LUBELSKI ROCZNIK PEDAGOGICZNY
T. XLIV, z. 3 – 2025

DOI: 10.17951/lrp.2025.44.3.105-122

Kinga Kuszak
Adam Mickiewicz University in Poznań
ORCID – 0000-0002-2430-7803

Jolanta Andrzejewska
Maria Curie-Skłodowska University in Lublin
ORCID – 0000-0002-1914-5387

UTILIZING AN INTERACTIVE FLOOR TO STIMULATE COMMUNICATION AND PEER LEARNING IN PRESCHOOL CHILDREN*

Introduction: The functioning of children within a peer environment constitutes a pivotal aspect of the social learning space fostered by preschool educators. In planning and developing this space, educators make critical decisions regarding pedagogical methods, learning tasks, types of play, and activity formats.
Research Aim: This article aims to analyze the nature of the objectives and activities for preschool children, as well as their learning and communication strategies. The research employed educational activities involving four-person groups using an interactive floor.
Research Method: The research was qualitative. Observations focused on forms of tutoring, peer learning, communication among preschoolers, and the emotions accompanying task completion within the research context. Following the activities, individual and focus group interviews were conducted, during which children were invited to self-evaluate their experiences.
Results: This article describes the terminological findings derived from the conducted research. Three categories of peer learning were observed in groups of children utilizing an interactive floor: joint task accomplishment, cooperative learning, and peer tutoring. The article also presents a broad spectrum of communication forms among children and their emotions during educational situations.
Conclusion: The presented results may inspire further research into preschool children's communication and cooperation. These findings also offer practical value for preschool teachers in fostering a peer learning environment supported by modern technology (e.g. interactive

* Suggested citation: Kuszak, K., Andrzejewska, J. (2025). Utilizing an Interactive Floor to Stimulate Communication and Peer Learning in Preschool Children. *Lubelski Rocznik Pedagogiczny*, *44*(3), 105–122. http://dx.doi.org/10.17951/lrp.2025.44.3.105-122

floors), designing developmental tasks within a learning community, and establishing contexts conducive to the development of children's linguistic and communication skills.

Keywords: preschool child, interactive floor, developmental task, peer learning

INTRODUCTION

The pedagogical construction of a preschool learning environment represents a fundamental endeavor for educators, demanding not only diligent effort but also refined expertise. In designing and establishing an educational space for children's peer interactions, educators make crucial decisions regarding pedagogical methods, learning tasks, play activities, resources, and activity modalities. In the 21st century, they have a choice between traditional methods and resources, as well as modern multimedia tools. Still, teachers exhibit varying degrees of willingness to integrate technological advancements into their work with children. Some readily adopt contemporary trends, such as the implementation of multimedia boards or interactive floors in classroom settings. This article focuses on the potential for collaborative learning and peer-mediated instruction, facilitated by teacher-designed activities utilizing an interactive floor.

Peer learning

Children in kindergarten are immersed in a new social space. The effectiveness of their learning largely depends on the quality of social processes within the peer group, interactions during collaborative problem-solving, the creative or effective approach to games or tasks, and the emotions accompanying these interactions. Learning is a process of constructing, interpreting, and modifying personal representations of the world in a situational, social, and cultural context. Peer learning occurs when children learn with and from each other both formally and informally, without immediate intervention from a teacher (Boud et al., 2013). Peer learning can take the form of:

- Performing tasks together – joint learning. This involves interactions occurring in small groups engaged in problem-solving or task completion. Participants represent a similar level of competence, and interactions are characterized by reciprocity.
- Learning through cooperation – peer cooperation. The learning process is characterized by joint discovery within a highly structured environment. Children engage in discussion, negotiation, idea sharing, and resource exchange.
- Peer tutoring. Peer tutoring occurs when one child assists another through teaching and providing guidance. One child possesses relevant information, while the other requires assistance in task completion. The advantage

of one partner in terms of achievement level or experience need not be substantial, but it is discernible.

Children's communication during learning with a peer

According to Bruner (2006), the concept of learning within a community of minds and learners necessitates children's agency, encompassing the orientation of their actions toward the activity, self-regulation, attention directed toward outcomes, and cooperation, specifically communication with other participants. Preschool children are increasingly active participants in interactions, possessing diverse capabilities for structuring their thoughts and formulating increasingly varied and situationally appropriate statements (Boniecka, 2010; Kuszak, 2017). Musati (1995b) emphasizes that joint activity with peers stimulates the process of knowledge socialization, which is achieved through the exchange of verbal messages. During joint activity, children must share a common system of meanings (Musati, 1995a) and employ the conventional system of meanings embedded in language and the rules of social exchange. According to Shugar (1983, 1995), children create a specific form of discourse that accompanies cooperation, termed "action discourse". This discourse begins with verbal activity initiating cooperation, comprising messages that integrate the partner into a shared line of action, facilitate joining a peer's activity, and initiate a novel, collective line of action (Bokus, 1984). Engaging in action with a peer necessitates verbal exchange not only at the initiation of joint action but also throughout the activity. The language accompanying the action is specific and refers to a particular situation and shared experiences.

Teacher as creator of children's community learning

The capacity to foster conditions for children's active peer-to-peer learning and the development of communication skills constitutes a crucial competence for teachers (Filipiak, 2018; Krauze-Sikorska & Kuszak, 2010). Teachers can choose from a variety of educational resources, toys, accessories, and technical aids anchored in various pedagogical systems, including Montessori, Froebel, and Reggio Emilia. Preschoolers can make objects in heuristic games together with their peers, engage in dramatic play, and construct board games. This creates episodes of joint engagement between the child and the peer or tutor. According to Ciemcioch (2015), teachers can create similar situations within new technological environments, utilizing tools such as computers, interactive boards, interactive floors, mats, carpets, surfaces, or StoryTech toys (Kara et al., 2013). Within technological spaces, children can experiment, gain experiences, seek non-standard solutions and problem-solving strategies, and share knowledge. The kindergarten teacher serves as an intermediary between the child and new educational tools and aids, with the goal of optimizing teaching and learning conditions for the child. An in-

teractive floor system projects interactive presentations onto various surfaces, such as floors, walls, or tables. Through movement, like touching, moving, discovering, drawing, children operate the interactive applications and animations.

The software with its educational tasks, games, and didactic games is a critical element of planning work with the device, as indicated by research from Kobe University Elementary School (Moriya et al., 2022). Using the floor or interactive surface is simple and intuitive for adults and children, however, its educational potential depends on the teacher's methodological, pedagogical, and psychological preparedness. Children's engagement with new technologies results in significant educational changes. According to Nowicka and Dziekońska (2018a), simply enriching the technical and IT equipment of the institution will not bring the desired results; a reflection on cultural and methodological adequacy is essential.

RESEARCH AIM AND QUESTION

Children's participation in peer culture plays a significant role in the concept of "interpretive reproduction". Corsaro (2005) notes that children create their own world and socialize one another. According to Bałachowicz (2017), "early inclusion of the child in the systematic process of constructing their own subjectivity in social contexts, within a planned and organized educational environment, should provide the child with experiences in developing themselves, creatively utilizing interactions, and designing their own actions" (p. 55). This is achieved through carefully conceived and planned developmental tasks, which are understood as educational tasks with specific goals aimed at skill development and related to the application of novel solution strategies or behavioural refinement. The primary objective was to propose an educational situation for children, utilizing an interactive floor within a four-person peer group, and to assess the extent to which a developmental task, presented as an engaging situation, would inspire engagement and peer learning, elicit emotions, and stimulate verbal and non-verbal activity. The research aim is significant for educational practice because engagement in action, in accordance with Nelson's (2007) concept of socio-cultural development, can enable children to acquire important individual and collective experiences within a peer group. The presented empirical research was inspired by the following research problems:

What joint action strategies did children employ during developmental activity using the interactive floor?

What did the children learn from their peers during the activity?

What forms of children's linguistic behaviour occurred during the activity?

How did the children verbalize emotions during the developmental activity?

RESEARCH METHOD AND SAMPLE CHARACTERISTICS

The conducted research project aligns with the interpretative paradigm within a qualitative perspective. Researchers observed four-child teams in an educational situations that utilized an interactive floor. Due to the availability of interactive floors in kindergartens, children were offered various developmental activities, including "Happy Faces", "Popping Balloons", "Magic Flowers", "Find Dinosaur Eggs", "Teddy Bear Looking for Honey", "Fish", "Bursting Balloons on Time", "Avoiding Fish", and "Dinosaurs". Their common feature was the need to work as a team to achieve the goal. An observation schedule served as the tool for recording children's behaviours and verbal communication during the joint activity. After the team activity was completed, an individual conversation and a focus interview were conducted with the children in teams of four. The research involved children aged 3–7 from kindergartens in the Lublin and Greater Poland voivodeships. In total, 29 teams of four children participated in the study (Lublin Voivodeship: 11 teams; Greater Poland Voivodeship: 18 teams).

STATISTICAL DATA ANALYSIS PROCEDURE

In the first phase, the researcher recorded and then analyzed the moment of starting the activity in the teacher-inspired educational situation with an interactive floor. The focus was on how the children took roles, communicated, and interacted. Then, the researcher recorded and analyzed the children's interactions and emotions accompanying the children's actions (expressed verbally and non-verbally) during the implementation and completion of the activity. At the same time, the children's peer learning strategies were identified.

In the second phase, children's actions were evaluated: their opinions on the cooperative experience were recorded and analyzed. Following the team activity, preschoolers were asked to articulate what they had learned from their peers during the interactive floor task. The evaluation was two-staged: initially, individual interviews were conducted with each child, followed by a focus group interview with the entire team to inquire about their collective experience. This process allowed for the recording and analysis of both individual and shared perspectives on the educational situation. During the data analysis, the focus was on capturing the situation of learning with a peer from the children's perspective. As a result, three categories emerged: social relations, problem or task solving, and emotions. Additionally, differences in children's opinions related to age and perspective were examined: the child's individual opinion (individual mind) versus the team's assessment (shared mind).

RESULTS

Children's joint action strategies during educational situations using an interactive floor

Developmental activities employing the interactive floor necessitated that children collaborate, organize, and direct their actions. This resulted in the immediate formation of a team structure. Each child entered the social action framework by assuming a role and establishing relationships within their team's "community of minds". The children in the sample adopted various roles, including: team member, activity initiator, leader, message recipient, tutor, and co-creator of solutions (e.g. adviser, expert, idea generator, action effectiveness assessor). The children showed a significant tendency to adhere to joint decisions, to follow norms, and to focus on the outcome. The appealing nature of the activities facilitated the achievement of both joint and individual goals by all team members. The children formed a coherent and centralized social system. The educational situation created by the use of the interactive floor activated all children as self-accepting members of task-oriented teams. The novel educational environment prompted children to adopt specific action strategies. Based on the observations, three joint action strategies preferred by preschool children were identified:

- performing tasks together was observed in seventeen groups (3 groups of 3-year-olds, 3 groups of 3–4-year-olds, 2 groups of 4–5-year-olds, 3 groups of 5-year-olds, 1 group of 5–6-year-olds, and 2 groups of 6-year-olds). For example, 3-year-old children collaboratively worked on the "Happy Faces" task. Hanna exclaimed, "Let's start!", and claped her hands. Tola exclaimed, "Zosia, not the happy faces!" while gesturing. Hanna responded, "Faster!" as she jumped up and down. Zofia pointed her finger, saying, "Not that one!". Marianna asked, "It was sad, wasn't it?" Tola interjected, "Hey, don't argue!" Marianna called out, "Hanka, catch!"
- learning through cooperation was observed in eight groups of 5-year-olds and 6–7-year-olds (5 groups of 5-year-olds, and groups of 6–7-year-olds, 5–6-year-olds, and 6-year-olds). For example, Leon addressed the other children, stating, "I haven't played this yet, I wonder if we will manage?" Marcel addressed the other children, declaring, "I can play this", and jumped. Jakub looked at Marcel and exclaimed, "Easy!", before also starting to jump. Lucjan began jumping and addressed the teacher, asking, "I managed to pop the balloon, did you see?"
- peer tutoring was observed in seven groups (3–4-year-olds: tutor Michał (4 years old); 4-year-olds: tutor Marcelina; 5-year-olds: tutor Oliwer; 5-year-olds: tutor Kuba; 6-year-olds: tutor Emmy; 6-year-olds: tutor Julia; and 6-year-olds: tutors Jagoda and Marta). Examples:
    - In a group of 4-year-olds, Filip and Bruno were independently jumping and popping balloons. Michał spontaneously joined the game,

quickly running, but upon noticing Lena standing, he grasped her hand and demonstrated the action. Michał exclaimed, "They are chasing us! They are everywhere. Lena, keep helping, look! Bruno, do you see them shooting?" Lena did not know what to do at first, but she learned with Michał.

- In a group of 6-year-olds, Kuba turned to Staś, "Turn around quickly, there". He crouched beside the interactive carpet and indicated where Staś should jump, saying, "Okay, you've got him, now here, here, okay, you've got him", Kuba then said to Staś, "Stachu, quick, behind you!" and ran to the other side of the interactive carpet.

- Taking action, even if initially inadequate to the nature of the change, mobilizes the child and changes the trajectory of their development. Three competitive behaviours also appeared in the study group. For example, in a group of 5-year-olds, Marcel told Leon, "I'm better than you". Leon retorted, "Not you aren't!" Marcel concluded, "I was the best". Leon summarized, "It was fun, but Marcel gets on my nerves".

The collected research results show that preschool children in educational situations were able to learn with a peer. Therefore, it is crucial to emphasize the importance of developing children's peer learning skills. Without these experiences, children lack the opportunity to comprehend the nature of a learning community and the significance of a peer as a developmental companion. Teachers must create opportunities for shared learning and communication within task situations. According to Bałachowicz (2017), Andrzejewska (2020), and Rybińska and Kuszak (2021), the world of peers is rarely noticed in the design of children's learning process, teamwork, the implementation of educational projects, and free play in kindergarten.

Evaluation – children's opinions on the effects of learning with a peer

Teachers should inspire children to cultivate awareness of their own learning and the evolving levels of their knowledge and skills. According to Bałachowicz (2017), "early inclusion of the child in the systematic process of constructing their own subjectivity and forming relationships with others within a planned and organized educational environment should provide them with experiences in developing their own self, creatively utilizing interactions, and designing their own actions" (p. 50). Developing the capacity for self-observation in action and articulating one's own opinion – that is, self-evaluation – is a crucial element. During the concluding individual interviews, children participating in the activities were asked what they had learned from their peers during the task. The children (all 3–4-year-olds and some 5–6-year-olds) were generally surprised by the question, responding with "Nothing" or "I don't know". This may indicate that teachers and parents do not sufficiently support their development of self-observation skills in peer relation-

ships and during challenging tasks. The children are not encouraged to articulate statements reflecting their recent experiences. A thorough analysis and interpretation of the children's statements showed differences between individually provided answers (individual mind) and collectively generated responses (shared mind). This analysis also facilitated the creation of several response categories concerning social relations, problem or task solving, and emotions.

Table 1.
Categories of children's statements about the effects of peer learning

Social relations – individual mind	
5-year-old children	6-year-old children
"you have to wait patiently", "being together", "you have to play together", "you have to help each other", "you can help each other and play with someone and not alone and then it's more fun", "I don't like being alone", "when you play with others you can help each other and you're not alone", "you have to be nice", "it was fun playing with the girls, I would like to play with them again", "I like such play because you can jump and have fun with your friends"	"argue less", "it's hard to work with Matiev because he doesn't speak well", "together we did it quickly", "congratulating each other", "you have to follow the rules", "know when your friend is lying", "do everything together", "play together"
Social relations – shared mind	
5-year-old children	6-year-old children
"we can help each other"	"that you can change the rules of the game when you're in charge"
Solving problems or tasks – individual mind	
5-year-old children	6-year-old children
"you have to teach others", you have to cooperate", "it's good that I tried", "I knew how to pop balloons", "I saw how they did it and I could do it too", "you have to be careful and look carefully at the floor", "wait patiently for your turn and the results of your colleagues", "how to really catch fish in a pond", "that fish have to be in the fridge"	"give hints", "others have already played it so they know how"

Selected skills related to the task: • jumping fast • swimming • how fish dance • looking where the water is coming from • jumping on the left leg	Selected skills related to the task: • jumping like Tosia • standing on stones in the water • walking on water • I learned to jump high Zuzia learned to pick up quickly from me
Solving problems or tasks – shared mind	
5-year-old children	6-year-old children
"we have to play together, then we can win, next time we can break more eggs"	"we can have gymnastics here"
Emotions – individual mind	
5-year-old children	6-year-old children
"it's great to play together", "losing is so tiring"	"it's great when you succeed", "we didn't get bored"
Emotions – shared mind	
5-year-old children	6-year-old children
"it's great to play like that, it was great fun, are we playing tomorrow too?" "you have to like each other and be good to each other", "it was great, we want to play more often", "it's great to play with others"	"we want to play again! Can we play another game?" "it was great, we want to play another game, losing was so tiring"

Source: Authors' own study.

In the concept of the socio-cultural development of the child, Nelson (2007) draws attention to the active participation of the child in social life suggesting that children do not merely observe, imitate, or copy actions. An important experience for children was certainly the opportunity to play together with a peer using an attractive interactive floor. The children experienced that peers have different knowledge and action skills and that joint action provides very different emotions, such as the joy of action, but also competition and sadness of defeat. The respondents' statements indicate that in interaction with others, children construct their models of the world, which are instrumental in interpreting their own experiences. It is the teacher's task to recognize this as a manifestation of children's activity and subjectivity. A comparison of individual and team statements from 5–6-year-old children in individual categories indicates that the perceptions of the benefits of joint learning are different in the minds of individual preschoolers, and different after agreeing on a common opinion. Together with their peers, children create generalizations of the situation and draw conclusions, a process they do not typically undertake individually. The understanding of a situation, its context, and its

experiential effects varies and is remembered differently, influenced, for instance, by children's personal characteristics and experiences (e.g. Nelson, 2007). The children's descriptions of the effect of learning together described by the children indicate the heterogeneity of developmental sequences and their organization. Statements from the "shared mind" indicate a process of working through, reflection, and negotiation of the peer learning effects.

Forms of children's verbal behaviour during a developmental activity

Based on the analyses of children's verbal activity in a team play situation, 30 types of messages formulated by children towards their peers and the teacher were identified:

- Suggestions for how to do the activity: "Let's play together". "Lena, we'll crack the same eggs together so they don't run away!" "Let's play this, because it's quick, we have to go out together".
- Leading the team: "Let's go!" "We have to pop all the balloons". "I'll go first, stand on the carpet. Franek, stand in the corner". "Let's go together, line up in a single file". "Stand behind me, cause I know how to walk". "You take Stach, and I'll take Svetlana". "Let's start. I'll be with Mati". "I go with Zuzia, Let's start!" "Jump with me, now!" "You here, Hania there!" "You have to come here too!" "Hey, Witek, pop that blue one". "Ola, come to us, there are plenty of them here".
- Expressing will/desire: "I want to swim". "I want something else". "Me, alone". "Now me!"
- Negotiating: "Don't argue!" "I want it to too. It's my turn. Why not me?"
- Correcting others' actions: "Not this!" "Stop it, it's just a game". "Okay, let's start together!"
- Inviting/calling: "Welcome to »Fish«". "Come on!" "Let's go, or the teacher will turn off the carpet".
- Praise and compliments: "We did it!" "But we already have a lot!" "We have a dinosaur!" "Great, look, we've won!" "Zuzia and I are undefeated".
- Bragging: "I'm undefeated!" "Franek, look how great I'm doing!" "I can play this!" "I'm better than you!" "I'll make everyone smile!" "We did it, I have a point." "Misia, I scored more!" "It's easy for us". "We are clever". "It's easy for me".
- Stories: Fabian described how he went fishing with his grandfather, "Grandpa Kazik has worms in a bucket and keeps them in the fridge". Franek talked about the book Nemo.
- Commenting: Franek commented on his friend's statements that claiming that no one keeps worms at home.
- Asking questions to peers: "How many do we have now, five?" "What do we need here?" "Hey, where are they?" "Bruno, can you see them shooting?" "What should I do?" "Do you want to do it again?" "Dominik, how

many do we have?" "Hey, maybe we can jump together?" "When's my turn?" "Can I have another go?" "Where's the ball? Because I'll be holding it" "Can I go with the other children?" "Can I do it one more time?" "How many points do we have?" "Yes, how many do we have?"

- Encouraging others: "You can do it, no need to speak". "Just try, hurry up!" "We'll manage!" "Catch, Hanka!" "Jump, Kostek!" "Quickly, together!" "Jump!" "Lena, now!" "Kalinka, look!" "Ola, come closer, there are loads of them here!" "Okay, you've got it, now here, here, okay, you've got it". "Time Stachu, quickly, behind you!" "Collect them, Konstanty, come on!" "This is our time!" "Jagoda, come, that's cool".
- Cheering on: "Go, go, Nina, Nina!" Children chanted their friend's name. "Come on, come on!"
- Requests to peers: "Shall we play together?" "Mateusz, help, this egg won't crack". "I want to do it myself."
- Requests and questions to the teacher: "Do I have to jump?" "Ma'am, Look!" "He was sad, right Auntie?" "I managed to pop the balloon, did you see?" "Ma'am, do we have a lot of points already?" "What do we Reed here?"
- Reassuring: "Stop, be quiet, don't argue!"
- Threats and admonitions: "What are you touching here?" "Kajtek, watch out, we'll crash!" "Be quiet!" "Watch out!" "There are eggs next to you, hit!" "But we were supposed to play together". "You're doing the wrong thing, don't lie down, don't push me!"
- Giving instructions, explanations: "Ania, your turn!" "Zosia, not the smily ones!" "Watch out for the turtle, don't step on it". "Stand here and press with your foot like this, like this, just be careful, don't touch the bees". "Turn around, quickly, yeah, there". "Oluś, wait, the teacher will turn it on in a moment". "We only walk on water". "Don't go where I go, follow me". "You're not allowed to catch fish, only this way".
- Joking: "And what about you? And you?" the child addressed the balloons appearing on the floor, "I'm staying here", said the child and lay down on the interactive floor laughing, "Nemo is coming, run away", said the child inventing funny figures and making all the children laugh.
- Giving orders: "Let's chase them!" Hey, they're running away, catch them!" "Lena, help us, look!" "Hey, Witek, keep hitting, help us! Look!" "Girls go first!!!" "Let's get to work! Now it's my turn!" "We're going in now!" "Move or go into the classroom!" "You have to stand behind me!" "Don't catch, avoid!" "Catch these fish!" "Let's go! But be quiet!" "Maks, you've got an egg under your feet, jump!" "Zosia, you've got an egg, hit it!"
- Excluding peers from the game: "Go away!" "Step aside!"

- Complaining to the teacher: "Ma'am!, Ma'am, Olek is there" complained the child pointing to a friend who is doing something else, "Please, Ma'am, can Kuba play with Mikołaj here?" "Hey, come on, Julek, that one was mine, don't step on me, Ma'am…"
- Criticising: "Why are you touching this?" "Why so slow?" "Kalina, don't just stand there, they don't crack because of you". Yes, because of you, because I told you to play faster". "Well, it's a cool game, but I prefer ants".
- Quarrels: "Hey, hey Julek, that was mine, don't step on me", Staś pushed his friend and tried to move him, "Get out of here", Alan exclaimed, "Nooooo, let go, nooooo, I'll tell Aunt Ewa what you're doing", Marcel addressed Leon, "I'm better than you!", Leon replied, "Not you aren't!"
- Expressing offense: "I can see that!" "You're playing too fast, you took all the honey." "I don't want to play with him because I lost because of him". "I don't want to anymore!"
- Informing: "They're running away". "Oh my, so many balloons are flying!" "They're chasing us!" "They're everywhere". "Look, a balloon is flying". "I've played this before". "I've had enough". "They're flying there". "So many balloons are flying". "One got away!" "I know, there are loads of them, they really are flying into the clouds". "Look, there are eggs! And even a crocodile". "See how he walks". "Do you his tail?" "It's almost over," commended the child looking at the clock, "You can't step on fish, let the fish swim, I run and chase the fish. But the fish swim away". "I have some at home, I know how to be here".
- Expressing doubts: "But will I be able to do it?" "I haven't played it yet, I wonder if I can manage?" "You'll probably beat me. I'm not as agile as you are". "I'm scared, I can't do it either". "Maybe one more time?!"
- Valuing or assessing: "It'll be great fun!" "What great fun!" "Easy!" "This is simple!" "This game is great" "It's so cute, orange!" "They're blue, they're so beautiful!" "Look how great!" "How great, there's a dinosaur, it's all blue! How cute". "Great game". "We were fast, you can't go faster!" "Well, you can't!" "He doesn't do anything but cry". "It's hard, it's hard to be fast, but it's great". "Ma'am, it was fun".
- Expressing emotions:
  - joy: "Hurray!" "So many, wow!" "Wow, it's green!" "Ugh, game over". "Yeah!" (a cry of joy), "I've got you!" "High fives!", children hugging after the game, a child lifted their shirt up and drummed on their belly, children were singing to themselves;
  - sadness: "Oh no. It's a shame the time is up".
  - euphoria: "Yes! Great, awesome, brilliant", the child ran around the room with joy and shouts.
  - aggression: "There you go!"

  - anger: "You can't do it", the child stomped their feet, a child cried with anger;
  - impatience: "Come on, jump". "I'm bored". "I want something else".
  - excitement: "Yeaaah Yeea!!!"
  - impatience: "I want that too".
- Justifying oneself: "I can't do it anymore, my stomach hurts". "I can't do it anymore, I need to lay down, I'm tired".
- Expressing dissatisfaction: "And again I have a crocodile and stones... I can't break the egg!!" "Oh no, and the turtles…" "It doesn't work for me! I don't like this game!" "This egg won't crack!" "I'd rather play this alone". "I knew I wouldn't do good, I can't jump on one foot". "It's not working". "Oh, it's over already".

A wide range of linguistic behaviours occasionally occurs during children's activities in kindergarten. During the research, forms of communication were noted that were relatively rarely found in games or tasks directed by the teacher, such as encouraging, motivating, expressing doubts, giving instructions, and explaining (Andrzejewska, 2009). The richness and variety of messages generated by children demonstrate that the attractive play, task, or game caused strong involvement and emotions, reflected in a large number of emotionally charged messages. Analysis of messages related to verbalizing and expressing emotions during team task performance and subsequent summarizing statements reveals a wide range of emotional states, including joy from the activity, success, and cooperation, euphoria, excitement, sadness from the passing of time or the inability to continue the game, aggression, anger, impatience, and boredom. The unusual educational situation created by the teacher using new technologies activated all children verbally and emotionally. Preschoolers not only learned to recognize peer messages in a specific social context, but also gradually acquired the ability to formulate messages and understand their peers' intentions.

DISCUSSION

The variety of children's linguistic behaviours observed in the study was atypical and not indicated in other research results so far. In studies on communication among children in selected task situations, Andrzejewska (2009) reported a fewer such behaviours. In this study, one variable was controlled: the age of the children. Other studies have indicated different relationships; for example, research on cognitive and social problem-solving (Sowińska et al., 2011) demonstrated a relationship between linguistic behaviours and factors such as gender, kindergarten location, duration of the child's stay at the facility, and the type and location of the kindergarten. Research on children's cooperation skills in specific educational situations (e.g. play, physical

activity, research tasks, and collaborative painting tasks) (Lubowiecka, 2011) demonstrated a dependence on gender, the duration of the child's stay in kindergarten, and the type of kindergarten. The research by Andrzejewska (2019, 2020) and Guz and Andrzejewska (2020) indicates that children in early childhood education can learn with peers by adopting peer tutoring strategies, which involve the transfer of procedures, knowledge, care, and assistance. Conversely, Nosorowska-Mohyluk (2001), in her research on 5-year-old children's task cooperation, observed strong skills among preschoolers in joint activities but difficulties in providing and utilizing assistance. Nelson (2007) and Bielecka-Pikul (2012) emphasize the relationship between children's active participation in the community and the significance of experiences for their development, as well as the role of awareness regarding social life contexts. The conducted study using modern technologies in the form of an interactive floor fits into the contemporary concepts of children's cultural experiences set in parallel in real and virtual realities. Following Bruner (2006), education is not isolated but anchored in culture, and the analysis of meanings and the creation of images of reality are combined with cultural and technological contexts. Nowicka and Dziekońska (2018b), in their research on the child as a "digital native", emphasize the necessity for teachers to use new technologies due to the rapid digital transformation of societies. Klichowski et al. (2017) indicate the potential for utilizing information and communication technologies to support the development of preschool children across various physical-motor, cognitive, and social-emotional domains. The research results presented here contribute to the research trend concerning children as digital natives, including: research on play and the development of children's imagination with an interactive projection system conducted by a research group from Kobe University Elementary School (Moriya et al., 2022); research with students with special needs using floor projection (Takahashi et al., 2018); research on social interactions using an interactive floor (Krogh, 2004); and research on the interaction of 5–6-year-old children with interactive story-telling toys (StoryTech) (Kara et al., 2013).

CONCLUSION

The observed activities employing new technologies were appealing to children, which motivated them to form structured teams, engage in joint performance, strive for success, and exhibit complex and diverse verbal activity. To date, the use of interactive floors in early childhood education has primarily focused on supporting motor development, children's coordination, and cognitive skills (Krogh, 2004; Moriya et al., 2022). Designing tasks using an interactive floor, in our view, should include new elements: developing pupils' linguistic, communication, and emotional skills, as well as the orientation towards creating educational situations in dyads or peer groups. To develop communicative competencies in kindergar-

ten, children should experience natural situations that involve joint activity with their peers. Linguistic experiences within peer relationships are different than experiences gained in other social relationships (Kuszak, 2018).

The children's collected opinions on the effects of working with a peer using technology show their experiences and indicate areas for constructing team development tasks for teachers and creators of interactive floors. Given the specificity of preschool child development and the emergence of socio-cultural and linguistic awareness, teachers should therefore be encouraged to balance educational tasks performed individually by children with tasks or problems solved in dyads or teams. Teachers are not only obligated to organize the educational situation but also, upon its completion, to encourage children to explore its essence, process, and effects through individual and group analysis of their own and team experiences. In this way, preschoolers develop the ability to capture different points of view, perspectives, and interpretation possibilities of the same events.

Teachers must also analyze the forms of communication between children in different contexts and use a variety of activities for preschoolers so that they experience educational situations that inspire different language performances. Consciously selected tasks using the interactive floor, board games or outdoor games or tasks in the local, natural, technological and cultural environment can be helpful here.

When selecting tasks utilizing the interactive floor, preschool teachers should be sensitive to their complexity and diversity, recognizing that some collaborative tasks fall within children's zone of proximal development and are only feasible when team members cooperate. The educational space facilitated by the interactive floor provides opportunities for joint activities, rich verbal and non-verbal communication among preschoolers, encompassing prompting, arguing, problem-solving, and experiencing and verbally expressing a full range of emotions.

The preschool period is a profoundly important stage in the formation of a child's biography as a member of a social group, a peer in the process of shared learning, and a sender of messages. The teacher, as the architect of the educational space, by utilizing modern technologies for teamwork, can foster conditions for each child's individual development, as well as facilitate peer learning and the formation of "human networks" (Corsaro, 2005).

STUDY LIMITATIONS

The issues discussed herein pertain to specific educational situations involving the interactive floor and, as such, cannot be generalized to other educational activities designed by early childhood education teachers. A limitation for broader research within preschool or early childhood education is the scarcity of interactive floors in most preschool facilities.

REFERENCES

Andrzejewska, J. (Ed.). (2009). *Wspieranie rozwoju kompetencji komunikacyjnych dzieci.* Wyd. UMCS.

Andrzejewska, J. (2019). Sytuacje edukacyjne w szkole zogniskowane na uczeniu się wychowanków. *Roczniki Pedagogiczne*, *11*(47/2), 81–91. https://doi.org/10.18290/rped.2019.11.2-7

Andrzejewska, J. (2020). Edukacja outdoorowa szansą na budowanie relacji rówieśniczych. *Lubelski Rocznik Pedagogiczny*, *39*(2), 151–167. https://doi.org/10.17951/lrp.2020.39.2.151-167

Bałachowicz, J. (2017). Szkoła jako przestrzeń budowania przyszłości. In J. Bałachowicz, A. Korwin-Szymanowska, E. Lewandowska, & A. Witkowska-Tomaszewska (Eds.), *Zrozumieć uczenie się. Zmienić wczesną edukację* (pp. 11–91). Wyd. APS.

Bielecka-Pikul, M. (2012). *Narodziny i rozwój refleksji nad myśleniem*. Wyd. UJ.

Bokus, B. (1984). *Nawiązywanie interakcji społecznych przez małe dziecko*. Zakład Narodowy im. Ossolińskich.

Boniecka, B. (2010). *Dziecięce wyobrażenie świata*. Wyd. UMCS

Boud, D., Cohen, R., & Sampson, J. (Eds.). (2013). *Peer Learning in Higher Education*. Routledge.

Bruner, J. (2006). *Kultura edukacji.* Universitas.

Ciemcioch, K. (2015). Learning Apps w szkole. Kreatywne wykorzystanie aplikacji w chmurze początkiem nowego stylu nauczania i uczenia się. In J. Skibska, & J. Wojciechowska (Eds.), *Nauczyciel i uczeń w przestrzeni kreatywnych działań* (pp. 239–250). Żak.

Corsaro, W.A. (2005). *The Sociology of Childhood*. Sage Publications.

Filipiak, E. (2018). Badanie potencjału możliwości uczenia się dzieci – eksperyment nauczający. *Problemy Wczesnej Edukacji*, *42*(3), 60–71.

Guz, S., & Andrzejewska, J. (2020). The teacher – originator of student activity during play and developmental tasks. *Konteksty Pedagogiczne*, *2*(15), 97–122. https://doi.org/10.26881/pwe.2018.42.07

Kara, N., Aydin, C.C., & Cagiltay, K. (2013). Investigating the activities of children toward a smart storytelling toy. *Educational Technology & Society*, *16*(1), 21–43. https://doi.org/10.2307/23612830

Klichowski, M., Pyżalski, J. Kuszak, K., & Klichowska, A. (2017) Jak technologie informacyjno-komunikacyjne mogą wspierać rozwój dziecka w wieku przedszkolnym? studium teoretyczne. In J. Pyżalski (Ed.), *Małe dzieci w świecie technologii informacyjno-komunikacyjnych. Pomiędzy utopijnymi szansami a przesadzonymi zagrożeniami* (pp. 115–157). Eter.

Krauze-Sikorska, H., & Kuszak, K. (Eds.). (2010). *Aktywne edukacja w przedszkolu i szkole. Teoria i praktyka.* Wyd. WSPiA.

Krogh, P. (2004). "Help me pull that cursor". A collaborative floor enhancing community interaction. *Australasian Journal of Information Systems*, *11*(2). https://doi.org/10.3127/ajis.v11i2.126

Kuszak, K. (2017). Charakterystyka rozwoju dziecka w wieku 3–6 lat. In J. Pyżalski (Ed.), *Małe dzieci w świecie technologii informacyjno-komunikacyjnych. Pomiędzy utopijnymi szansami a przesadzonymi zagrożeniami* (pp. 11–60). Eter.

Kuszak, K. (2018). Dziecko w przestrzeniach języka. In K. Kuszak (Ed.), *Dziecko w przestrzeniach języka. Wybrane konteksty teoretyczne – wybrane perspektywy praktyczne* (pp. 95–121). Wyd. UAM.

Lubowiecka, J. (2011). Kompetencje społeczne dzieci w sytuacjach edukacyjnych w przedszkolu. In H. Sowińska (Ed.), *Dziecko w szkolnej rzeczywistości. Założony a rzeczywisty obraz edukacji elementarnej* (pp. 367–393). Wyd. UAM.

Moriya, K., Takaya, I., Yukiya, S., Tomoharu, M., Fusako, K, Shigenori, I., & Hiroshi, M. (2022). Playing with invisible animals. An interactive system floor – projected footprints to encourage children's imagination. *International Journal of Child–Computer Interaction*, *32*. https://doi.org/10.1016/j.ijcci.2021.100407

Musati, T. (1995a). Zdolności do komunikacji i reprezentacji we wczesnej zabawie społecznej. In A. Brzezińska, T. Czuba, G. Lutomski, & B. Smykowski (Eds.), *Dziecko w zabawie i świecie języka*. Zysk i S-ka.

Musati, T. (1995b). Wczesne relacje rówieśnicze według Piageta i Wygotskiego. In A. Brzezińska, T. Czuba, G. Lutomski, & B. Smykowski (Eds.), *Dziecko w zabawie i świecie języka*. Zysk i S-ka.

Nelson, K. (2007). *Young Minds in Social Worlds: Experience, Meaning and Memory*. Harvard University Press.

Nosorowska-Mohyluk, A. (2001). Współpraca i wzajemna pomoc w kontaktach dzieci pięcioletnich. In S. Guz (Ed.), *Edukacja przedszkolna na przełomie tysiącleci. Wybrane zagadnienia* (pp. 173–184). Wyd. WSZPTWP.

Nowicka, M., & Dziekońska, E. (2018a). *Cyfrowy tubylec w szkole – diagnozy i otwarcia. T. 1: Współczesny uczeń a dydaktyka 2.0.*Wyd. Adam Marszałek.

Nowicka, M., & Dziekońska, E. (2018b). *Cyfrowy tubylec w szkole – diagnozy i otwarcia. T. 2: Nauczyciel a nowe technologie*. Wyd. Adam Marszałek.

Rybińska, A., & Kuszak, K. (2021). *Współpraca dzieci w wieku przedszkolnym. Zmieniające się konteksty i perspektywy*. Wyd. UAM.

Shugar, G.W. (1983). Dyskurs małego dziecka w interakcjach różniących się typem partnera. *Studia Psychologiczne*, *21*, 1–2.

Shugar, G.W. (1995). *Dyskurs dziecięcy*. Energea.

Sowińska, H. (Ed.). (2011). *Dziecko w szkolnej rzeczywistości. Założony a rzeczywisty obraz edukacji elementarnej.* Wyd. UAM.

Takahashi, I., Oki, M., Bourreau, B., Kitahara, I., & Suzuki, K. (2018). FUTUREGYM: A gymnasium with interactive floor projection for children with special needs. *International Journal of Child–Computer Interaction*, *15*, 37–47. https://doi.org/10.1016/j.ijcci.2017.12.002

SYTUACJE EDUKACYJNE Z WYKORZYSTANIEM PODŁOGI INTERAKTYWNEJ STYMULUJĄCE KOMUNIKACJĘ DZIECI I WZAJEMNE UCZENIE SIĘ

Wprowadzenie: Funkcjonowanie dziecka w środowisku rówieśniczym jest ważnym aspektem tworzonej przez nauczyciela edukacji przedszkolnej wspólnej przestrzeni społecznej. Nauczyciel projektując i kreując przestrzeń edukacyjną do spotkania dziecka z rówieśnikiem dokonuje ważnych wyborów metod, zadań, zabaw, środków i form aktywności.
Cel badań: Przedmiotem badań zaprezentowanym w artykule jest analiza charakteru celów i zadań realizowanych przez dzieci w przedszkolu, przyjmowanych przez nie strategii uczenia się i komunikacji z innymi. Wykorzystano sytuacje edukacyjne z udziałem czteroosobowych zespołów dzieci z wykorzystaniem podłogi interaktywnej.
Metoda badań: Badania miały charakter jakościowy. Obserwowano formy wzajemnego/wspólnego uczenia się, formy komunikacji między przedszkolakami, emocje towarzyszące realizacji zadań w sytuacji badawczej. Po aktywności zadaniowej przeprowadzono rozmowy indywidualne i wywiady fokusowe w zespołach. W ich trakcie dzieci dokonały ewaluacji swoich doświadczeń.
Wyniki: W publikacji dokonano opisu ustaleń terminologicznych na podstawie przeprowadzonych badań. Wyłoniono i zaprezentowano trzy kategorie uczenia się rówieśniczego: wspólne wykonywanie zadań, uczenie się przez współpracę, tutoring rówieśniczy zaobserwowane w grupach dzieci uczestniczących w zadaniu przy wykorzystaniu podłogi interaktywnej. Pokazano zarejestrowany w trakcie badań szeroki wachlarz form komunikacji między dziećmi i towarzyszących im emocji w sytuacji edukacyjnej.
Wnioski: Zaprezentowane wyniki mogą zainspirować do dalszych badań nad komunikacją i współpracą dzieci przedszkolnych. Mają też wymiar aplikacyjny. Dostrzegamy ich użyteczność dla nauczycieli przedszkoli w procesie tworzenia środowiska uczenia się dzieci z rówieśnikiem przy zastosowaniu nowoczesnych technologii (interaktywnej podłogi), projektowaniu zadań rozwojowych realizowanych we wspólnocie uczącej się i tworzenia kontekstów do rozwijania umiejętności językowych i komunikacyjnych dzieci.

Słowa kluczowe: dziecko w wieku przedszkolnym, podłoga interaktywna, zadanie rozwojowe, uczenie się z rówieśnikiem