurement, communication, inference, prediction and experimenting. In Science and Technology Program (2005), these skills are classified under three different headlines as Planning and Starting, Practice, Analysis and Inference and presented as follows;

- Planning and Starting: Observation, comparison and classification, inference, prediction, estimation, defining variables
- Practice: Formulating Hypothesis, designing experiment, recognizing experiment materials and tools, setting up of experiment mechanism, controlling and changing variables, defining operationally, measurement, collecting data and information, data recording.
- Analysis and Inference: Data processing and formulating model, interpretation and inference, presentation.

Whereas John Johnston (2005) by combining science process skills with problem solving steps classified them as follows;

- Exploration: observation, inquiry, classification, formulating hypothesis
- Planning: planning research, determination of the sources, determination of what to measure, data collection, communication
- Making Future Predictions
- Research: Actualization of understanding, determining measurement tool, controlling variables, recording data
- Interpretation: analyzing data, interpreting data, testing hypothesis
- Communication: what did we do, what did we find, and what did we change?

Regarding teaching science process skills in early childhood, Martin (2001) argues all science process skills can be taught while Ritz (2007) argues four science skills as observation, communication, comparison, classification or organization can be taught.

In early years of their lives, children come across with the situations whereby they use their science process skills. Beginning from the time when they begin to understand the external world, they have their initial scientific experiences resulting from their social and physical lives and their personal discoveries. For example, babies in their mother's wombs can already hear sounds and even they can by differentiating these sounds respond to them. After birth, their scientific experiences rapidly increase as a result of their lives in external world. A baby observes that when it throws a toy it falls to the ground and from then on, it knows that it should look for the toy on the ground. Similarly, while bathing, it observes that some of the toys float while others sink. Thus, they discover certain basic laws such as gravitation and buoyancy by experiencing (Johnston, 2005). In parallel with language development, the interaction of the children with the environment increases. The children get curious about the concepts and situations that they come across with and they begin to ask questions. Their desire to discover and understand their environment is intense, they want to touch to everything, the question "why" is at the forefront. In this period in which the children are eager to learn and discover, it may be possible to teach them science process skills and their accessing information and problem solving skills may be improved.

In early childhood period, since the children do not have enough cognitive maturity, their discoveries are not planned. Therefore, when planning the education of the children in this period, teaching them basic skills which will lead them to high level skills should be aimed. Teachers are expected to develop programs which pave the way for the children to play, discover, solve problems and make research, supporting their ability and perception development and enable the children to take part actively in these programs (Harlen, Macro, Reed, Schilling, 2004; Ünal, Akman, 2006). Suggested basic skills in early childhood education may be specified as observation, classification, measurement, prediction and (Bentley, Ebert E. et. Ebert C. 2000; Johnston 2005; Harlen, Macro, Reed, Schilling 2004).

1.1. The purpose of the study

The purpose of the study is to examine the educational attainments in pre-school education program 2006 for children 60 – 72 months of age in terms of science process skills, to determine how much weight is given to scientific process skills in daily lesson plan samples practiced in pre-school education institutions and daily lesson plan samples from various publishing houses and to determine the awareness of preschool teachers regarding science process skills.

1.2. Problem statement

How much weight is given to attainments serving to scientific process skills taking place in preschool education program 2006 in daily lesson plans that preschool teachers practiced in 2008-2009 academic year and in daily lesson plan samples from various daily lesson plans and what is the awareness of preschool teachers regarding scientific process?

2. Method

In the study, from the developmental domains in Preschool Education Program, inclusion frequency of science process skill attainments (Target 2: To be able to observe various features of phenomena or beings, Target 6: To be able group beings according to their various features, Target 8: To be able to measure objects, Target 18: To be able solve problems) in daily lesson plans in a year and interview forms which inquire awareness levels of teachers regarding science process skills are examined.

Lesson plans used in this study consist of lesson plans applied in both private and public pre-school institutions in 2008-2009 academic year and daily preschool lesson plan samples from publishing houses. Ten preschool daily lesson plans were examined in the study. These plans were provided by the teachers whose work experience is between 1-10 years, working in both private and public pre-school institutions in the provinces Ankara (1), Bursa (1), Kırıkkale (1), İstanbul (2), Kayseri (1) at the end of the academic year and from the web-pages of publishing houses.

In the study, *Interview Form* was prepared to determine the awareness levels of teachers regarding science process skills. The interview form; consists of seven questions, two multiple choice question for demographic data, two sorting questions for the awareness levels regarding science process skills, one opinion question and two paragraph questions requiring answers. On the issue of validity of the interview form, opinions of three experts were taken. Qualitative analysis was applied to data acquired from interview form.

From qualitative research techniques, content analysis and descriptive analysis were applied in the study. Meaningful themes were chosen from literature in content analysis and codes formulated that correspond to the themes from the activity samples that take place in interview forms. And in descriptive analysis part, frequency values of these codes were calculated. For the reliability of scorer, three researches came together and coded three selected forms and scorer reliability calculation result was .91.

3. Results (Findings)

Findings acquired in the study were examined under two sections as examination of the daily lesson plans and determination of teacher awareness.

3.1 Findings related to daily lesson plans

When daily plans were examined, inclusion frequencies of attainments in five developmental domains in Preschool Education Program 2006 in selected daily plans were found as follows.

Table 1. Inclusion Frequency of Developmental Domains in Daily Plans

Cognitive	Social-Emotional	Psychomotor	Self-care	Language Development
26%	24%	19%	11%	20%

When table is examined, it is seen that more place is given to social emotional domain and cognitive domain attainments than other developmental domain attainments. However when total attainment numbers are examined it is seen that the percents in the table is in parallel with attainment numbers.

While the percentage of the science process skills attainments among cognitive process skill attainments in Preschool Education Program 2006 is 22%, this percentage was found as 27 % in selected lesson plans. It is seen

that although scientific process skills attainments take pretty much place in the selected daily plans, these attainments do not show a balanced distribution among themselves.

Table 2. Distribution of Scientific Process Skills Attainments Among Themselves in the Selected Daily Plans

Observation	Classification	Measurement	Problem Solving
68%	17%	4%	11%

When table is examined, it is seen that attainments regarding observation skill is higher than other science process skills attainments. It is concluded that preschool education teachers give more place to the activities that help to develop observation skills in daily lesson plans when selecting activities regarding teaching scientific process skills. Besides, measurement skill takes remarkably less place in daily plans than observation, classification and problem solving skills. It is thought that it is appropriate that the percentage of inclusion frequency of science process skills attainments in daily plans are close to each other, whereas, the fact that measurement and problem solving targets are much lower than expected shows that preschool teachers do not make plans for these targets.

2.2 Findings derived from the Interview Forms

At the second phase of the study, the aim is to examine the awareness of the teachers regarding science process skills. For this purpose, opinions of 68 preschool teachers from 78 cities were taken. Distribution of the participants according to residence cities is as follows.

Table 3. Distribution of the Participations According to Residing Cities

Cities																	
Ankara	Artvin	Balıkesir	Bilecik	Bolu	Bursa	Çanakkale	Çorum	Diyarbakır	Erzurum	İstanbul	Kayseri	Kocaeli	Malatya	Manisa	Şırnak	Tekirdağ	Total
37	2	8	1	1	1	1	1	1	1	3	1	2	1	1	2	2	68

The participants were divided into two groups according to the types of the schools they work in. Preschool teachers working in any primary school of Ministry of Education take place in Public and preschool teachers working in certain preschools serving to the children of the personnel of an institution take place in Institution group. And participants were divided into three groups according to their work experience. School types and work experience distribution of the participants are as follows.

Table 4. School Type and Work Experience Distribution of the Participants

Experience	0-3 years	Count	Public	Institution	Total
			25	10	35
		% of Total	36,8%	14,7%	51,5%
	4-10 years	Count	6	7	13
		% of Total	8,8%	10,3%	19,1%
	11 and above	Count	1	19	20
		% of Total	1,5%	27,9%	29,4%
Total		Count	32	36	68
		% of Total	47,1%	52,9%	100,0%

According to data derived from the interview form that participant preschool teachers filed, 78% percent of the preschool teachers play activities take place in first three among activity types. Drama activities with 54% and Turkish activities with 52% follow play activities. The place of science activities among most preferred three

activity type is 13,2%. A great number of the participants (approximately 53%) preferred to put science activities in last two.

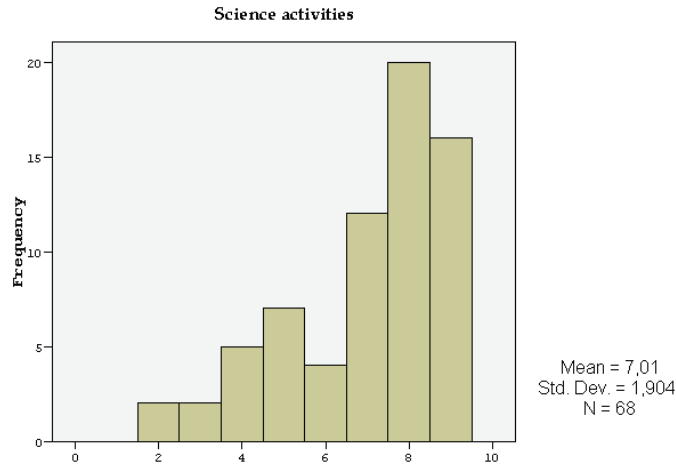


Figure I. Preference Ranking of Science Activities in Application

The participant preschool teachers were asked whether it is appropriate to teach science process skills in preschool period or not and the results are as follows.

Table 5. Opinions of the Participants Regarding Teaching Science Process Skills

	Observation		Measurement		Data Recording		Testing Hypothesis	
	N	%	N	%	N	%	N	%
Appropriate	61	91	28	41.2	17	26.2	17	26.6
Not appropriate	6	9	40	58.8	48	73.8	47	73.4

A significant number of the participants (91%) stated that it is appropriate to teach observation skill in preschool period. This situation is in parallel with the fact that more place is given to observation skills in daily lesson plans. About measurement skills, the participants have two different opinions. 58,8% percent of the participants stated that it is not appropriate to teach measurement skills in preschool period. The percentage of the participants who are on the opinion that it is not appropriate to teach data recording and testing hypothesis skills in preschool period is much higher. 73,8% and 73,4% percent of the participants stated that it is not appropriate to teach data recording skills and testing hypothesis skills are not appropriate respectively. According to information derived from interview forms data recording and testing hypothesis skills are considered as high level skills by teachers. However, it is stated that, even in most basic level, children in preschool period can generate solutions to the problems and can record observation and measurement results (Martin, 2001).

In the study, the participants were requested to share an activity that they practice in an academic year and thirteen science activities were chosen from these activities and subjected to descriptive analysis method. Codes formulated according to the statements of teachers are specified in following table.

Table 6. Codes and Frequencies of Science Process Skills

Codes	f
Observation	17
○ Examining (7)	
○ Observing (10)	
Classification	3
Measurement	2
Prediction	1
Recording and Interpreting Data	4
Formulating and Testing Hypothesis	4
○ Formulating Hypothesis (1)	
○ Testing Hypothesis (3)	
Communication	6
○ Sharing the Results(3)	
○ Exempling (1)	
○ Explaining (2)	
Formulating a Model	1

Table shows that highest frequencies belong to the observation skill and the lowest frequencies belong to the prediction and model formulating skills. When data acquired from daily lesson plans that preschool teachers use in an academic year and opinions of the teachers regarding teaching science process skills taken into consideration, the frequencies of observation skills are not surprising. However, taking frequencies of other skills this constitutes a contradiction with the opinions of the teachers. For example, while a great number of teachers are on the opinion that it is not appropriate to teach data recording and testing hypothesis skills their giving place to these skills in their activities indicates that their awareness regarding science process skills are low.

4. Discussion

According to the collected data, the most proffered activity types are play, drama and Turkish activities. And the least preferred activity types consist of maths, science and preparation to reading-writing activities. It is seen that teachers usually avoid practicing activities aiming science process skill attainments. The attitudes of the teachers towards science education and correspondingly the activities they prepare affect children's attainment of science process skills and development of their intellectual skills (Ünal, Akman, 2006). Özbek (2009) found out in his study, although 82,8% percent of preschool teachers think that it is appropriate to give science education in preschool period, they are involuntary to give science education and avoid practicing activities regarding science education in their classrooms. The reasons of this are determined to be that they think they do not have sufficient knowledge regarding science and they believe although they have the answer they cannot give science education suitable for the level of the children. Besides, the possibility that the answers of the teachers to the questions of the children include misconceptions is high. Whereas, the teachers who view science education as making research, inquiring and accessing information together with children saw that they both felt comfortable while studying science and their knowledge level increased thanks to this approach (Martin, 2001; Kallery and Psillos, 2001; Palmer, 2002; Altınok, 2004).

5. Conclusion and Recommendation

It is seen that a large number of the daily lesson plans collected from the participant preschool teachers were ready to use plans from publishing houses, and the rest is the customized version of the daily lesson plans of ready to use plans. The daily lesson plans prepared by publishing houses are thought to be suitable with the attainments in Preschool Education Program and therefore teachers prefer these plans. However, when these plans are examined, it is seen that though the distribution of attainments regarding developmental areas is appropriate, distribution of science process skills is not. In their undergraduate education period, the teachers take education regarding preparing daily lesson plans suitable with the structure and the needs of the class and have the opportunity to

actualize these plans. In the interviews, it was seen that even the fresh graduate teachers with just a few months of vocational experience avoid preparing their own plans. From this point of view, more detailed research may be carried out to find out why the teachers prefer to use ready to use plans.

In-service trainings/seminars/courses may be organized to introduce science process skills to the preschool teachers. Much emphasis may be put on the fact that teachers do not have to know everything about all scientific laws, what is important is that taking role as the one who research and learn together with the child in the process of accessing information. Thus, the concerns of the teachers regarding science education may be eliminated and children may like science and become more interested.

A large number of the preschool teachers stated that it is not appropriate to teach science process skills in preschool period. But science process skills take place in Preschool Education Program among attainments in cognitive domain. in parallel with that, they take place in daily lesson plans that teachers use in academic year. This indicates that the preschool teachers do not have information about science process skills.

According to the results that the study yielded, the opinions of the teachers regarding the science process skills that the children in this period should attain are in parallel with the targets and attainments in Preschool Education Program. From this point forth, by informing preschool teachers of the needs, expectations and attainments of the children in this period, they may be helped to internalize the program and integrate it into in-class practices.

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