

Meaning of Play with Loose Parts Materials in Preschool Education: A Case Study*

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Abstract: This study aimed to determine the opinions of preschool teachers on loose parts materials (LP) and the reflections of these opinions in practice. This study, which was conducted by the qualitative research method, adopted the case study design (ERASMUS+ KA229). The purposive sampling method was used to select participants for this study. The research was carried out at a public school in the Etimesgut district of Ankara province, Turkey. This school was participating in a European Union project called Learn by Design. This project aims to improve children's creativity, conceptual understanding, and overall developmental levels through the use of LP. It was planned to be carried out between September 2019 and June 2022. The participants of the study consisted of seven preschool teachers who will actively implement the project during the 2020-2021 school year. To further deepen the research and show the reflections of the project in practice, the project's product output posts on social media (photos and videos) from the same school year were also included. The obtained data were analyzed using the content analysis technique. In this study, it was determined that integrating LP into educational environments increased children's learning motivation, general happiness, and positive social behaviors, increased parent participation by strengthening parent-school communication and interaction, supported children in numerous ways, and contributed to their holistic development, as well as assisted children in becoming independent, competent individuals who create, discover, and innovate.

Keywords: Preschool education, loose parts materials, play with loose parts materials, preschool teacher.

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Introduction

Play is the most important occupation of the child. Many of the seemingly ordinary actions of children turn into play after a while. Play is the need that enables us to adapt to the world and create learning experiences (Elkind, 2011).. Therefore, the play has a critical role in the preschool period. To make the best use of this critical period, it is necessary to provide the right tools for the child to explore themselves and the world around them. The studies conducted on outdoor learning activities and plays showed that games played with LP were key components that supported all learning opportunities, including a sense of discovery, curiosity, and creativity (Flannigan & Dietze, 2017; Kiewra & Veselack, 2016).

LP are natural or synthetic materials that can be moved, combined, redesigned, used alone, or in multiple ways with other materials without any intended use (Nicholson, 1971). LP is child-oriented and challenges adult choices and preferences. Compared to the toys produced or purchased by adults, LP allows reusing, assigning different purposes and meanings, rethinking, designing, and deciding on waste materials (Flannigan & Dietze, 2017; Neill, 2018). Play with loose parts materials (PwLP) is suitable for all age groups. It offers children endless possibilities through moving, adding, subtracting, reusing, redesigning, breaking apart, and combining. It is claimed that integrating LPs into outdoor spaces can provide a method and provocation that activates divergent and creative thinking skills (Neill, 2018; Smith-Gilman, 2018).

The principles for using LP in early childhood education are built on solid theoretical foundations (Smith-Gilman, 2018). For example, in her book "My System of Education", Montessori (1915) emphasizes that children can explore freely, without adult intervention, in an environment prepared with well-chosen materials. The Reggio Emilia approach states that young children's potential to form their own identities and generate hypotheses can be motivated through LPP. Many educational approaches, such as Reggio Emilia, Waldorf, and Montessori, advocate the need for real experiences to acquire life skills (Casey & Robertson, 2016). Playing with a variety of loose parts, flexible materials supports these approaches. Similarly, Froebel stated that the child's natural sense of curiosity, creativity, and exploration can be supported with LP (Aksoy & Aksoy, 2018; Provenzo, 2009; Smith-Gilman, 2018) and that a greater progress can be made in creativity when the play material becomes flexible and offers more diverse usage possibilities (Kiewra & Veselack, 2016; Tovey, 2007). This emphasis on LP by early childhood education pioneers evokes experiences with heuristic play. Heuristic play allows children to build their own plays while simultaneously putting various open-ended objects together in creative ways. Based on these views, it can be thought that LP can support creativity through heuristic play.

The studies conducted so far show that teachers play an important role in facilitating children's play and developing depth and understanding (McInnes et al., 2011; Siraj-Blatchford et al., 2002). It is becoming increasingly clear that teachers' provision of opportunities for PwLP has a direct impact on children's creative abilities (Daly &

Beloglovsky, 2015; Drew & Rankin, 2004; McClintic, 2014). Ensuring that the play environment is rich in LPs and allowing children to use these materials as they wish is important in facilitating learning and development (Casey & Robertson, 2016). In summary, PwLP requires careful planning and support from teachers. Therefore, this study aimed to determine the opinions of preschool teachers on the LP and the reflections of these opinions in practice. Within the framework of this aim, the answers to the following research questions will be sought:

1. What are preschool teachers' opinions about the difference between LP and other materials?
2. How do preschool teachers use LP in planning and implementing educational activities?
3. What is the role of teachers in PwLP?
4. What are the opinions and thoughts of children and parents about LP according to preschool teachers?
5. What are the opinions of preschool teachers on the contributions/benefits of LP?
6. What are the reflections of the activities carried out with LP at school on the home environment?

Method

Research Design

This study employed the qualitative research methodology. Qualitative research is a method for discovering or understanding the meanings attributed by individuals or groups to a social or human problem or phenomenon (Creswell, 2017). In line with the aim of this specific study, the case study design, one of the qualitative research designs, was preferred to reveal the opinions of teachers and parents about PwLP and its reflections on practice in detail. According to Merriam (2015), a case study, which is an in-depth description and examination of a limited system, is the most appropriate design to be used when there is a need to comprehend, explore, and interpret a situation/fact/phenomenon that is desired to be investigated among qualitative study methods. This is because a case study may aim at understanding or evaluating a particular subject, problem, or issue (Creswell, 2017).

Study Group

The purposive sampling technique was used in determining the participants of this study. Purposive sampling allows for in-depth analysis by selecting information-rich situations depending on the purpose of the study (Buyukozturk, 2012). This study was conducted

at a public school in the Etimesgut district of Ankara province, Turkey. This school was running a European Union project called Learn by Design (ERASMUS+ KA229). This study aimed at improving children's creativity, conceptual levels, and general developmental levels with the use of LP and was planned to be conducted between September 2019 and June 2022. Twenty-eight team members and 68 teachers from six countries (Turkey, Portugal, Poland, Bulgaria, Romania, Lithuania) were actively involved in the project. The school where the research was conducted was the organizer and executor of the project.

In the school where the research was conducted, two "Learn by Design Workshops" were created to carry out the practices for LP. The workshops created are in the corridors where the kindergartens are located. The workshops have cabinets and work desks at a height that children can easily reach. There are modular wooden boxes on the cabinet shelves, the amount of which can be changed according to the needs. LP requested from parents, collected from nature with children, and purchased, albeit limited, placed in these boxes. Teachers use this area with the children twice a week. The periods when the area is used are the so-called free play hours.

Seven preschool teachers were working in this school. Six of the preschool teachers had a five-year-old group and one of them had a four-year-old group. Semi-structured interviews were conducted with the teachers who volunteered to participate in the study. To evaluate the reflections of the project on the application, the social media posts of the project, which include the visuals of the plays and designs created with LP, were also included in the research. The evaluated social media posts belong to the 2020-21 academic year. The main reason for choosing this period is that it is the longest period in which project implementations have not been interrupted due to the Covid-19 global pandemic. Information about the participating teachers is presented in Table 1.

Numbered codes were used instead of the real names of the teachers participating in the research (see Table 1). The average age of the participating teachers is 36.5, while the average of professional seniority is 12.8 years. Five of the teachers graduated from the preschool teaching department, one of the teachers graduated from the child development and preschool teaching department, and one of the teachers graduated from the kindergarten teaching department. It was seen that all the teachers participating in this study were graduates of undergraduate programs. It was determined that the professional interests of the teachers included plays, oractivities, and children's books, while their hobbies included traveling, playing instruments, painting, and handicrafts.

Many researchers have associated LP materials with subjects such as creativity (Kiewra & Veselack, 2016; Lisaniyah vd., 2022, Mozaffer, 2017), play behaviors (MacQuarrie vd., 2022), contributions to development areas (Branje, 2021; Daly & Beloglovsky, 2015; Gibson vd., 2017), development of thinking skills (Trinanda & Yaswinda, 2022), STEM[†] education (Nipriansyah vd., 2021; Rahardjo, 2019; Rahaju vd. 2022; Wagland, 2018),

[†] STEM (Science, Technology, Engineering, Mathematics)

and social development (Mackley vd., 2022) especially in recent years. The school where the study was conducted and the kindergarten teachers of the school is the first and -yet- the only public school in Türkiye that conducts long-term (more than one year) and systematic studies with LP materials. For this reason, the opinions of the teachers working in the relevant school on the integration of loose parts materials into play and learning environment and their social media posts on the subject are very important for the study to be the only source that can find answers to the research questions.

Table 1.

Demographic Information of Teachers

Code Name	Age	Professional Seniority	Last Graduated School	Age Group	Professional Interests	Personal Hobbies
T1	34	9	Preschool Education Undergraduate Program	5-year-old	Orff activities, drama	Charcoal and oil painting works
T2	37	13	Preschool Education Undergraduate Program	5-year-old	Children’s books, technology, STEM, coding, fairy tales	Cycling, knitting, Web 2.0 tools, traveling, playing ukulele
T3	40	15	Child Development and Preschool Teaching Undergraduate Program	4-year-old	Children’s books, play activities, Orff activities	Puzzles, traveling, cooking, crafts
T4	46	22	Kindergarten Teaching Undergraduate Program	5-year-old	Turkish language activities, play, and music activities	Listening to music, traveling, knitting
T5	39	17	Preschool Education Undergraduate Program	5-year-old	Establishing learning centers, producing, and designing educational toys, children’s books	Taking photographs, painting, playing the ukulele, nature activities, traveling
T6	31	9	Preschool Education Undergraduate Program	5-year-old	Intelligence games, play activities, orff studies	Walking, reading, playing an instrument
T7	29	5	Preschool Education Undergraduate Program	5-year-old	Play, music and Turkish language activities	Kitchen chores

Data Collection Process and Tools

Case data is all of the information available about the current situation. This comprises information from interviews, observations, document data (such as program records), and information about the case's setting and what others have commented about it (Patton, 2018). To conduct this study, the researchers applied for the ethics committee's approval two months before the data collection phase. After obtaining the approval of

the committee, the researchers interviewed the teachers. In this study, a semi-structured interview form consisting of nine questions prepared by the researchers was used to determine teachers' opinions about LP. A field survey was conducted, and critical determinants of the LP were revealed before preparing the interview forms. Then, teacher and parent interview questions were formed in line with the research questions. The opinions of two preschool education experts who conducted studies on subjects such as sustainability, forest pedagogy, and environmental education were obtained before finalizing the interview questions. Necessary changes were made in line with the opinions of the experts.

The teacher interview questions prepared in line with the research questions were presented in Table 2.

Table 2.

Interview Questions

Research Question	Source	Interview Question
What are the opinions of preschool teachers about the difference of LP from other materials?	Teacher	- Considering the LP and other toys, what are the main differences?
How do preschool teachers use LP in planning and implementing educational activities?	Teacher Social Media Products/Outputs	- Which LP do you include in your educational environment (classroom, garden, etc.)? Drilling Question (DQ): Why do you choose them? - What do you pay attention to when placing the LP in the educational environment? - Considering your daily education flow, what activities do you use the LP in? DQ: When you consider all the types of activities implemented in preschool, what is the place of LP in these activities?
What is the role of teachers in PwLP?	Teacher	- Can you explain your role in children's PwLP? DQ: Do you structure the plays/activities or leave it to the children's preferences?
What are the opinions and thoughts of children and parents about LP according to preschool teachers?	Teacher	- What are the attitudes of children towards PwLP? DQ: How do they react when it is time to play/activity with these materials? - What are the attitudes of parents towards PwLP? DQ: What kind of feedback do you receive from the families about their children's PwLP?
What are the opinions of preschool teachers on the contributions/benefits of LP?	Teacher	- What is the role/importance of LP in the child's play? - What benefits can PwLP have for the child? DQ: In which developmental areas do you think these benefits support the child?

During the interviews with the teachers, attention was paid to keeping the environment calm and to creating an environment where only the researcher and the teacher were together. Before starting the interview, the participating teachers were informed that participation in the study was voluntary, and their permission was obtained to record the interview using a voice recorder. In addition, the participating teachers were informed that they could end the interview whenever they wanted, code names would be used

instead of their real names, and the interview could be sustained by taking written notes instead of taking audio recordings if requested. After providing the necessary information, the participating teachers were requested to sign the voluntary participation form and give permission for the audio recordings. Each interview lasted between 10 and 20 minutes on average. The interviews were carried out outside school hours, and the educational activities of the participants were not interrupted. After the interview was transcribed a few days later, the reports were shared with the participating teachers, and a member check was performed.

During the data collection process, the activity/product photos and videos shared as project outputs on the active social media accounts of the school and the ongoing project were also evaluated. Screenshots were taken when evaluating the videos, and these screenshots were saved. Instead of the videos, the saved screenshots were included in the analysis (213 screenshots).

Data Analysis

The posts on the social media accounts of the pertinent project were carefully analyzed before we began to analyze the social media data. Since the same images are shared simultaneously on both (Instagram and Facebook) project social media accounts, it has been decided to get a transcript of the posts of only one account (Instagram). The photos and videos in the account within the specified date range were documented by taking screenshots for analysis in the MaxQDA 2020 qualitative data analysis program. Before beginning to analyze the data on teachers' opinions, the interviews were written down and both sets of data were organized into files. These records, which were edited and transformed into an analyzable format, were first read, and analyzed by the two researchers conducting this study. An inductive content analysis was conducted for all two data types (teacher interview, and social media transcripts). The inductive analysis aims to reveal the concepts underlying the data and the relationships between these concepts through coding (Yildirim & Simsek, 2018). The obtained data were analyzed using MaxQDA 2020 analysis software. First, data files and dumps were added to this software, and codes were created by dividing the data into meaningful sections based on the purpose of the study and the interview questions related to this purpose. Then, the prepared codes were brought together to form meaningful groups, and categories were created. The themes were obtained in the final stage.

In the next phase of the study, expert opinion was sought to finalize the codes, categories, and themes. In this regard, opinions were obtained from an assessment and evaluation expert who was an expert in qualitative studies and from two different experts who previously conducted outdoor play and related subjects. The obtained data was shared with these experts, and the codes, categories, and themes were finalized in line with their opinions. To increase the reliability and credibility of the data, the final codes, categories, and theme patterns were sent to an independent researcher with direct quotes from the data. This researcher was asked to categorize the data in the determined codes. For the

sections with disagreement, the two researchers conducting this study made separate evaluations and reached a joint decision to compromise or correct the differences. In line with the evaluations on the proposed 15 different code layouts, additional codes were added to the existing codes for 10 statements, and code changes were made for five statements.

In summary, in the content analysis of this qualitative case study, the stages of coding the data, finding the themes, organizing the codes and themes, and finally defining and interpreting the findings were followed (Yildirim & Simsek, 2018).

Validity and Reliability

The concepts of “validity” and “reliability”, which are traditionally accepted in quantitative research and shown as important value criteria, are not suitable for the context-sensitive nature of qualitative research. Therefore, it is recommended to use the concepts of “credibility” instead of “internal validity”, “transferability” instead of “external validity”, “consistency” instead of “internal reliability”, and “confirmability” instead of “external reliability” (Yildirim & Simsek, 2018). In this study, the use of these alternative concepts was preferred.

Credibility and Transferability. To ensure credibility, depth-oriented data collection, diversification, expert review, and participant confirmation strategies were included in this study. The researchers discovered patterns that even the research participants were unaware of by continuously comparing, analyzing, and conceptualizing the results collected from various sources during the data collection and analysis process with one another and the relevant literature.

The variation resulted from the diversity of data sources, techniques, and researchers (Yildirim & Simsek, 2018). Diverse data sources were utilized, including the comments of teachers and the images and videos of social media product-process sharing. To broaden the methodology, face-to-face interviews and document analysis were conducted. To ensure researcher diversity, the entire process was evaluated by a researcher who was not one of the two researchers conducting the study. As stated by Yildirim and Simsek (2018), another measure that can be taken for credibility is that people who have general knowledge about the research subject and specialize in qualitative research examine the study in terms of its various dimensions. In this regard, a critical review of the research design, data collection process, and analysis of the collected data were requested from a researcher who was an expert in qualitative research, and feedback was obtained accordingly. To evaluate the conceptual framework, expert opinion was sought from two researchers with various studies published at LP (loose parts or open ended material) related study subjects (forest school, sustainability, outdoor play, sociodramatic play, pretend play, etc.). Then, the codes, categories, and themes were evaluated in detail and finalized by the researchers.

To increase the credibility of the data, the final codes, categories, and theme patterns were sent to an independent researcher with direct quotes from the data. This researcher was asked to re-categorize the data in the determined codes. Using Miles and Huberman's (2019) reliability formula, Encoder reliability was calculated ($\text{Reliability} = \frac{\text{Agreement}}{\text{Agreement} + \text{Disagreement}}$). As a result of the calculation based on the reliability formula, the encoder reliability of this study was calculated to be 83.3% ($\frac{75}{75+15}$). Miles and Huberman (2019) state that if the study's reliability is over 70%, the coding is carried out reliably. For the sections where there was a disagreement, the two researchers conducting the study made separate evaluations and reached a consensus.

Another strategy used to ensure credibility is participant confirmation. During the data collection process, face-to-face and online interviews with teachers were recorded electronically, and then the researchers transcribed these recordings. During the transcription process, no comments were included. Only the sentences with significant expression problems were corrected to avoid misunderstandings or not being understood in the expert review and independent researcher evaluation. Immediately after this process, the written transcripts were shared with the participating teachers, and their confirmation was received regarding the accuracy of the written transcript.

Yildirim and Simsek (2018) suggested the use of detailed description and purposive sampling strategies to ensure the transferability of the research in a qualitative study. In this regard, the selection and justification of data sources, data collection, data analysis, and data evaluation processes were explained in detail to ensure transferability. In addition, the data obtained were transferred through direct quotations in a rearranged form according to the emerging concept patterns and themes and without adding comments.

Another strategy used to ensure transferability is purposive sampling. In this regard, seven teachers working at the preschool level of the state school that carried out the European Union Project (ERASMUS+ KA229 project aiming at developing children's creativity, conceptual level, and general developmental level with LP) in the 2020-2021 academic year, and the posts made as project product-output on the project social media account in the same academic year were included in the sample group.

Consistency and Confirmability. All data collection tools of the study, raw data, coding made during the analysis phase, and notes on the perceptions and inferences that establish the basis of these coding were reserved and kept ready for examination when necessary to ensure consistency and confirmability. In addition to this, the data collected by different sources and methods were constantly compared with each other during the analysis phase. Thus, special attention was paid to ensure that all data were consistent and confirmed each other

Findings

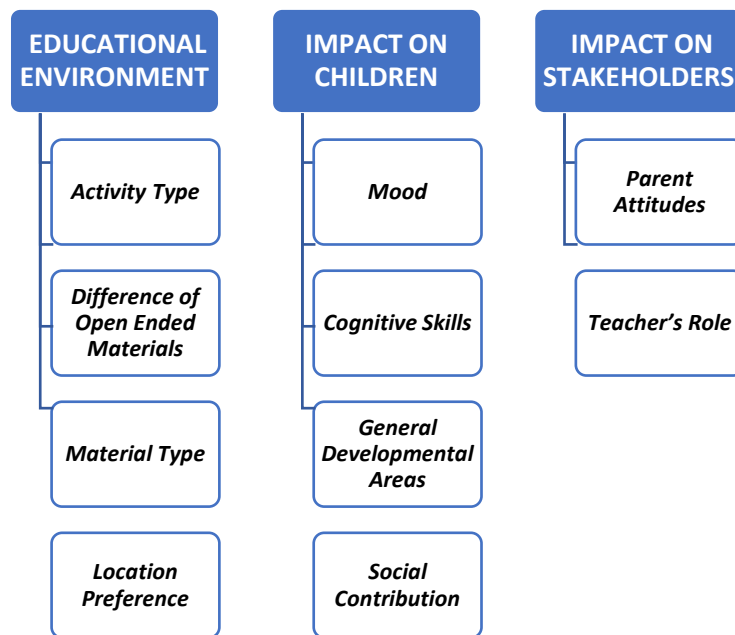
Under this heading, firstly, the themes obtained from teacher interviews and social media accounts were presented with a holistic perspective. Then the findings were sequentially included in the axis of the research questions.

Themes from Teacher Interviews

The data obtained from the teacher interviews were collected under three themes. The themes and categories of the findings obtained from the teachers' opinions are presented in Figure 1.

Figure 1.

Themes and Categories (Sub-themes) Obtained from Teachers' Opinions



As seen in Figure 1, three themes were based on the data obtained from the teacher interviews: *the educational environment*, *the effect it creates on the child*, and *the effect on the stakeholders*. Under *the educational environment theme*, there were four categories: *activity type*, *the difference of LP*, *material type*, and *location preference*. Under *the theme of the impact on the child*, there were four categories: *mood*, *cognitive skills*, *general developmental areas*, and *social contribution*. Finally, under the theme of *the effect on the stakeholders*, there were two categories: *parent attitudes* and *the role of the teacher*. The frequency values of the themes, categories, and codes for teacher opinions are presented in Table 3.

Table 3.

Frequency Distribution of Themes, Categories, and Codes for Teachers' Opinions

EDUCATIONAL ENVIRONMENT							
Activity Type		Difference of OEMs		Material Type		Location Preference	
<i>Code</i>	<i>f</i>	<i>Code</i>	<i>f</i>	<i>Code</i>	<i>f</i>	<i>Code</i>	<i>f</i>
STEM	10	Unstructured	9	Natural material	9	Order	1
							6
Art	3	Child-centered	7	Artificial/manufactured material	8	Center outside the classroom	5
Free time	3	Can be converted/modified / added	6	Reliable	2	Unassisted access	5
Play	1	Easily accessible	6	Clutter-free	1	Center inside the classroom	4
Turkish Drama	1	Economic	5	Cultural patterns	1		
	1	Enhances the play	2	Binding materials	1		
		Can be reused	1	Child's interest	1		
TOTAL	19	TOTAL	36	TOTAL	23	TOTAL	30
IMPACT ON CHILDREN							
Mood		Cognitive Skills		General Developmental Areas		Social Contribution	
<i>Code</i>	<i>f</i>	<i>Code</i>	<i>f</i>	<i>Code</i>	<i>f</i>	<i>Code</i>	<i>f</i>
Motivation	7	Design and creativity	18	Social development	6	Increased communication/interaction	13
Pleasure/happiness	6	Liberating	9	Cognitive development	4	Creating a product	7
Excitement	3	Imagination	8	Language development	3	Cooperation	6
Calmness	2	Cognitive flexibility	5	Motor development	3	Responsibility	4
		Busy/focused	4	Holistic development	2	Self-awareness	4
		Planning	2			Self-confidence	4
		Active use of the sense	1			Self-expression/presentation	4
						Sharing	3
						Decrease in problem behaviors	3
						Play-making skill	2
						Belonging	1
TOTAL	18	TOTAL	47	TOTAL	18	TOTAL	44
IMPACT ON STAKEHOLDERS							
Parent Attitudes				Teacher's Role			
<i>Code</i>	<i>f</i>	<i>Code</i>	<i>f</i>	<i>Code</i>	<i>f</i>	<i>Code</i>	<i>f</i>
Impact on parents	9			Scaffolding	5		
Impact of parents	7			Planning and organizing the environment	3		
				Observer	2		
				Guide	2		
				Discovering talents	1		
TOTAL			16	TOTAL			13

As seen in Table 3, teachers' opinions on the subject focused on the impact of the LP on the educational environment, the child, and the stakeholders (teachers and parents).

When the frequency distributions were examined, it was determined that teachers especially mentioned the impact of LP on children's cognitive skills (47) and their social contribution to children (44). In this regard, T7 emphasized the development of imagination and an increase in observation and design skills by saying "...*First, it develops the imagination of children. The child does something, watches their friends, gets inspired by them, and learns. While searching for materials in boxes, they see something else and starts to design something completely different...*" while T2 emphasized communication and interaction by saying, "...*Children interact with each other while playing with LP much more than they do with normal toys. It definitely enhances communication...*"

The intensity of the difference of LP from other materials (36) in teacher opinions was also remarkable. In this regard, T4 emphasized LP's convertible, replaceable, attachable, and removable nature by saying "...*The child can enrich it with different things and materials. They can add what they want, subtract what they want, transform it from shape to shape. I think this is the biggest difference...*" T5, on the other hand, emphasized these materials were economic by saying "...*The difference is that these materials can be obtained without paying money...*" The minor emphasis was on the teacher's role (13) and the parent's attitude (16). Considering the role of the teacher, T7 emphasized the scaffolding role of the teacher by saying "...*Our main role is to guide, but sometimes we see that some children do not try to do anything or do not know how to do it. In such cases, I serve as a guide. I offer them ideas, or we start the play together. Afterward, they sustain the play themselves...*" while T1 emphasized the observer role of the teacher by saying "...*I observe the child's reactions and act accordingly...*" Considering the attitude of the parents, T5 emphasized the supportive attitude of parents by saying "...*In this regard, we were lucky with our parents. We were supported by them...*" T7 emphasized that parents sustained the activities carried out within the scope of the project at home as well by saying "...*They do similar activities at home...*"

Themes Obtained from the Project Social Media Account

The data obtained from the project's social media account were collected under three themes. The themes and categories of the data obtained from the social media account are presented in Figure 2.

As can be seen in Figure 2, three themes were determined based on the data obtained from the social media account as *material*, *heuristic play*, and *STEM*. Material theme included two categories as *natural material* and *artificial/manufactured material*. *Heuristic play* themes included six categories as *inspiration from nature*, *from life*, *inspiration from human-made products*, *symbol*, *fiction*, and *technical-skill acquisition*. Finally, the *STEM* theme included three categories as *science*, *engineering/technology*, and *mathematics*. The frequency values of the themes, categories, and codes for the data obtained from the social media account are presented in Table 4.

Figure 2.

Themes and Categories (Sub-themes) Obtained from Project Social Media Account

Material	Heuristic Play	STEM
<ul style="list-style-type: none"> Natural material Artificial/manufactured material 	<ul style="list-style-type: none"> Inspiration from Nature From the Life Inspiration from Human-Made Products Symbol Fiction Technical-Skill Acquisition 	<ul style="list-style-type: none"> Science Engineering/Technology Mathematics

Table 4.

Frequency Distribution of Themes, Categories, and Codes Obtained from the Project Social Media Account

MATERIAL											
Artificial/Manufactured Material						Natural Material					
Code	f		Code	f							
Artificial/manufactured	200		Natural material	111							
Waste-garbage-scrap	131										
TOTAL	331		TOTAL	111							
HEURISTIC PLAY											
Inspiration from Nature		From the Life		Inspiration from Human-Made Products		Symbol		Fiction		Technical-Skill Acquisition	
Code	f	Code	f	Code	f	Code	f	Code	f	Code	f
Human figure	3	Creating space	35	Object (assimilating to an existing one)	44	Letter	13	Character	2	Collage	17
Animal figure	2	Cultural element	5	Food	14	Number	13	Storytelling	8	Different ground	2
Plant figure	1	Imitation of action	4			Shape	6	Fairy tale/story	6	Skill development	2
		Daily life	4								
		Play	2								
TOTAL	66	TOTAL	50	TOTAL	58	TOTAL	32	TOTAL	41	TOTAL	21
L											
STEM											
Science				Engineering/Technology				Mathematics			
Code	f		Code	f		Code	f				
Motion	13		Vehicle	21		Mandala	17				
Balance	10		Building	17		Counting	8				
			Invention	10		Symmetry	3				
			Space	9		Pattern	3				
			Machine/vehicle	7							
			Mechanism	5							
			Robot	2							
TOTAL	23		TOTAL	71		TOTAL	31				

By examining the social media account where the concrete outputs of the project process were shared, more detailed information about the PwLPs process was attempted to be obtained. As can be seen in Table 4, most of the posts included heuristic play outputs made from artificially produced materials (200). In addition, among the heuristic plays

played by children using LP, there was a remarkable amount of object (assimilating to an existing one) plays (44). Figure 3 is an example of a heuristic game produced with man-made materials, and Figure 4 is an example of an encoded visual (based on an existing object).

Figure 3.

Heuristic Plays Using Artificially Manufactured Materials

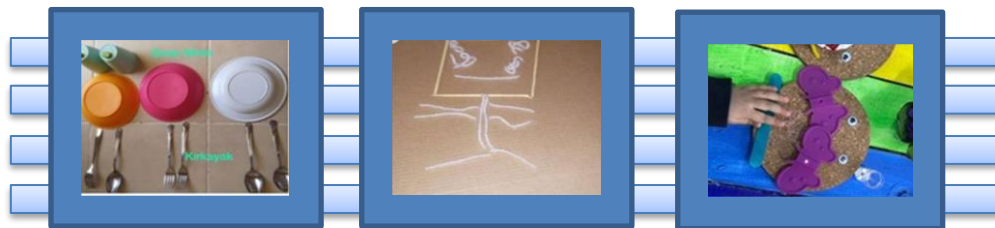
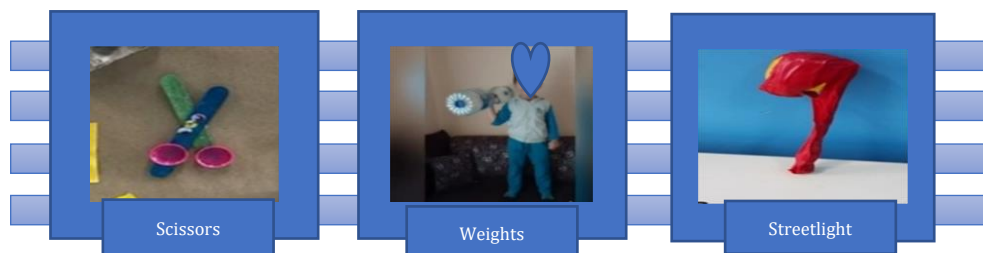


Figure 4.

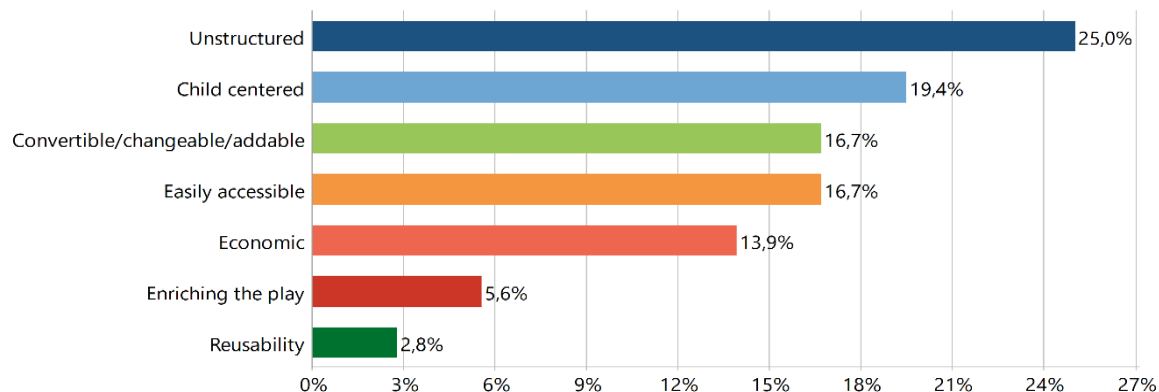
Object (assimilating to an existing one) Examples



Findings on Preschool Teachers' Opinions on the Difference of LP from Other Materials

To answer this research question, the following question was addressed to the teachers: *What are the main differences between LP and other toys?* The teachers emphasized the unstructured (9), economical (5), reusable (1), easily accessible (6), transformable, adaptable, and addable (6) nature of the LP when explaining the difference between them and the other materials. The teachers also emphasized child-centered/oriented (7) and enhancing the play characteristics (2) of the LPs. It was determined that the teachers used more than one distinguishing expression when explaining the difference of LP from the other materials. In this regard, T4 focused on the unstructured and open-ended nature, being able to use in combination with other materials, and its transformable, adaptable, and addable nature of LP when explaining the difference between them and the other materials. T4 expressed his opinions as follows:

"...These materials are open-ended objects. The child can change a product they have made and turn it into something else. They can add something to it. There is no specific pattern or rule. The child can add and subtract what they want and transform it from shape to shape. I think this is the most important difference..."

Graphic 1.*Code Distribution of Teachers' Opinions on The Difference of LP from Other Materials*

The most frequently mentioned characteristic when explaining the difference between LP from other materials was the unstructured nature of these materials (9). All the teachers emphasized the unstructured nature of LP. Considering the unstructured nature of these materials, T2 expressed himself/herself as *"...One of the main differences of these materials is that they allow the child the opportunity to build his/her play, that is, not within a certain framework..."* Another characteristic frequently mentioned by the teachers was that these materials were child-centered materials (7). Five of the teachers emphasized the child-centered and empowering nature of LP. In this regard, T6 emphasized that these materials reshaped the role of the teacher in the classroom and created an environment where everyone was responsible for their learning by saying, *"...In the beginning, children usually gained experience depending on the teacher, but later on, they found themselves directly in front of the material they would choose without requesting guidance..."* Considering the opinions of teachers, the least emphasized characteristic was that these materials could be used again (1). In this regard, T3 expressed himself/herself as *"...I think one of the most important differences of these materials is that they can be used many times..."*

Findings on Preschool Teachers' Use of LP in Planning and Implementing Educational Activities

The following questions were directed to the teachers to answer this research question: *Which LP do you include in your learning environment (classroom/garden/other)? Why do you choose these LP?", "What do you pay attention to when placing the LP in the educational environment?"* and *"Considering your daily education flow, what kind of activities do you use the LP in? DQ: When you consider all the types of activities implemented in preschool, what is the place of LP in these activities?"* In addition to these questions, school activities shared on the project's social media account were also evaluated to find answers to this research question.

The *material type* category was created after analyzing the responses provided by the teachers for the “Which LP do you include in your educational environment (classroom, garden, etc.)? Why do you choose these LP?” research questions. While responding to the related interview question, the teachers expressed opinions focusing on the structural characteristics of the materials such as natural or artificial/manufactured, as well as their usage characteristics, such as being safe or not creating clutter. Code-based distributions of teachers’ opinions evaluated under the category of material type were presented in Table 5.

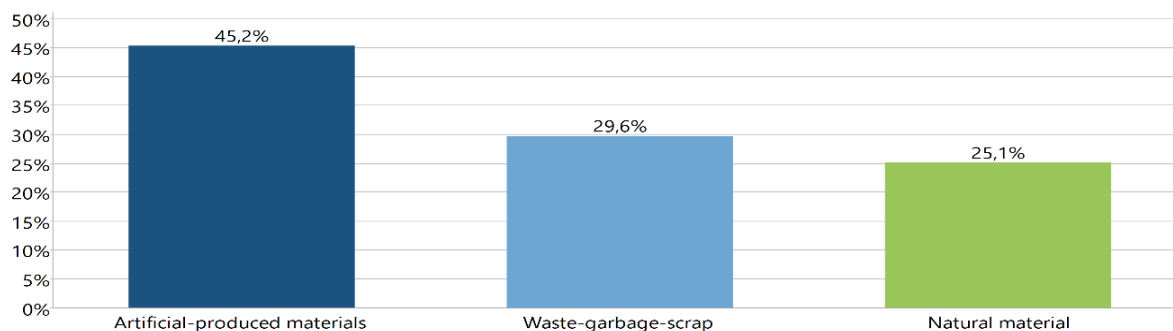
Table 5.

Frequency Distributions of Codes Under the Material Type Category

Material Type Category and Codes	f	%
Natural material	9	39.13
Artificial/manufactured material	8	34.78
Reliable	2	8.70
Clutter free	1	4.35
Cultural patterns	1	4.35
Binding materials	1	4.35
Child’s interest	1	4.35
TOTAL	23	100.00

The following questions were directed to the teachers: “Which LP do you include in your learning environment (classroom/garden/other)? Why do you choose these LP?” As seen in Table 5, the teachers focused on the structural characteristics of the materials by emphasizing natural materials (9) and artificial/manufactured materials (8). It was determined that teachers also mentioned usage characteristics such as being safe (2), not creating clutter (1), including cultural patterns (1), binding materials like rubber-rope-wire together (1), and being oriented towards the child’s interest (1). Considering the *natural material* category, T7 expressed himself/herself as follows: “Natural materials such as bark and acorns are the materials that we use the most and attract children’s attention the most”. Considering the *artificial/manufactured* category, T2 expressed himself/herself as follows: “...These materials include wooden blocks, lego, toilet paper rolls...other...different materials such as wastepaper...”

The project’s social media posts were also included in the evaluation to examine the material preferences in detail. The photographs shared on the social media account of the project included photographs and videos of the games played and the activities performed by using LP, both at home and school. However, the teachers determined the studies that would be shared on the social media account. Therefore, it was considered that the posts shared on the social media account reflected the material preference of the teachers. The data on the *material* theme obtained from the evaluation of 213 visuals (consisting of the photographs and videos shared on the social media account of the project) as project output in the 2020-2021 academic year were presented in Graphic 2.

Graphic 2.*Distribution of Codes in the Material Theme Regarding the Social Media Posts*

As can be seen in Graphic 2, artificially produced materials (200) were used the most among the visuals shared on the project's social media account. Waste-garbage-scrap materials (131), which were the closest to it in terms of ratio, were also evaluated together with artificial-produced materials in terms of quality. Still, they were also coded during the analysis as they were frequently included in the visuals and considered a separate category in the literature (Casey & Robertson, 2016; Daly & Beloglovsky, 2015). It was determined that the natural materials ranked in third place among the frequency distributions. In the beginning, it was considered that the teachers' opinions and the findings obtained from the social media account did not overlap in terms of the preferred material type. However, the visuals of the products prepared by children with the LP in their home environment were frequently included in the social media posts. As expressed by T7, the children mostly continued activities with natural materials at school until April-May (the weather starts to warm up in Turkey and, thus, the children can access nature more often) as they could reach artificial-produced and waste-garbage-scrap materials more easily in their home environments:

"...Natural materials such as bark and acorns are the materials we use most and attract children's attention the most. I think this is because they don't see or touch these materials very often. Even if the children see these materials very often, they cannot see them in many ways and together. This may also have an impact. They can cut and paste twigs and acorns and turn them into something completely different. Even if they play with these materials outside, they cannot cut and paste them and turn them into something else as they do at school. However, they can do this in our learning centers..."

The results of the data obtained from two different sources, the teacher interviews and social media posts, did not seem to overlap as the home activities shared on the social media account were generally made up of artificial-produced and waste-garbage-scrap materials. The visuals in Figure 5 were presented as examples of artificial-produced materials, the visuals in Figure 6 were presented as examples of waste-garbage-scrap-coded visuals, and the images in Figure 7 were shown as examples of visuals coded as natural materials. Special attention was paid to ensuring that the visuals consisted entirely of the coded materials. However, it should be noted that children often used different types of materials together in their practice unless the teacher presented only one type of material.

Figure 5.

Visuals Evaluated by Artificially Generated Code



Figure 6.

Visuals Evaluated by Waste-Garbage-Scrap Code



Figure 7.

Visuals Evaluated by Natural Material Code



The *location preference* category was obtained after analyzing the teachers' responses to the question of, "What do you pay attention to when placing the LP in the educational environment?". The teachers emphasized the location of the center where the material was placed and the reason for preferring that location when responding to the related interview question. Code-based distributions of teachers' opinions evaluated under the category of location preference are presented in Table 6.

Table 6.

Frequency Distributions of Codes Under the Location Preference Category

Location Preference Category and Codes	<i>f</i>	%
Order	16	53.33
Center outside the classroom	5	16.67
Unassisted access	5	16.67
Center inside the classroom	4	13.33
TOTAL	30	100.00

As seen in Table 6, among the responses provided by the teachers for the question of, "What do you pay attention to when placing the LP in the educational environment?", it was determined that the emphasis on order (16) drew a considerable amount of attention. Among the expressions of teachers coded as *order*, T2 expressed himself/herself as follows:

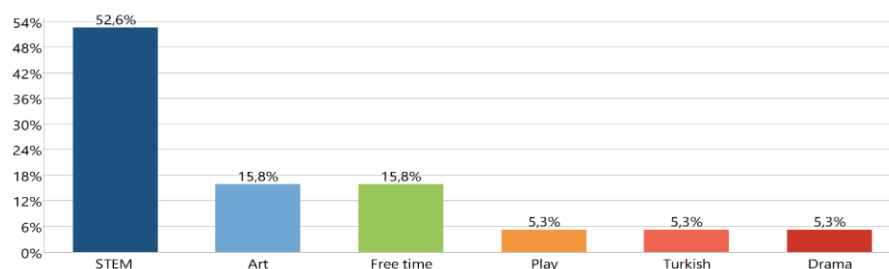
"The first thing I pay attention to is order. I try to sort the materials into specific boxes. I also try to make sure they don't interfere with each other. They have a certain place; they have an order. Therefore, the children know where the materials they need are..."

Considering the opinions of the teachers evaluated under the category of *location preference*, the code of *order* was followed by the codes of *center outside the classroom* (5) and *unassisted access* (5). Considering the opinions coded as *center outside the classroom*, T3 expressed himself/herself as follows: "When we were going to do the Design and Learn activities, we used to go out of the classroom with the children to this area, perform our activities, and pick up ourselves there again. Considering the opinions coded as *unassisted access*, T7 expressed himself/herself as follows: "We store these materials in open and closed boxes and on open shelves such as bookshelves. The child can see all of them simultaneously and get the material he/she wants from there without any help..."

After analyzing the responses provided by the teachers for the question of, "Considering your daily education flow, what kind of activities do you use the LP in? DQ: When considering all the types of activities implemented in preschool, what is the place of LP in these activities?", *activity type* category was obtained. Code-based distributions of teachers' opinions evaluated under the category of *activity type* were presented in Graphic 3.

Graphic 3.

Distributions of Codes Under the Activity Type Category

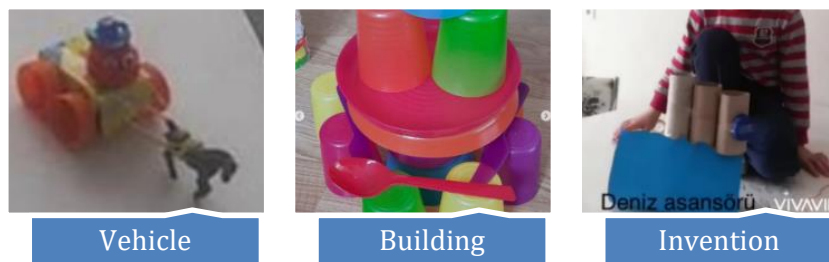


As can be seen in Graphic 3, the teachers expressed that they used LP most frequently in STEM (10), art (3), and free-time activities (3). Apart from these activities, the teachers expressed that they used plays (1), language (Turkish) (1), and drama (1) activities. The *STEM* code evaluated all the activity types expressed by the teachers as science, mathematics, engineering, and STEM. In this regard, T1 expressed himself/herself as follows: "...We use these materials when examining the types and colors of stones in a science activity, while counting in a math activity, for example, when counting the age of a tree..." Considering the opinions coded as *art*, T7 expressed himself/herself as follows: "...We used these materials in art activities..." Considering the opinions coded as *free time*, T4 expressed himself/herself as follows: "...I mostly include them in free-time activities. I have never included them as an activity type..."

To understand how teachers use LP in planning and implementing educational activities, school activities shared on the project's social media account were also assessed. Within the scope of the evaluation, *STEM* and *heuristic play* themes were obtained from the 213 photographs in line with the teachers' opinions (see Figure 2 and Table 4). The categories under the *STEM* theme are *engineering/technology* (71), *mathematic* (31), and *science* (23), respectively. The *engineering/technology* category consisted of *vehicle* (21), *building* (17), *invention* (10), *space* (9), the *machine/vehicle* (7), *mechanism* (5), and *robot* (2) codes. Examples are presented in Figure 8.

Figure 8.

Visuals Under Engineering/Technology Category



The *mathematic* category included *mandala* (17), *counting* (8), *symmetry* (3), and *pattern* (3) codes. Examples of the *mathematic* category are presented in Figure 9.

Figure 9.

Visuals Under Mathematic Category



The *science* category consisted of *motion* (13) and *balance* (10) codes. Examples of the *science* category are presented in Figure 10.

Figure 10.

Visuals Under Science Category



The categories under the theme of *heuristic play* were named *inspiration from nature* (66), *inspiration from human-made products* (58), *from life* (50), *fiction* (41), and *symbol* (32). *Inspiration from the nature* category included *human figures* (32), *animal figures* (23), and *plant figures* (11) codes. Examples are presented in Figure 11.

Figure 11.

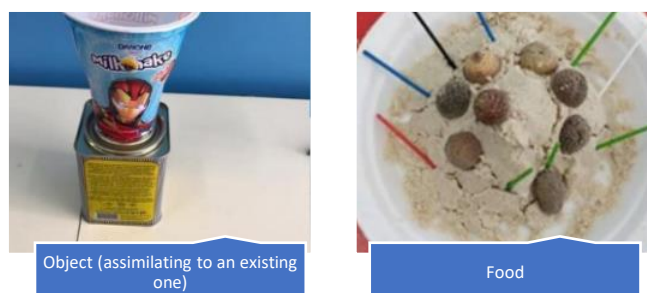
Visuals Under Inspiration from Nature Category



Inspiration from human-made products category included *object* (assimilating to an existing one) (44) and *food* (14) codes. Examples were presented in Figure 12.

Figure 12.

Visuals Under Inspiration from Human-Made Products Category



From the *life* category included *creating space* (35), *cultural elements* (5), *imitation of action* (4), *daily life* (4), and *play* (2) codes. Examples are presented in Figure 13.

Figure 13.

Visuals Under from The Life Category



The *fiction* category included *character* (27), *storytelling* (8), and *fairy tale/story* (6) codes. Examples are presented in Figure 14.

Figure 14.

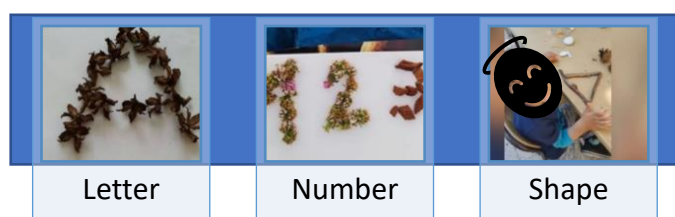
Visuals Under Fiction Category



The *symbol* category included the *letter* (13), *number* (13), and *figure* (6) codes. Examples are presented in Figure 15.

Figure 15.

Visuals Under Symbol Category



Findings on the Role of Teachers in PwLP

To get an answer to this study question, the teachers were asked the following questions: *“Can you explain your role in children’s PwLP? DQ: Do you structure the plays/activities or leave it to the children’s preferences?”* After analyzing the responses provided by the teachers for these questions, the *teacher’s role* category was obtained. Code-based distributions of teachers’ opinions evaluated under the category of *teacher’s role* were presented in Table 7.

Table 7.

Frequency Distributions of Codes Under the Teacher’s Role Category

Teacher’s Role Category and Codes	<i>f</i>	%
Scaffolding	5	38.46
Planning and regulating the environment	3	23.08
Observer	2	15.38
Guide	2	15.38
Discovering talents	1	7.69
TOTAL	13	100.00

As can be seen in Table 7, the *teacher’s role* category included *scaffolding* (5), *planning*, and *organizing the environment* (3), *observer* (2), *guide* (2), and *discovering talents* (1). The scaffolding role basically includes the teacher roles (observer, planner-organizer, guide, discoverer) expressed in other codes, but this role implies much more than them. Bodrova and Leong (2017) clarify the scaffolding role as follows:

“At the beginning of the learning process, the adult intervenes and supports more, directing the child’s behavior rather than the process. The more the child or novice learns and takes responsibility for performance transitions, the more the learner becomes involved in producing behavior. At this stage, the task of the adult or teacher is to time the withdrawal of support to expand the child’s successful performance (p. 78).

In other words, with the scaffolding role of the teacher, the child gradually moves from being a "spectator" to a "participant" role and gradually gains independence. Considering the scaffolding role, T6 expressed himself/herself as follows: *“...When we first went to that environment with the child, we also participated in studies with them. I got involved without saying anything or giving directions. I took some of the materials, used them, and replaced them when I was done. Then I slowly pulled myself away. I waited there as an observer...”*

Considering the planning and organizing of the environment role, T5 expressed himself/herself as follows: *“...I think my role is just to bring this material to class. I choose the material, and they do the rest...”*. Considering the observer role, T4 expressed himself/herself as follows: *“...I totally serve as an observer...”* Considering the guide role, T7 expressed himself/herself as follows: *“...Our main role is to guide, but sometimes we find that some children do not get involved, do not try to do anything, or do not know how to do it. In such cases, I become a guide...”* Considering the role of discovering talents, T4 expressed himself/herself as follows:

"One of my students, B., used to play with recycling materials before going to school. He made a lawnmower and binoculars. This is related to engineering. If we hadn't implemented the "Design and Learn" project last year, maybe I would never have seen this tendency..."

Findings Regarding Children's and Parents' Opinions and Thoughts on LP According to Preschool Teachers

To get an answer to this study question, the teachers were asked the following questions: *"How do children react to PwLP? DQ: How do they react when it is the time to play/activity with these materials?"* and *"What are the attitudes of parents towards PwLP? DQ: What kind of feedback do you receive from the families about their children's PwLP?"*. Considering the question of *"How do children react to PwLP?"* the teachers emphasized the changes that the play with these materials created on the children's *mood*. Teachers emphasized *motivation* (7), *pleasure/happiness* (6), *excitement* (3), and *calmness* (2) related to the effect of PwLP on their children's *mood*. The code distribution of the teachers' opinions on the effect of PwLP on the mood of their children is presented in Table 8.

Table 8. Frequency Distributions of Codes Under the Mood Category

Mood Codes	f	%
Motivation	7	38.89
Pleasure/happiness	6	33.33
Excitement	3	16.67
Calmness	2	11.11
TOTAL	18	100.00

Six of the teachers (one of the teachers did not make any comments associated with this category) emphasized the change in mood when responding to the question of what the children's reactions to PwLP were. The most frequent emphasis in the related statements was on *motivation*. The most frequently expressed *mood* code after *motivation* (7) was *pleasure/happiness* (6). Considering the teachers' opinions about the motivation-enhancing effect of LP, T4 expressed himself/herself as follows: *"...The children are eagerly waiting to get there..."*. Another code frequently included in *mood* category was *pleasure/happiness*. Considering this code, T3 expressed himself/herself as follows: *"They are very pleased and happy. They constantly ask 'Teacher, when will we have Design- Learn activities?'..."*

The following questions were asked to assess how teachers evaluate parents' attitudes about PwLP: *"What are the opinions and thoughts of the parents about PwLP? DQ: What kind of feedback do you receive from the families about their children's PwLP"*. The responses provided for these questions were evaluated under the *parent attitudes* category. This category was divided into two sub-categories: *impact on parents* and *impact of parents*. The distribution of the evaluation of the responses provided for the questions of *"What are the opinions and thoughts of the parents about PwLP? DQ: What kind of feedback do you receive from the families about their children's PwLP"* at the code, the level was presented in Table 9.

Table 9.

Frequency Distributions of Codes Under Parent Attitudes Category

Sub-categories and Codes of Parent Attitudes	f	%
Impact on parents	9	56.25
Participation/maintaining	3	33.33
Satisfaction	3	33.33
Aware of the development	2	22.22
Gaining perspective	1	11.11
Impact of parents	7	43.75
Supportive	6	85.71
Interfering	1	14.29
CATEGORY TOTAL	16	100.00

As seen in Table 9, there were two sub-categories in the teachers' statements regarding the *parent attitudes* category. 4 codes were determined in the *impact on the parents* sub-category, and two codes were determined in the *impact of the parents* sub-category. Teachers emphasized the *impact on parents* more frequently (9) than the *impact of parents* (7), although the frequencies were close to each other. The most commonly expressed codes in the *influence on parents'* sub-category were *participation/continuation* (3), *satisfaction* (3), and *aware of the development* (2). Considering the *participation/continuation* code, T3 expressed himself/herself as follows:

"...Actually, the parents want us to give tasks for the children and they would like to do something for their children. Some of the other tasks may be hard for the parents, but this one is easy and can be performed by them..."

Considering the *satisfaction* code, T7 expressed himself/herself as follows: *"...Our parents are very happy..."*

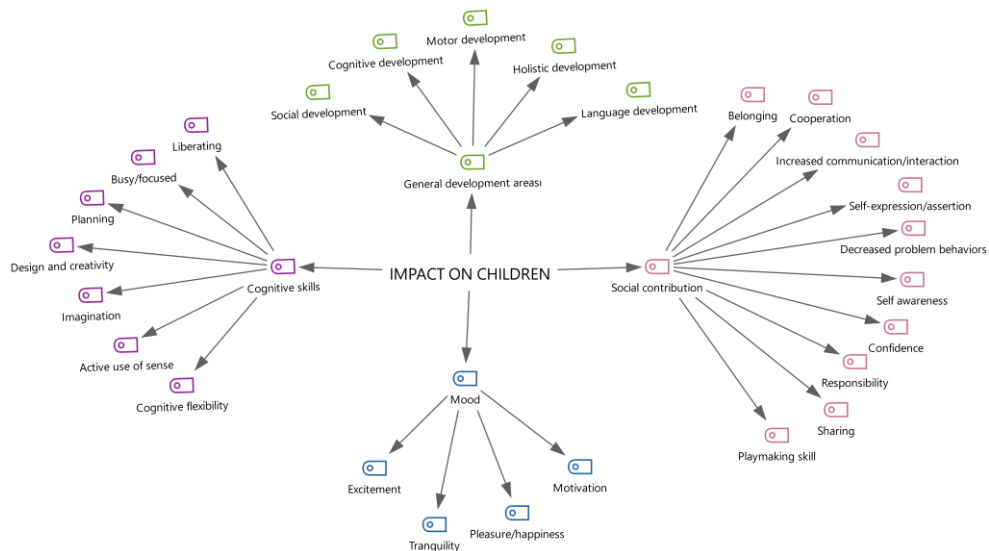
In the *impact of the parent* sub-category, the *supportive attitude of the parents* (6) was emphasized dominantly. Considering these codes, T3 expressed himself/herself as follows: *"...They supported the process from the beginning to the end, and they continue supporting..."*. T5 expressed the interfering impact of parents as follows: *"...Of course, the parents intervened more than us, but they were still involved..."* It was interpreted that the intervention here was aimed at the child rather than the teacher.

Findings Regarding Preschool Teachers' Views on the Contributions/Benefits of LP

To get an answer to this study question, the teachers were asked the following questions: *"What is the role/importance of LP in the child's play?"* and *"What benefits can PwLP have for the child?"* DQ: *What developmental area or areas do you think these benefits can be associated with?"*. By analyzing the responses provided by the teachers to both questions, *cognitive skills, general developmental areas, mood, and social contribution* categories were created. All these categories were used to form the *impact on children* theme. The map for this theme is presented in Figure 16.

Figure 16.

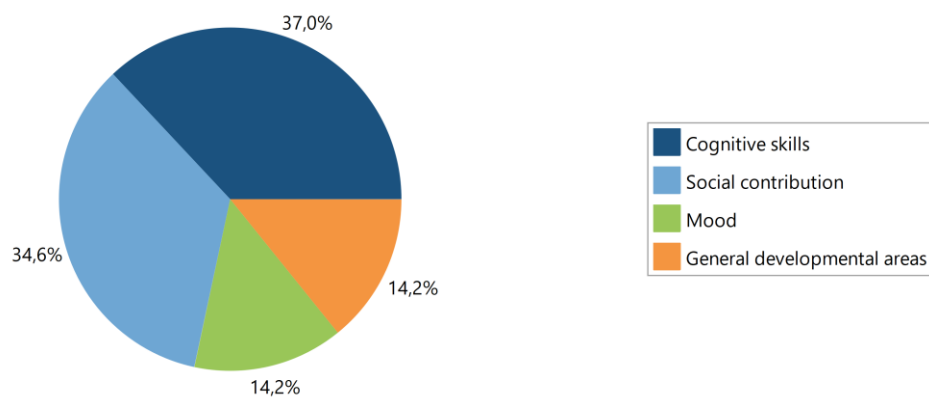
Code Map for Impact on Children Theme



As seen in Figure 17, in line with the teachers' opinions, *the impact on children's* themes was created based on the contribution of LP to the child's play and development. This theme included *cognitive skills, general developmental areas, social contribution,* and mood categories. The codes depending on the social contribution and emotion categories, were in parallel with the teachers' opinions on the children's attitudes towards these materials. The distribution of the codes forming the theme at the category level was presented in Graphic 4.

Graphic 4.

Categorical Distribution of Codes Creating the Impact on Children Theme

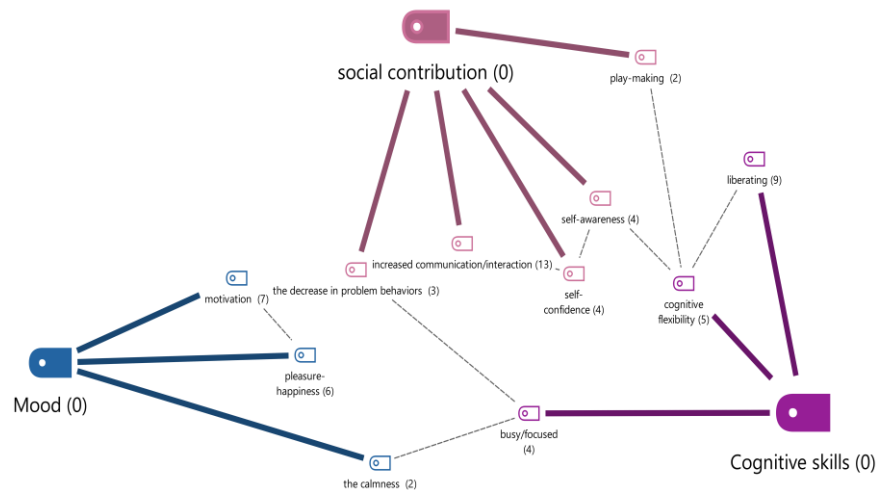


When the *impact on children* theme was identified, it was determined that the codes and categories within it were in parallel at several points. Therefore, the relationships between the codes were analyzed. As a result of the analysis conducted, the relationships

in Figure 17 emerged between the categories of *social contribution*, *cognitive skills*, and *mood*.

Figure 17.

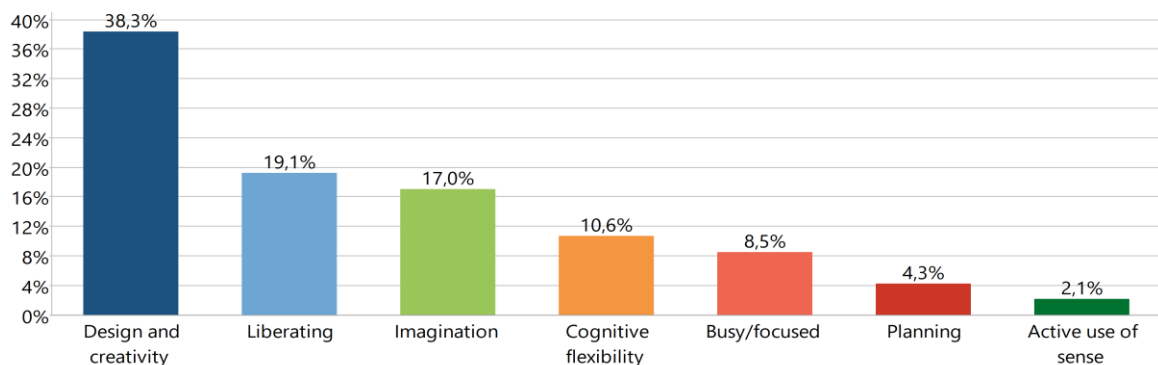
“Impact on Children” Theme Inter-Category Correlation Analysis Results



As seen in Figure 17, the liberating educational environment in the category of *cognitive skills* and *cognitive flexibility*[†] are closely related. *Cognitive flexibility* is also related to *play-making skills* and *self-awareness*. In addition, with the development of *self-awareness* and *self-confidence*, *self-confidence* is also associated with *increased communication/interaction*. It is striking that the child's being *busy/focused*, considered under *cognitive skills*, is also associated with a *decrease in problem behaviors* and the *calmness* code from the *mood* category. Another result is the relationship between *motivation* and *pleasure/happiness* in the *mood* category.

Grafik 5.

Distributions of Codes Under the Cognitive Skills Category



^{† †} Cognitive flexibility includes thinking about something in different ways or switching between rules or mental sets (Zelazo, 2016).

It was determined *cognitive skills* (47) and *social contribution* (44) categories were the most imminent categories in the *impact on children* theme. The distribution of teachers' opinions under the *cognitive skills* category is presented in Graph 5.

As seen in Graph 5, the teachers considered that LP supported children the most in terms of *design and creativity* (18) among cognitive skills. *Design and creativity* skill was followed by *liberating* (9),[§] *expanding imagination* (8), *cognitive flexibility* (5), *busy/focused* (4), *planning* (2), and *active use of sense* (1) codes. Regarding the *design and creativity* code, T5 expressed himself/herself as follows "...I think it develops their creativity. The child creates something visually beautiful ..." T3 provided expressions related to the liberating code.

"At the same time, these materials give freedom to the children. At first, the children were asking the following questions: 'Teacher, can I use this adhesive?', 'Will I use it like this?', and 'What if I paste it wrong?' However, after a while, the children started to feel like, 'Maybe, I want it to be like this and 'What I did is not wrong, I wanted it to be like this, I did it like this'.

Considering the "What is the role/importance of LP in the child's play?" and "What benefits can PwLP have for the child? DQ: What developmental area or areas do you think these benefits can be associated with? Questions, code-level distributions of the teachers from a social contribution perspective were presented in Table 10.

Table 10.

Frequency Distributions of Codes Under Social Contribution Category

Social Contribution Category Codes	f	%
Increased communication/interaction	13	29.55
Cooperation	6	13.64
Self-expression/presentation	4	9.09
Responsibility	4	9.09
Self-awareness	4	9.09
Self-confidence	4	9.09
Decrease in problem behaviors	3	6.82
Sharing	3	6.82
Play-making skill	2	4.55
Belonging	1	2.27
TOTAL	44	100.00

When Table 10 was examined, 10 codes were determined in the *social contribution* category. It was determined that *increased communication/interaction* and *cooperation* codes came to the forefront. Considering teachers' opinions on the *increased communication and interaction*, T2 expressed himself/herself as follows: "...Children interact with each other while playing with the LP much more than they do with common toys. It enhances communication..." Considering teachers' opinions on the increased

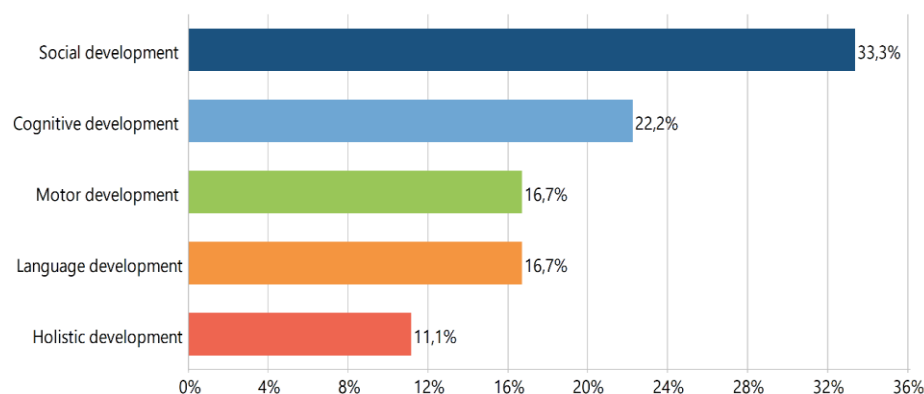
[§] This name was given to the code based on the statements of the participants. What is meant to be expressed here is that the material makes the child an authorized individual and makes him/her mentally free and independent.

cooperation, T3 expressed himself/herself as follows: *"...These materials affect their social development. They collaborate with each other..."*

The other categories obtained through *"What is the role/importance of LP in the child's play?"* and *"What benefits can PwLP have for the child? DQ: What developmental area or areas do you think these benefits can be associated with?"* Questions were about *mood* and *general developmental areas*. Due to the intersection between the data obtained from the *mood* category and the fact that the fourth research question (What are the opinions and thoughts of children and parents about the LP according to preschool teachers?) was previously evaluated, only the *general developmental areas* category was discussed in this section. The distribution of teachers' opinions under the *general developmental areas* category is presented in Graph 6.

Graphic 6.

Distributions of Codes Under the General Developmental Areas Category



As seen in Graph 6, the teachers considered that LP supported children the most in terms of *social development* (6) and *cognitive development* (4) among *general developmental areas*. According to teachers' opinions, PwLP also contributed to children's *language* (3) and *motor development* (3). Two of the teachers stated that these materials supported all developmental areas of the child holistically as follows: *"...supports all areas of development..."* (T2) and T3:

"...I think all of them. These materials and plays affect their language development because they are in constant communication. They tell us something, and they tell their friends something. This affects their social development. They cooperate with each other. Cognitively, they're constantly asking questions like 'How can I use this?' and 'How can I create a new product?'..."

Considering the social development code, T6 expressed himself/herself as *"... I think they improved a lot, especially in terms of social and emotional aspects..."* Considering the cognitive development code, T4 expressed himself/herself as *"...I think these materials and plays support cognitive development. In fact, they support cognitive development the most..."*

Conclusion and Discussion

This research aims to determine the opinions of preschool teachers who are practitioners of the European Union Project Learn by Design (ERASMUS+ KA229) aimed at improving the creativity, conceptual level and general developmental level of children with the use of LP and to reveal the reflections of these opinions in practice. In this regard, semi-structured interviews were performed with teachers. In addition, the social media account, where the images of the products and activities emerging during the project implementation process were shared, was analyzed.

In line with the other aims of this study, the question of, “What is the difference between LP from other materials” was directed to the teachers. Considering the difference between LP from other materials, the teachers emphasized the unstructured nature, child-centered/orientated nature, easy accessibility, transformable-modifiable or addable structure, economic nature, enhancing the play characteristic, and reusable characteristic of these materials, respectively. The unstructured nature and child-centered nature (Flannigan & Dietze, 2017; Houser et al., 2016), and manipulable, transformable, and reconfigurable in various ways (Gull et al., 2019; Smith-Gilman, 2018) other researchers revealed nature of LP, too. Other researchers also revealed that LP enhanced the play with their portable, reusable, divisible, and addable structure (Neill, 2018). PwLP is child-centered/oriented as it allows children to make their own choices, develop their own ideas, solve problems, and explore the world (Flannigan & Dietze, 2017). Similar to teacher opinions, Nicholson (1972), defines LP as materials that can be changed/variable, experimented/invented, and used in more than one way. The contribution of LP to the acquisition of sustainable life skills (Celebi Oncu, 2015; Daly & Beloglovsky, 2018). was emphasized by teachers. This finding also was observed frequently in social media posts. While explaining the difference of LP, the teachers referred to the economic dimension of sustainability by emphasizing its reusable nature and social-cultural dimension. The teachers also expressed that they preferred cultural elements in their material choices. In a study they conducted, Daly and Beloglovsky (2018) addressed LP under three dimensions of sustainability as environmental, socio-cultural, and economic dimensions (Combes, 2005). According to Daly and Beloglovsky (2018), the child connects to nature and his/her environment with the LP he/she collects from nature. When LP is integrated into the play and learning environment, which include cultural elements, children are allowed to reproduce and represent their own culture in various ways. In addition, all children can interact with the LP equally as they are open-ended and free of prejudice. Materials can be reused and transformed in different ways and for different purposes in the PwLP process. In return, this can lay the groundwork for gaining an economic sustainability perspective.

There are many situations that teachers need to consider when adding LP to the educational environment. The first challenge teachers face as play facilitators is setting the scene, finding and selecting appropriate materials, and creating spaces for comparisons (Tarr, 2008). The teachers participating in this study mentioned natural materials and artificial/manufactured materials as LP frequently used in the educational

environment. They emphasized that they considered whether the material was safe and whether it would create clutter during its use. They also emphasized the importance of including cultural elements, connecting materials to each other (such as rubber-rope-wire), and is oriented to the child's interest. The security of LP stands out as an important issue that has been considered and emphasized by many researchers and practitioners (Casey & Robertson, 2017; Neill, 2018; Olsen & Smith, 2017). Ensuring that the environment is rich in terms of LP and arranging the environment so that children can use these materials as they wish and have easy access is very important in terms of supporting children's learning and development (Casey & Robertson, 2017; Daly & Beloglovsky, 2015; White, 2017). This importance imposes duties on teachers, such as following the process carefully and understanding it correctly.

LP are core component of early childhood education. As emphasized by Curtis and Carter (2005), learning is permanent and effective for children who are given engaging material, ample time, the opportunity for frequent review, and the opportunity to invent without rigid schedule interruptions. LP enriches the curriculum, enhance classroom learning, and expand children's thinking (Daly & Beloglovsky, 2015; Shaw, 1984). Therefore, their potential is invaluable. The teachers participating in this study emphasized that children most frequently experienced LP in STEM, followed by art activities and plays. The teachers also emphasized that they used them in language and drama activities. Project social media posts were evaluated to understand how LP was reflected in plays and activities. The obtained results were in parallel with the opinions of teachers. As seen LP, which can be found in almost any setting, potentially support STEM teaching if children are allowed to play and explore (Nipriansyah et al., 2021; Rahardjo, 2019; Wagland, 2018) and create an environment for a high-quality arts education (Hui et al., 2015; Smith-Gilman, 2018; Szekely, 2015). In other words, the freedom and diversity LP offers clearly supports science, mathematics, language, and arts education and significantly supports problem-solving, engineering, and technology education. In this regard, Armitage (2010) makes an important distinction while explaining the effect of PwLP on learning. According to Armitage, this approach is so successful and supports learning activities because of the lack of adult intervention. In LP, learning through play is in question, not teaching through play. To put it more clearly, the management and responsibility of learning in PwLP belong to the learner himself/herself.

The role of adults in PwLP is a complex issue, as their participation can have both positive and negative effects on children's play. Adults can be observers, consultants, material and resource selectors, and planners. A teacher's involvement should enhance children's learning through play. However, it should also give children the confidence to act autonomously and make their own choices (Aras, 2016). In this study, teachers expressed their roles in the plays with LP as scaffolding, planning and organizing the environment, observer, guide, and discovering talents. All the roles mentioned by the teachers have been separately defended and emphasized by various researchers working on LP and PwLP in the literature (Armitage, 2010; Casey & Robertson, 2017; Kiewra & Veselack, 2016; Rahardjo, 2019; Rinaldi, 2006; Shabrina & Lestaringrum,

2020). Adults should care for and manage LP and assist children with easy access (Casey & Robertson, 2017). According to Shabrina and Lestarinigrum (2020), PwLP different effects on children depending on how teachers organize the environment. In other words, the presence of supportive adults is critical to support creativity and imagination in play environments (Kiewra & Veselack, 2016). The role of scaffolding expressed by the teachers is directly related to the zone of “proximal development” suggested by the Russian developmental psychologist Vygotsky (1966). The zone of proximal development refers to a level of development that a child can reach with the support provided by their teachers. Teachers need to observe children during play. However, as stated by the teachers participating in this study, the role of the teacher should be more than observation to increase the developmental results of play (Aras, 2016).

In the interviews, the teachers stated that PwLP caused an increase in motivation, pleasure/happiness, excitement, and peace in children. Similarly, Flannigan and Dietze (2017) concluded that various emotional states such as happiness and excitement and various positive social behaviors emerged in play environments with LP. James (2012) stated that play with LP reduced boredom and aggression by bringing about the development of positive behavior in the child and, thus, increased happiness and encouraged a positive parental attitude. Similarly, according to Branje (2021), the children often laugh while playing with LP. According to the author of this study, the laughter observed during the play indicates that children have fun and are happy. It is important to know that children enjoy the play as they are more likely to participate in an enjoyable activity.

When the teachers evaluated the plays and activities carried out with LP from the parents' perspective, they discussed the subject in two categories: *the impact of the parent* and *the impact on the parent*. While explaining the impact of the parents, the teachers emphasized the supportive attitude to a large extent. The influence of the materials on the parents was the component they were most interested in. While the teachers discussed the effects of the LP plays and activities on the parents, they stressed the parents' participation and continuation of the activities at home, their satisfaction with the process, and their awareness of the children's development. Studies claim that especially parent involvement increases the functionality of educational activities carried out at school (Clarkin-Phillips & Carr, 2012; Fan & Chen, 2001; Izzo et al., 1999; Kluczniok et al., 2013). In the interviews conducted in this study, the teachers stated that the parents wanted to participate in and support children's educational activities. Still, generally, they did not know how to do this. When parents communicate constructively with teachers and participate in school activities, they can better learn how to work at home to improve their child's education (Dauber & Epstein, 1993). The project, based on plays with LP at school, provided a great opportunity for teachers in this regard. During the project's implementation process, parent cooperation and participation were ensured and maintained effectively by giving detailed information to the parents on how the process would work, and successfully conveying the process, points of attention, and developmental outputs to the parents through social media and one-to-one parent-teacher interaction. In the process, the school administration and teachers asked for

support from the parents and clearly explained how this support would be. Thus, the parents learned how to support and participate in the activities carried out at the school and were empowered to take responsibilities and opportunities to enhance their own involvement to support their child's development, which positively impacted their children.

As stated by the teachers participating in this study, the emphasis on increased cognitive flexibility has critical importance among the advocated opinions about what LP is and its consequences for the players. LP is open to manipulation and change by players. These features provide them with the flexibility of use. This flexibility that LP provide creates unexpected opportunities that are shaped by children's own ideas, actions, and interactions (Curtis & Carter, 2005). Thus, the children can develop cognitive flexibility. Findings obtained from this study show that the liberating educational environment and cognitive flexibility are interrelated. Cognitive flexibility is also linked to play-making skills and self-awareness. This finding can be explained by the fact that children need a flexible and liberating environment to be playmakers. Such an environment has the potential to help children become individuals who can adapt to different situations and have acquired the ability to think flexibly (Brown, 2003). Therefore, a liberating and flexible environment can improve the child's self-awareness and play-making skills by developing their curiosity, problem-solving, and creative potential (Celebi Oncu, 2015).

The teachers participating in this study expressed that LP supports children the most regarding social and cognitive development among the general development areas. However, the teachers also expressed that these materials contributed to children's language and motor development. Two of the teachers stated that these materials holistically supported all developmental areas of the child. Different researchers also express the contributions of LP to the development of children (Armitage, 2010; Curtis & Carter, 2005; Daly & Beloglovsky, 2015; Shaw, 1984). According to Shaw (1984), LP can enhance classroom learning thanks to the contributions such as language skills, colors, size, and shape recognition. Offering children LP in various fields encourages their imaginations and their desire to combine and rearrange materials to explore and invent continuously (Curtis & Carter, 2005). In addition to these, the support provided by the LP for the active use of the senses, also included in the statements of the teachers, was one of the cognitive contributions emphasized in the related literature. According to Daly and Beloglovsky (2018), children who interact with the natural LP gain invaluable opportunities to actively use their senses and acquire new sensory experiences. The sensory awareness and richness experienced through these new and meaningful experiences encourage children to explore and invent. In parallel with the findings obtained in this study, Armitage (2010) emphasizes that children are more engaged in playgrounds where LP are included compared to other playgrounds. This engagement also contributes to children exhibiting fewer problem behaviors.

As demonstrated by the results of this study, Branje (2021) emphasizes that LP intervention in playgrounds contributes to children's more conscious use of language. Different researchers also advocate the contribution of LP to the language development of children (Daly & Beloglovsky, 2018; Flannigan & Dietze, 2017; Lee, Lane, Brown, et al., 2020). In literature, the contribution of LP to the physical development of children is

another element frequently emphasized by researchers (Barbour, 1999; Branje, 2021; Bundy et al., 2017; Bundy et al., 2009; Engelen et al., 2013; Fjærtøft, 2004; Houser et al., 2019; Houser et al., 2016; Hyndman et al., 2017; Lee, Lane, Tang, et al., 2020; Wyver et al., 2017). In this regard, according to Engelen et al. (2018), LP contributes to children's more creative thinking and being socially and physically active by increasing constructive and creative play. On the other hand, in her experimental study, Barbour (1999) demonstrated that various playground designs affected the subjects' social and physical skill development by facilitating or restricting the strategies children used to manage their play with their peers. As can be seen in the results obtained from the studies in the literature, LP contributes to the holistic development of children and improve them in many ways.

Children naturally become curious when they are exposed to LP. This curiosity also inspires them to make discoveries. Thus, when LP is added to the playgrounds, the quality and depth of their play can increase (Flannigan & Dietze, 2017). Bagley and Klass (1997) also emphasize that children engage in longer, more varied, and more complex plays with LP materials such as cardboard boxes, pipes, and rags rather than structured play materials. During the research process, teachers also expressed the quality and deepening of the child's play, emphasizing the increase in fictional diversity, symbolic use of objects, playtimes, and communication and interaction between children. Änggård (2011) and James (2012) emphasize that LP improves children's play experiences, and they associated these materials with PwLP's liberating structure that allows children to implement their ideas and goals. According to Casey and Robertson (2017), LP provides the resources the children need by creating a richer play environment for all children. More specifically, LP is not based on specific patterns and usage rules. Therefore, these materials offer children unlimited possibilities for use. Rather than fixed and unchanging playgrounds, the movable and changeable LP opens the door to a world of options for children.

The teachers consulted in this study discussed the benefits of adding LP to the educational environment in terms of cognitive contributions, contributions to general development areas, positive change in mood, social contributions emphasizing social skill development, and support for the development of plays. Teachers listed LP's cognitive contributions as design and creativity, a liberating educational environment, imagination, cognitive flexibility, being busy and focused, developing planning skills, and enabling active use of the senses. In the literature, some studies support these opinions of teachers (Broadhead, 2004; Daly & Beloglovsky, 2018; Nicholson, 1971). Existing studies on LP and PwLP also confirm the results obtained from this study by demonstrating that the liberating and flexible nature of the environment plays a vital role in enriching children's imaginations and creativity (Bundy et al., 2009; DiBello & Ashelman, 2010; Hui et al., 2015; Maxwell et al., 2008; Mozaffar, 2018; Neill, 2018; Rahardjo, 2019; Shabrina & Lestarinigrum, 2020; Sutton, 2011; Thompson, 2017; White, 2017; Woolley & Lowe, 2013; Zamani, 2016). Daly and Beloglovsky (2015), like the teachers participating in this study, emphasized that LP deepens and liberates the plays. According to them, nothing gives children a greater sense of freedom than controlling the material they use.

The expression “whatever you want it to be”, used by Broadhead (2004) in flexible interiors for referring to open-ended materials, can also be interpreted as an emphasis on the liberating nature of LP, which empowers the child in planning skills and provides the opportunity to choose and decide. Another emphasis in studies carried out on LP is on LP’s ability to keep the children fully ‘engaged’ by providing them with quality play experiences (Daly & Beloglovsky, 2015; Gibson et al., 2017; Houser et al., 2016; McClintic, 2014).

This study revealed that integrating LP into the educational environments provided an increase in learning motivation and general happiness as well as various positive social behaviors in children, increased parent participation by strengthening parent-school communication and interaction, supported children in many ways, and contributed to their holistic development, and supported children in becoming free and competent individuals who create, discover, and are responsible for their learning by providing quality play experiences. In this regard, LP’s unique potential in early childhood education environments is invaluable. All this potential that LP offers challenges the teacher’s traditional roles in the classroom. Teachers’ responsibilities in the role of play facilitator are preparing the environment, choosing suitable-safe materials, ensuring children’s access to materials, and making necessary arrangements by carefully observing the play process. Considering the play process with LP, mentoring is the most critical role of the teacher, who builds scaffolds using his/her observations and supports children in reaching the zone of proximal development through models. This role creates a liberating educational environment that allows LP to be used at the highest level by eliminating unnecessary interferences in child’s play.

There are LPs everywhere. They are conveniently available, cost-effective, and long-lasting resources. They are simple to incorporate into instructional settings. Training and family involvement activities organized to raise awareness of more teachers and parents about LP can enable more children to benefit from the potential of LP. For this reason, the widespread use of intervention studies, such as experimental studies and action research, that develop and diversify teacher practices for integrating LP into early childhood education environments and programs will contribute to increasing the quality of educational environments. In addition to this, innovative work with the participation of teachers and school administrators is considered as an important step in initiating the desired change to deepen the teacher and parent perspectives on the child’s play and to carry out transformative activities aimed at the use of LP in school indoor and outdoor spaces. Finally, it is recommended that intervention studies be conducted to integrate LP into public play environments so that the potential benefits of LP can reach more children.

The teachers participating in this study were the practitioners of the ‘Learn by Design’ European Union Project (ERASMUS+ KA229), which aimed at improving children’s creativity, conceptual level, and general developmental levels with the integration of LP into the educational environments since September 2019. These teachers are seven preschool teachers working in a public school in Ankara. To examine the reflections of the opinions obtained from the teachers in the research, 213 photos and videos shared between September 2019 and June 2020 on the project’s social media account were

also included in the research. As in any research, this study also has some limitations. The research is limited to the opinions and practices of the teachers who implement the relevant project. Teachers, students, and parents that practice with LP in various contexts, time periods, and conditions might get varying results.

Ethics Committee Approval: This study was approved by the Ethics Committee of Hacettepe University Ethics Committee's with the decision date 27.11.2020 and numbered E-76942594-600-00001344796.

Informed Consent: An informed consent was obtained from all participants prior to their inclusion in the study.

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