



PLAY VALUE

The influence of playground equipment on preschoolers play behaviour and language use

The influence of playground equipment on pre-schoolers play behaviour and language use

Justin Markussen-Brown, KOMPAN Play Institute

Abstract

This observation study investigated the extent to which a high quality play structure facilitated preschoolers' social play, cognitive play, and language development as compared to play on a grassy field. We found that the play structure encouraged more socially and cognitively complex play for some children, and increased the amount of speech use in

all children. Additionally, we found that the shyest child played more independently on the play structure, and that the changes in play behaviour were most salient for the child with the least developed language. Furthermore, a series of activity panels encouraged specific types of play depending on the activity they offered, as intended.



Background

Play is not merely a pastime of children – it is a complex behavior that promotes key areas of child development including sensorimotor skills, cognitive skills, social skills, and language^{1,2}. Although children themselves are adept at instigating play, adults can increase the developmental value of children's play by providing children with access to high quality play environments³. The outdoor playground is an iconic example of this. Playground structures present children with a number of activities, challenges and spaces that would not be available

to them if they merely played, for example, on an open field. Although research has demonstrated the importance of play for development⁴, less research has investigated the added value that playground equipment holds for children's play and development.

Mostly, the existing research has focused on the effect of playground play on children's physical development and health⁵, but less is known about the influence of playground play on other important developmental domains such as

social, cognitive and language development. This knowledge would be highly useful not only for educators, teachers, and parents, but as well for those who procure playground equipment. With a greater knowledge of how playground equipment facilitates child development, these stakeholders can make better informed decisions as to what kind of playground equipment they should invest in for their particular user groups, and why.

The goal of the current study

The current study had two objectives. The primary objective of the study was to investigate how playground equipment contributes to children's social, cognitive and language behaviour. To do this, we, research staff from the KOMPAN Play Institute, conducted an observation study of four 3-year-olds' play. More specifically, we analyzed chil-

dren's play behaviour while they played on a play structure designed specifically for preschoolers, and compared the results to the children's play behaviour when they played on the grassy area near and around the structure. The comparison revealed a number of ways in which the playground structure benefited children's social, cognitive,

and language behaviour. The secondary goal of the study was to report on the influence of activity panels on children's play behaviour. Activity panels are a common addition to KOMPAN play structures, and are intended to provide children with additional opportunities for learning, both during free play and during adult-led educational activities.

¹ Ginsberg, K. R. (2007): The Importance of Play in Promoting healthy Child Development and Maintaining Strong Parent-Child Bonds. *Pediatrics*, 119(1), 182-191. <http://doi.org/10.1542/peds.2006-2697>

² Lester, S., & Russel, W. (2010): Children's right to play: an examination of the importance of play in the lives of children worldwide. The Hague: Bernard van Leer Foundation.

³ Rivkin, M. S. (1995): The Great Outdoors: Restoring Children's Rights to Play Outside. National Association for the Education of Young Children.

⁴ Frost, J. L., Wortham, S. C., & Reifel, S. (2012): *Play and Child Development*. Pearson.

⁵ Ridgers, N. D., Stratton, G., Fairlough, S. J., & Twisk, J. W. R. (2007): Long-term effects of a playground markings and physical structures on children's recess physical activity levels. *Preventive Medicine*, 44(5), 393-397. <http://doi.org/10.1016/j.ypmed.2007.01.009>

The study

Study Participants

Four 3-year-olds (two girls and two boys) from a typical Danish preschool participated in the study. Table 1 displays each child's casestudy pseudonym with gender and age. On four different days, all four children were led outside to a grassy area where a three-platform play structure was set up. We told the children that they were allowed to play on the play structure, but they were not told that they had to play on it.

Table 1: Participants

Name	Gender	Age
Jesper	Male	3;5
Marie	Female	3;3
Bertel	Male	3;7
Sanne	Female	3;8

The play structure

The play structure employed in this study was a prototype based on KOMPAN's new Moments Mini series, which is a series of play structures built specifically for children aged 1-4 years. The prototype employed in this study consisted of three platforms connected via a hanging bridge and an inclined bridge respectively (Figure 1). The play structure had typical playground activities such as a slide and a fireman's pole, and was further enhanced with three activity panels designed to present children with additional engaging play opportunities. Panels make use of the play structures wall space, turning them into activities and objects that children can interact with and use in their play. The three panels employed here were (1) a panel with manipulatable sand scoops, (2) a panel with an abacus, and (3) a panel with a window (Figure 2).

The sand scoops panel has two scoops that can be filled with sand or water and moved along tracks, allowing the child to position the cups one over the other, and pour a substance from one cup to the other. This panel trains children's fine motor skills, cross-coordination, and encourages learning of the effects of gravity. Because the playground structure was placed on grass for practical reasons, we positioned buckets of sand next to the sand scoops before commencing each observation. The abacus panel has an abacus consisting of ten counting pieces placed on two rows, and is intended to facilitate children's use of numbers and counting in free play. The window panel is a circular window designed to encourage social interaction between children on and off the play structure. All three panels were in child height and were manipulatable from both sides.

“ A Mini play structure was a good choice for evaluating the value of play structures on children's development. we designed the structures to be perfectly ageappropriate in terms of size and scaling, and the learning panels provide a lot of extra play value.
- Cathrine Lüttge, designer on MOMENTS Mini

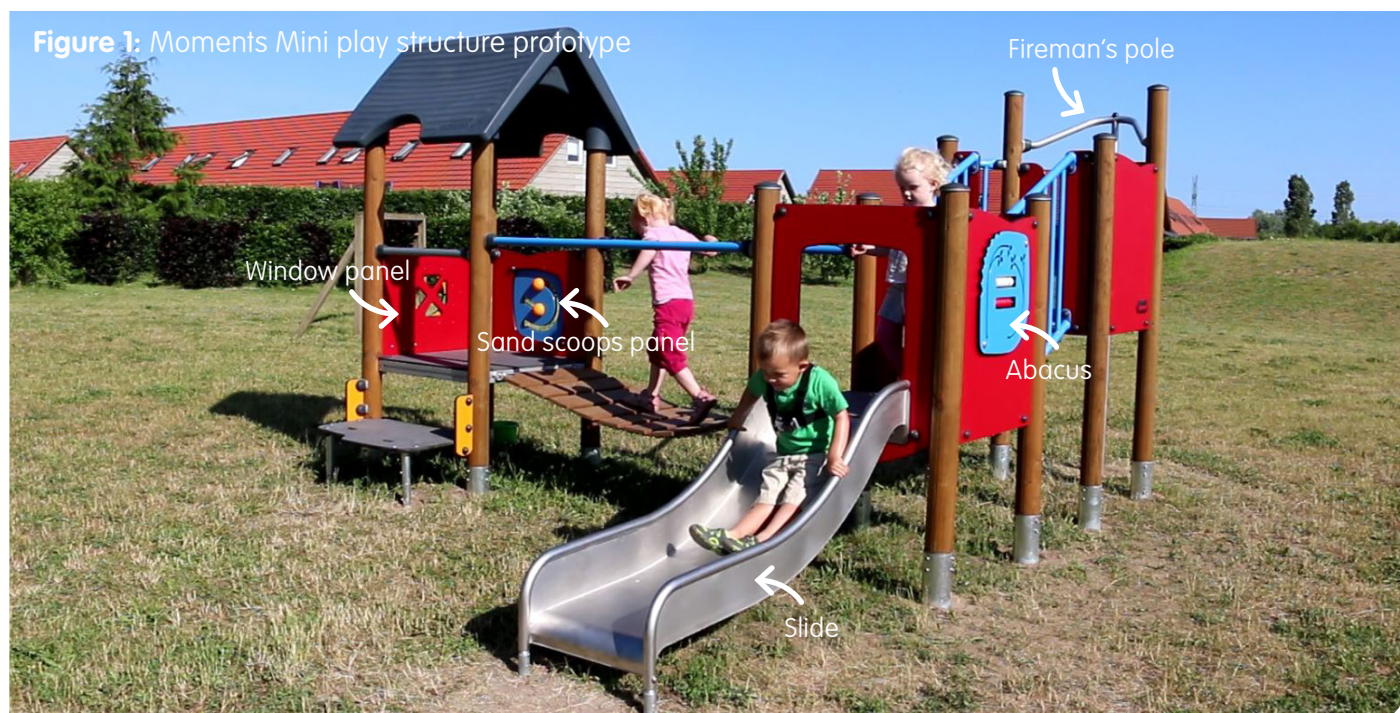
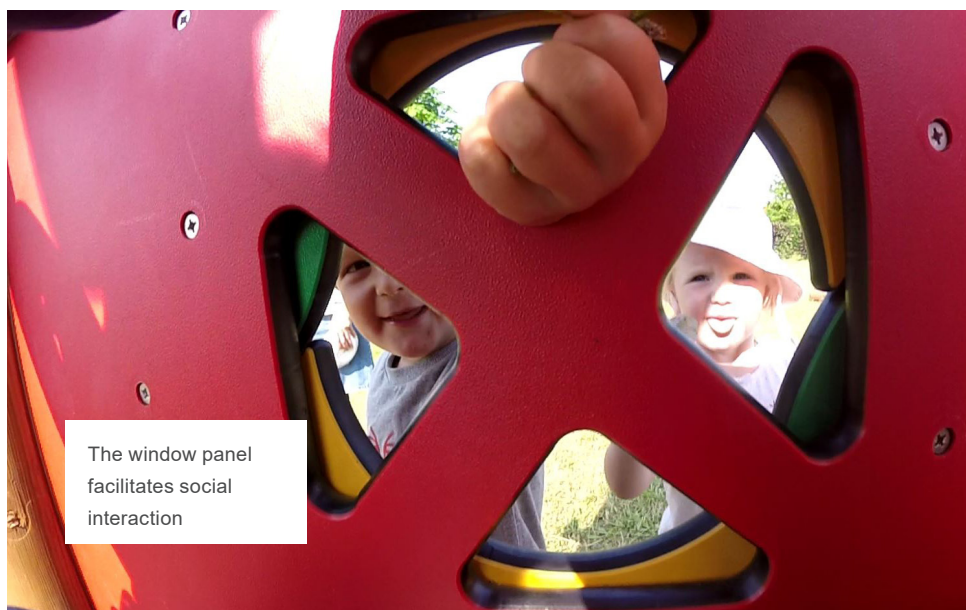
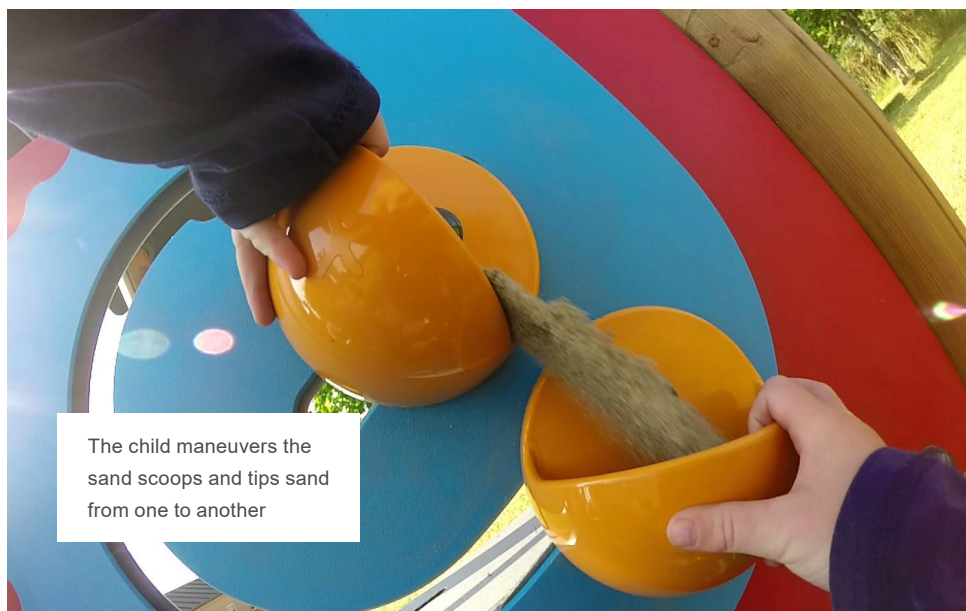


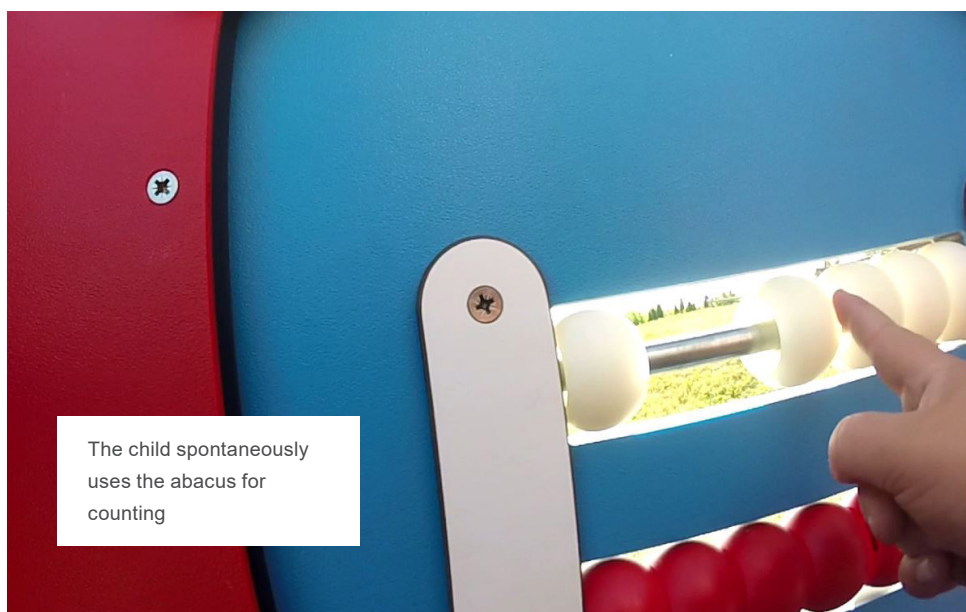
Figure 2: The sand scoops, abacus and window panels as seen from the child's perspective (go-pro camera)



The window panel facilitates social interaction



The child maneuvers the sand scoops and tips sand from one to another



The child spontaneously uses the abacus for counting

Procedure and analysis

On each observation day, the research team selected one of the children to be the focus child (each child had this role once). Our team then video-recorded the focus child's play using a handheld camera, and using a go-pro camera that the child wore using a special harness. The go-pro camera allowed us to verify the play behaviour that we observed using the handheld camera, and it also produced a high quality recording of the child's speech that we used for transcription. Although the children were at first aware that they were wearing small cameras, they each quickly forgot it was there after a few minutes of play.

Play behaviour analysis

We analyzed the play behaviour of each focus child using two behavioral measures. The first measure used was the *Play Observation Scale* (POS)⁶, a validated measure that codes children's play behaviour in terms of social⁷ and cognitive play behaviours^{8,9}. Children's play is often fast paced, and play behaviours can change rapidly. To account for this, the POS codes children's play in 10-second intervals, which allows us to quantify social and cognitive play behaviours over time. To assign a score to a 10-second interval, the investigator first determines what type of social

play behaviour is occurring based on three options: solitary play, parallel play, and group play. Then, the investigator categorizes the play behaviour in terms of its cognitive type, which includes constructive play, exploratory play, functional play, dramatic play, and games play. The social and cognitive play classifications are described in more detail below.

Definitions of social and cognitive play behaviours

Social play behaviours <ul style="list-style-type: none">• Solitary play: The child plays alone, paying little attention to other children.• Parallel play: The child plays independently, but alongside another child.• Group play: The child plays with other children.	Cognitive play behaviours <ul style="list-style-type: none">• Functional play: Play which centers around enjoying the physical sensation that a certain activity provides, e.g. sliding.• Constructive play: Manipulating objects to create something, e.g. building with Lego.• Explorative play: Focused examination of an object, e.g. examining stones on the ground.• Dramatic play: Symbolic, pretend play, e.g. playing doctor.• Games: Playing games that have rules, e.g. hide-and-seek.
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Language analysis

In addition to the social and cognitive play analysis, we also conducted a linguistic analysis of each child's speech during the recorded period of play. To do this, each child's mean length of utterance (MLU) was calculated to give an indication of the complexity of the child's language skills. MLU is an average count of how many morphemes (the smallest speech unit) a person's utterances contain, and in children it is an indication of their language development.

The MLU in itself only tells us about the complexity of a child's speech, but it does not tell us how much the child speaks over time. In order to investigate this, we also calculated the focus child's average MLU and average number of utterances during play on the play structure, and compared the results with play on the grassy area.

Understanding the MLU

The MLU is calculated by averaging the number of morphemes in a person's utterances. An utterance such as "one cat" contains two morphemes, as both words cannot be reduced to smaller parts, whereas "two cats" contains three morphemes. The suffix -s is a separate morpheme that adds information about the word cat (that there are more than one).

⁶ Coplan, R. J., & Rubin, K. H. (1998): Exploring and Assessing Nonsocial Play in the Preschool: The Development and Validation of the Preschool Play Behaviour Scale. *Social Development*, 7(1), 72-91. <http://doi.org/10.1111/1467-9507.00052>

⁷ Parten, M. B. (1932): Social participation among pre-school children. *The Journal of Abnormal and Social Psychology*, 27(3), 243-269. <http://doi.org/10.1037/h0074524>

⁸ Piaget, J. (1962): *Play, Dreams And Imitation In Childhood*. Routledge.

⁹ Smilansky, S. (1968): The Effects of Sociodramatic Play on Disadvantaged Preschool Children. Retrieved from <http://eric.ed.gov/?id=ED033761>

¹⁰ Rice, M. L., Redmond S. M., & Hoffman, L. (2006): Mean Length of Utterance in Children With Specific Language Impairment and in Younger Control Children Shows Concurrent Validity and Stable and Parallel Growth Trajectories. *Journal of Speech Language and Hearing Research*, 49(4), 793. [http://doi.org/10.1044/1092-4388\(2006\)056](http://doi.org/10.1044/1092-4388(2006)056)

Key findings for primary goal

Children's cognitive play behaviour changed on the play structure

Based on the comparison of the children's play on and off the play structure, we observed that three out of four of the children showed clear changes in cognitive play behaviour when they played on the Moments Mini play structure. For two of the children, the play structure facilitated increases in dramatic play behaviours. For Bertel, 8% of his play was dramatic on the grass, whereas this number increased to 39% on the play structure. An even larger increase was observed in Sanne. For her, 20% of her play was dramatic when playing on the grass, but this increased to 75% when playing on the play structure. Thus for these two children, the play structure appeared to facilitate dramatic play in a substantial way. Dramatic play is more-over known as a more cognitively advanced form of play, because it requires the child to use symbolic thinking⁸. Marie's play behaviour changed as well, but with a different pattern emerging. Marie was a shy child, and she followed the play behaviours of her friend, Jesper, to a large extent. Off the play structure, this led to a mix of play types, but also a great deal of onlooking and unoccupied behaviour as she waited for cues from Jesper. On the play structure, however, she attended far less to Jesper, and engaged exclusively in functional play. Instances of her wanting to do tricks and get the attention of the adults also occurred here. In short, the play structure evoked more independent play in Marie.

Jesper's cognitive play behaviour remained stable both on and off the play structure. He engaged nearly exclusively in dramatic play on the grassy field, and included the play structure in his dramatic play when he was on it.

“*Play structures appear to promote more independent and confident behaviour in shy kids*

- Justin Markussen,
KOMPAAN Play Institute

The complexity and amount of speech was higher on the play structure

The play structure facilitated an increase in use of speech in all the chil-

dren. On average, the children's average number of speech utterances per 10-second interval increased from 0,91 to 1,13, which is approximately a 20% increase (Figure 3).

In addition to an increase in frequency of speech utterances, the children's utterances were also more complex when they played on the structure. The average MLU was 2,21 when children played on the grassy area, and 2,68 when they played on the structure (Figure 4). This indicates that play on a play structure facilitated more complex language use.

The finding that playing on the structure increased speech frequency and complexity in the children indicates that play structures can have a role in facilitating language development, which is a key area of development in this age. The finding is likely related to the increase in social interactions between children when they are in closer proximity to each other, which the play structure facilitated. One of the early childhood educators from the preschool commented that the play structure encouraged the children to play together in groups.

Benefits of the play structure strongest for least developed child

Changes in play behaviour were most salient for Bertel, who had the lowest MLU (the least developed language) amongst the four children. In terms of social play behaviour (Figure 5), most of his play off the structure was solitary – only 27% of his play was group play. However, when playing on the play structure, group play became his dominant social play behaviour, accounting for 61% of his play behaviours. Similarly, we found a substantial contrast between his cognitive play behaviours on and off the play structure (Figure 6). Off the structure, he engaged mostly in functional play (86%), with very little dramatic play (8%).

This changed on the play structure, with functional play falling to 56%, and dramatic play increasing to 39%. In short, the play structure appeared to facilitate more socially and cognitively advanced behaviours in Bertel. This finding is of special significance, as Bertel appeared to be less developed than his peers in terms of language and play behaviour.

Figure 3: Children's number of utterances on and off the play structure

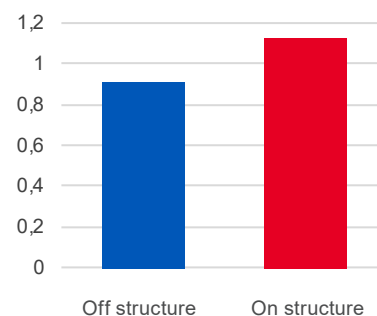


Figure 4: Children's mean length of utterance on and off the play structure

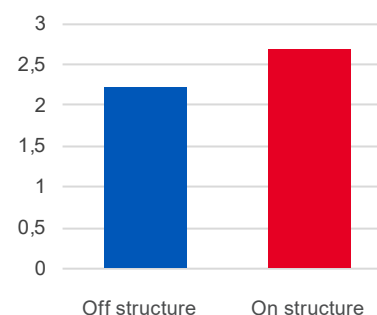


Figure 5: Social play behaviour for Bertel on and off the play structure

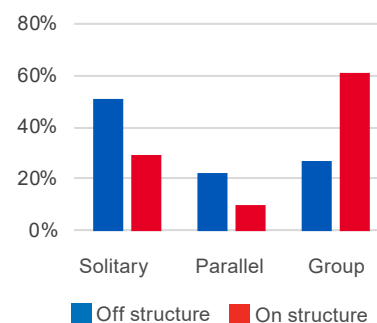
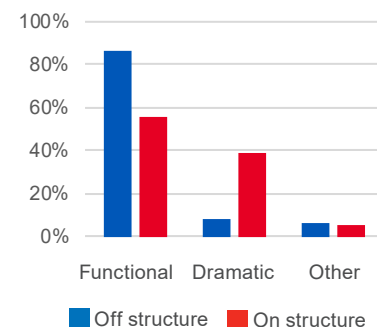


Figure 6: Cognitive play behaviour for Bertel on and off the structure



Key findings for secondary goal

The influence of activity panels on children's play

Our analysis of children's interactions with the panels revealed interesting, but differential influences. The sand scoops panel encouraged a great deal of functional and exploratory play at the solitary and parallel level. Functional and exploratory play are often considered to be less advanced forms of play compared to dramatic play, because they do not include the aspect of symbolic play. However, in instances requiring increased levels of concentration, exploratory and functional play are in fact signs of a highly engaged child¹¹. In the same way that a child constructing something with Lego may work independently and with great concentration, we found that the sand scoops required considerable focus of the child to manipulate and maneuver them. In all the children, we observed how they even stopped speaking when using the sand scoops due to their high level of concentration.

Our analysis of the abacus panel found that it encouraged spontaneous counting in the children. For example, Bertel, as he was going by the abacus, stopped suddenly and began counting as he manipulated the counting pieces. Interestingly, the abacus appeared to facilitate his counting of numbers that he

still had not yet mastered. We recorded his speech as he manipulated the abacus counting pieces: “Ten, eleven, twelve, thirteen, fourteen, fifteen – thirteen, fourteen, fourteen.”

“ *Activity panels are not only additional play value to children - they are also instructional tools for educators*

- Justin Markussen,
KOMPAN Play Institute

The window – although not manipulatable – was used in two ways. Either children used it as intended and interacted with each other through the window, or they used it symbolically in dramatic play, pretending for example that it was the steering wheel of a ship. We were surprised to see how popular the window was with the children, but it also reaffirmed for us the importance of testing and observation when developing play equipment, as it can be difficult to predict (even with decades of experience) exactly how children will use play equipment.

Educational applications of the activity panels

The activity panels did not only figure into the children's free play. The preschool's educators also used the panels actively in their educational activities. For example, the children did not at first know what the abacus was, and what it could be used for. The educators capitalized on this lack of understanding, and instructed the children on how to use the abacus, the results of which were clearly reflected in the way Bertel spontaneously used the abacus as described above. Educators described to us a number of other learning moments facilitated by the activity panels. On the social level, for instance, the sand scoops panel gave educators the opportunity to instruct children on turn-taking and cooperation. The panel has room for up to two children, which resulted in occasional, short-lived conflicts over whose turn it was. Educators used these opportunities to instruct children on cooperation, controlling their feelings, resolving conflicts, being considerate, and so on. These are essential aspects of a child's social development and socialization.

Conclusion

This exploratory observation study found that a high quality play structure designed specifically for its user group facilitated changes in children's social and cognitive play behaviours, as well as increases in language use. Changes in play behaviour were differential depending on each child's characteristics, but increases in dramatic play were common. Increases in language use and language complexity were observed in all children regardless of the child's developmental level. Furthermore, the child who was least developed of the four children displayed the most salient changes, with both

social and cognitive play behaviours becoming more complex. In addition, we found that the activity panels were successful in facilitating changes in play behaviour. One of the panels encouraged concentration, fine motor skills and critical thinking, another encouraged spontaneous counting, and the third encouraged dramatic play and social interactions.

“ *Children look to the play equipment because there they can play in groups. That's when it's really fun for them.*

- Jeanette, early childhood educator from the preschool

This study contributes to our knowledge of how play equipment can benefit children's development, an area that receives little attention in scientific research. Our study provides clear indications of the benefits that well-built play equipment can provide children, and these results can help guide stakeholders in a number of questions related to playground equipment procurement.

¹¹ Smith, P. K. & Simon, T. (1984): Object play, problem-solving and creativity in children. In P.K. Smith (Ed.), Play in animals and humans (pp. 199-216). Oxford, England: Basil Blackwell, Inc.



KOMPAN International Sales

C.F. Tietgens Boulevard 32C

5220 Odense SØ

Denmark

Tel.: +45 63 62 12 50

export@kompan.com

www.kompan.com