
Social play by young at-risk children: a microgenetic approach to the study of emergent collaboration and numeracy

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Abstract

A sociocultural perspective was taken to examine the development of social play and emergent mathematics during social play with students at-risk. A longitudinal experimental design was carried out including a microgenetic study of the play sessions. Nineteen dyads from five primary schools and eight dyads from six special primary schools participated in the study. The dyads will be followed through from Grade 2 to 3. The subjects were selected with respect to age, language development, intelligence score and temperament. Then dyads were matched within classrooms according to sex and age. The dyads in the experimental condition took part in six 20-minute play sessions over a period of three weeks followed by a seventh session two months after the sixth one. The dyads in the control condition were studied in the first and seventh session only. Each experimental session included an invitation to build a zoo using toy-animals and wooden blocks. The study is still in progress. The results with respect to comparison of mathematical knowledge at the end of Grade 2 are presented. Moreover, collaboration and emergent mathematics during play sessions from two dyads are described and discussed.

Introduction

Sociocultural theory will be discussed to frame the general research question that will be explored, namely, whether social play develops differently with students at-risk attending a regular primary school as opposed to students at-risk attending a special primary school. As the data collection is currently in progress, the paper examines one of the hypotheses stated which is that emerging collaboration during play is related to emerging mathematical knowledge.

Sociocultural theory and the meaning of play

Within sociocultural theory, culture is understood as the created environment of people. It contains views, meanings, and ways of collaborating, rules and values as well as visible 'products', for example, signs and symbols in the material world. According to Vygotsky (1978), the child needs to interact with this created environment in order to learn. Results of learning thus comprise knowledge that is socially constructed. There is a dynamic exchange between individual meaning making and the task at hand. The result of this exchange is displayed in increasing stability of performance related to individual variability (Rogoff, 1998).

Within this framework, play is a form of imitation. As a culturally meaningful practice, the child creates zones of proximal development during play (Vygotsky, 1978). Children do not experience feelings of anxiety as they act out or imitate only what they can handle. Play is meaningful for development. Children experiment with their environment, materials, and language. They experience social processes and try to influence them. They can take initiatives and try to resolve problems to get acquainted with the cultural customs and the role that they are allowed to take (Van Oers and Wardekker, 1997).

When undertaken in a classroom, it seems logical that play also reveals how children experience the classroom in that they play in order to understand the social practices they are experiencing. The quality of play as seen in the skills children use to solve social and cognitive problems during play have been found to be related to future success in school as well as to the ability to work collaboratively together with colleagues later in life (Hannikainen, 1998; Lloyd and Nowe, 2003; Van Oers, 1997; Verba, 1998; Wyver and Spence, 1999).

Based on the work of Piaget, Vygotsky and Parten, Göncü (1993) suggests that social play requires intersubjectivity. This emerges in the third year of life when solitary play gives way to social play, and children achieve intersubjectivity in social play by negotiating their ideas with one another. Social play thus is a major developmental task, as children become part of a classroom and a school community.

In social play, peers are often approximately equal in status and competence. There are different kinds of cooperative formats related to joint role-play that reveal that cooperation develops from asymmetrical interactions into

symmetrical co-elaboration. Various social, motivational and cognitive factors become intertwined and balanced during cooperation as opinions and intentions related to goal orientation, meanings and management are shared (Verba, 1993, 1994, 1998). The children's play and learning are not cognitive activities in themselves, but they come about related to situational factors, such as activity, time and actors.

Göncü (1993) studied how social play evolves with 3-year-olds compared to 4-year-olds by investigating how play interactions are expanded. His study included pairs of children of the same sex from one regular primary school who were friends, according to their teachers. He showed that there was a significant effect of age with respect to length of sequences of social play. His study was an interesting start to studying social play with youngsters. However, the topic of situatedness of social play was not addressed in his investigation. Kontos and Keyes (1999) and Nolen (2001) who included environmental characteristics reveal that the quality of the classroom adds to chances that children will profit from interventions that take place in the classroom.

As children become more aware of cultural tools used by the adults surrounding them, it can be expected that emerging interest in reading, writing and mathematics is revealed during social play. The interactions displayed can show emerging number sense when concepts related to role play are discussed as well acted out during counting and discussing numbers of toys (Burchinal, Roberts, Riggins, Zeisel, Neebe and Bryant, 2000; Malofeeva, Ciancio and Jeanne, 2001). Since the behaviours may come forward during social play and during individual play whilst using private speech, we expect that social play in itself reinforces the appearance of utterances that are related to emergent mathematics.

Young children at-risk for learning difficulties in the Netherlands

In the Netherlands, children enter primary education at the age of four. One per cent of all young children attends special primary education by the time formal academic learning of reading and writing starts at the age of six in Grade 3. Although these children at-risk for learning difficulties appear to have special educational needs, it is not clear whether placement in a special primary school is the solution to their problems. Moreover, enormous

differences exist between provinces on the number of children referred to special education that cannot be explained by rural versus urban or socio-economic status (Van der Aalsvoort, Van Tol and Thomeer-Bouwens, 2002). We refer to these children as “at-risk” because they:

... manifest some or all of the following behavioral characteristics: difficulty in using language fluently and effectively in a range of situations, inability to attend to and persevere with tasks and activities, lack of purposefulness, imagination and variety in play, lack of initiative; lack of ‘normal’ social and emotional maturity (Elliott and Hall, 1997, p.198).

Accurate placement in special education of these children is difficult for several reasons. Firstly, reliable prediction of success or failure to become readers and writers is difficult. Children develop at their individual pace and seemingly slow or quick progress can be caused both by endogenous and environmental factors (Hauser-Cram, Bronson and Upshur, 1993; Kontos and Keyes, 1999; Pianta and Stuhlman, 2004). In other words, some of the so-called students at-risk will indeed become poor readers and writers, however, others will not. Secondly, the rationale underlying placement recommendations at a special primary school at a young age is that there are clear-cut advantages to the child being among comparable performing peers. Yet, results of teaching homogeneous groups of ‘slow developers’, as opposed to heterogeneous groups of students are mixed. Some studies have revealed that attending school with comparable performing peers will make it easier for the child to feel at ease (Chandler, Lubeck and Fowler, 1992; Guralnick, Connor, Hammond, Gottman and Kinnish, 1996). Other findings suggest that education in the early years is the result of a challenging environment with a heterogeneous group of students. A child may feel challenged by this environment irrespective of adult involvement (Kontos, Burchinal, Howes, Wisseh and Galinsky, 2002; Stagnitti and Unsworth, 2000). On the other hand, however, the school as an environment can play a negative role in that children at-risk may be perceived as unresponsive to teaching efforts (Keogh, 1982 cited in Coplan, Barber & Lagacé-Séguin, 1999).

The arguments listed above are at the centre of discussions in the Netherlands about decision-making related to the referral of young children to special education. The question is what type of information is helpful in deciding whether a special primary school suits the needs of a child at-risk for learning difficulties.

Our study aims at clarifying the role of school-type with young children at-risk since the Dutch school system provides two types of academic environment for young children at-risk: regular and special primary education. Grades 1 and 2 in both types of education offer a comparable programme during a school day. Each day involves whole-group sessions. These sessions include storybook reading, singing songs, and children talking about everyday experiences. Birthday celebrations and festivities can also be part of these sessions. The rest of the day includes tasks that elicit experiences of emergent literacy and mathematics alternated by snack time, playtime in the classroom, and playtime outside. Why would we expect differences between these school types? We found that differential influence occurs because of the time available to interact with peers and teachers (Van der Aalsvoort, Van Tol and Thomeer-Bouwens, 2002). The mean group size of classes in regular primary schools is about 25 compared to a maximum of 15 in those of special primary schools. Teachers in special primary schools tend to interact with each child individually more often in their aim to respond to the child's special needs. At the same time, the child loses opportunities to interact with peers. Moreover, children placed in special education often take part in individual therapy sessions such as speech therapy and locomotor therapy, which also decrease chances to be involved with peers. We do not know whether these differences have an impact upon the child's developmental progress.

Design of the study

The general research question to be answered is whether social play develops differently by students at-risk attending regular primary schools as opposed to their peers in special primary schools. In addition, the study explored one sub-question, namely, whether an intervention that includes opportunities to play improves mathematical knowledge as assessed by standardized achievement tests.

The study included an intervention to evoke social play. We planned a longitudinal experimental design including a microgenetic study. The design involved dyads of young at-risk children from regular and special education in two conditions. The dyads of the experimental condition took part in seven play sessions and those of the control condition participated in two sessions only.

To allow for statistical group comparison, subject selection was based on intelligence scores, passive language development, and temperament. Every student from a classroom was tested with respect to passive vocabulary and intelligence to identify children at-risk. In addition, the teachers rated the children's temperament to exclude children who were either too introverted and at-risk for communication disorders, or too extroverted and at-risk for behavioural disorders. The children selected were then matched according to age and sex for dyads within classrooms. Dyads were chosen randomly to be part of the experimental or control condition. At least one of the dyads was part of the control condition if there were more than three dyads within a classroom. The design of the study controlled for quality of home and school environment as co-variables. Home environment was rated by collecting data on education and occupation of both parents, and the pedagogical quality within the school was also rated.

A play-session typically took place in a room separate from the classroom and the room included a video camera. Before the first session, each dyad was made familiar with the camera. Next, a task was offered to trigger the children's interest in materials that aimed at eliciting social play. The researcher said: "The two of you can play now. Do you see the blocks and toy-animals? Can you build a zoo for me? It's up to you to think about how to build the zoo and which animals are going to live in it". The researcher was present during the sessions but she did not participate or interfere in the unfolding activities. A dyad was allowed to stop playing after 20 minutes or when one of the children asked permission to leave the room. The researcher then said: "You built a lot of things! I will make a photo of your zoo so that you can play with it again next time". Then she escorted the dyad back to the classroom. In the next session, the configuration left behind by the dyad at the end of a session was built again by the researcher. She asked the dyad whether she had done this correctly, and invited the dyad to start playing again. Table 1 on the next page shows the design of the study.

Table 1: Design of the longitudinal study

		3 weeks of play sessions								1 session 8 weeks after session 6	June 2004	March 2005
		1 month of selection										
		C	S	P1 O	P2	P3	P4	P5	P6 O	P7 O	AP1	AP2 + P8
RPS	E	+	+	+ +	+	+	+	+	+ +	+ +	+	+ +
	C	+	+	+ +						+ +	+	+ +
SPS	E	+	+	+ +	+	+	+	+	+ +	+ +	+	+ +
	C	+	+	+ +						+ +	+	+ +

- RPS Regular primary school
- SPS Special primary school
- E-C E = experimental group; C = control group
- C Co-variables: Early Childhood Environment Rating Schedule (ECERS), Socio-economic status (SES)
- S Selection of subjects: Raven Coloured Progressive Matrices; subtest of Language of Children in Kindergarten; School Behaviour Evaluation List.
- P1-P6 Play session 1 to 6
- P7 Play session 7
- O Observation of the dyad in the classroom after a play session
- AP1 Academic performance: Ordering, Number sense, Passive language development, Phonological awareness
- AP2+P8 Play session 8 and tests to assess academic performance: Passive language development; Technical reading and spelling; Mathematics

The microgenetic study within the experimental design aimed at investigating the emergence of social play as a developmental process. According to Siegler and Crowley (1991) and Siegler and Svetina (2002), many observations in a short period of time need to be made, followed by in-depth analyses both qualitative and quantitative to grasp the process that may underlie a change, such as improved skills. Therefore, the play sessions were planned in a period of three weeks followed by a ‘retention’ session after two months in the research conditions to control for maturation. As each session was videotaped, the tapes allowed us to transcribe verbal utterances and nonverbal behaviours displayed. Next, the transcripts were analysed with respect to social play and emergent mathematics (see Instrument section). This procedure permitted us to study social play and emergent mathematics developing over time.

Instruments

As the study is still in progress, we will describe the instruments pertinent to the study until the end of Grade 2.

Passive vocabulary: Subtest of Language of Children in Kindergarten (Van Kuijk, 1996)

The norm-referenced test is administered individually. The child is offered two practice items before test items are presented. The test includes four subtests: two for expressive language development and two for passive language development. The passive vocabulary test was used to select participants. In the test, the child is offered four pictures, and the tester provides one word. The child should point at the picture that represents the word. Scores ranged from one (high) to five (low). All children from one classroom were tested to identify who would participate in the study. The cut-off score was a score lower than three.

Raven Coloured Progressive Matrices (Raven, 1965)

This is a nonverbal intelligence test that can be administered to children aged four to ten. The test contains 36 items. In each item the child is asked to point at a picture that would complete a series of three pictures. The choice made requires analogical reasoning. The raw score of each child was compared to Van Bon's standard norms for the Dutch population (Van Bon, 1986). Scores ranged from 9.9 (high) to 0.9 (low). All children from one classroom were tested to identify who would participate in the study. The cut-off range was a score higher than two and lower than six.

The School Behaviour Evaluation List (Bleichrodt, Resing and Zaal, 1993)

The instrument contains 52 rating scales that refer to four factors: extroversion, task behavior, emotional stability and agreeableness. Teachers rated each child separately and then the factors were traced and related to norm tables. Factor scores could range from one to nineteen. Children rated between four and sixteen for each factor selected.

Pedagogical quality

The schools were rated using the Early Childhood Environment Rating Scales (ECERS) (Harms, Clifford and Cryer, 1998). This rating scale includes seven categories that can be rated from one (poor quality-level) to seven (high quality level). The categories are: space and furnishings, personal care and routines, language-reasoning, activities, interaction, programme structure, and

parents and staff. The ECERS was rated in each classroom of the school that took part in the study. The categories parents and staff, however, were rated at school level only. The Pearson Correlation Quoefficient was used to check inter rater reliability by rating four classrooms from different schools twice. The ratings were highly comparable: SPS-1: $r = .95$; SPS-2: $r = .99$; RPS-1: $r = .93$; RPS-2: $r = .98$; RPS-3: $r = .98$.

Socio-economic status (SES)

The socio economic status of each parent was rated using the Standard International Socio-economic Index of Occupational Status (Ganzeboom, De Graaf and Treiman, 1992). The index contains four levels of education and six levels of occupation. The levels of education ranged from one (low level) to four (high level) whereas level of occupation ranged from one (low level) to six (high level). Both indexes were computed for the fathers and the mothers separately.

Mathematical knowledge

Ordering (CITO, Van Kuyk, 1997). The test is administered individually. The child is offered two practice items before test items are presented. Then page one of the test booklet of the Grade 2 test is presented. When a child failed on more than two items of the four on the first page, the child was presented the test booklet of Grade 1. The booklet contains 42 items. Each item requires that the child points at the picture that fits with the question. Although the booklet can be used as a classroom assessment tool, the children were tested individually. The norm tables for Grade 2 students were used to derive the norm score. A score was given to reveal skill and performance related to comparable age groups. Scores ranged from one (high) to five (low).

Number sense (Borghouts-Van Erp, Bakermans, Coumans and Minkenberg, 1982). The task includes the principles of number sense as suggested by Piaget. They are: counting to ten and back (six items); sense of measure (eight items); conservation (six items); correspondence (six items); classification (four items); seriation (seven items). The results on the items solved correctly on number sense were used for the study as well as the score on counting.

Analyses of the transcripts made from the videotapes

Collaboration during play was determined using an adjustment of the procedure of Verba (1994). All play-sessions were transcribed, followed by a three-step procedure.

- Step 1: Assessing episodes in the transcripts
- Step 2: Assessing cognitive level in behaviour displayed in the transcripts as realism or play
- Step 3: Level of collaboration

Collaboration during play was examined at two levels:

- Simple: Seeking contact: saying something and being heard; reciprocal eye-contact; verbal communication may be part of the exchange but adds little information to the interaction.
- Deep: Seeking contact: saying something and being heard; reciprocal eye-contact followed by verbal communication followed by planning (proposing ideas, and/or giving directions, and/or carrying them out; and/or evaluating role play).

Emerging mathematical knowledge was assessed by identifying utterances referring to mathematical meaning making, such as numerical relationships, and utterances relating to number sense during episodes. Moreover, utterances as expressions of private speech were also identified with respect to numerical relationships and number sense. The numbers of utterances found were added to the data collection.

Participants

The study was carried out with 56 children who attended one of five regular or one of six special primary schools from different regions in Holland. The scores for the research conditions are listed in Table 2 on the next page.

Table 2: Means and standard deviations by school and by research condition

	RPS: e-condition		RPS: c-condition		SPS: e-condition		SPS: c-condition	
N	24		14		12		6	
	M	SD	M	SD	M	SD	M	SD
Age	67,0	2,83	69,0	4,81	71,0	7,45	74,0	2,34
Raven score	4,1	0,88	4,3	0,85	4,4	1,10	3,8	1,38
Language score	3,1	1,53	3,2	1,37	3,8	1,55	4,0	0,82
Temperament:								
Extraversion	10,6	2,36	10,8	2,23	10,9	3,20	11,3	1,50
Task behaviour	9,0	2,33	11,1	1,92	9,9	1,93	7,3	1,06
Agreeableness	8,8	2,77	9,9	2,84	9,5	3,06	7,8	2,22
Emotional stability	10,0	2,40	9,7	2,43	8,1	1,78	12,0	1,83

The school conditions were comparable with respect to all variables except for age ($F(3, 52) 4,905, p .004$), task behaviour ($F(3, 50) 21, 325, p .006$), and emotional stability ($F(3, 50) 18,423, p .019$). These results indicate that the selection procedure did not always lead to comparable groups.

When the experimental conditions were compared within school condition, task behaviour was higher in the control condition of the regular primary schools ($t(36) -2,853, p .005$) compared to the experimental condition. When the experimental conditions were compared within school condition, age ($t(14) 2,359, p .033$) was higher in the experimental condition of the special primary schools compared to the control condition. Emotional stability ($t(14) -3,787, p .002$) was lower in the experimental condition of the special primary schools compared to the control condition. These results were taken into account by using analyses of covariance with respect to the variables compared.

As the participants had been selected from eleven schools, we compared the pedagogical quality of the research conditions. In addition, we compared socio-economic status (SES). The results are listed in Table 3

Table 3: The means and standard deviations of the ECERS ratings by category and the SES by school and by research condition

	RPS: e-condition		RPS: c-condition		SPS: e-condition		SPS: c-condition	
N	24		14		12		6	
	M	SD	M	SD	M	SD	M	SD
ECERS:								
Space & furnishings	6,2	0,48	6,0	0,44	5,7	0,58	5,8	0,52
Personal care routines	6,0	0,77	5,9	0,09	5,4	1,45	5,2	1,33
Language-reasoning	6,1	0,94	5,5	1,21	5,5	0,89	6,3	0,22
Activities	5,0	0,69	4,7	0,45	4,2	0,56	4,7	0,34
Interaction	6,1	1,22	6,4	0,51	5,6	1,09	6,3	0,85
Programme structure	6,7	0,40	5,6	1,14	6,3	0,57	6,7	0,30
Parents and staff	5,5	0,61	5,6	0,61	5,6	1,01	5,3	0,78
SES index:								
Father	6,0	2,39	5,7	1,98	6,3	2,63	4,3	0,58
Mother	5,6	2,12	5,6	2,19	5,0	0,00	4,7	0,58

When the experimental conditions were compared with respect to activities ($F(3, 52) 5,301, p .003$), the groups differed remarkably in favour of the regular primary schools whereas programme structure ($F(3, 52) 3,863, p .000$) was higher in the special primary schools. When the experimental conditions were compared within school condition, programme structure was rated higher in the experimental condition of the regular primary schools ($t(14,831) 3,500, p .003$) compared to the control condition. When the experimental conditions were compared within school condition, language-reasoning ($t(13,470) -2,714, p .017$) was higher in the control condition of the special primary schools than in the experimental condition. Activities ($t(16) -2,344, p .032$) were rated lower in the experimental condition of the special primary schools compared to the control condition. Regarding SES, no significant differences were found between schools and between conditions. These results were taken into account by using analyses of covariance with respect to the variables compared.

Research procedure

The principals of several schools for regular primary and special primary education were asked to participate in the study. When the principals agreed, the teachers from Grade 1 were addressed. As soon as they gave their consent, the research procedure was explained to each teacher. Then a letter that was composed by the research team informed the parents about the study, and they were invited to give their consent. After having received their written consent, the assessment of child characteristics began. Due to the strict selection procedure only five regular primary schools and six special primary schools could participate in the study. Then the Early Childhood Environment Rating Scale (CERS) was administered including an inter rater reliability check. Next the play sessions were planned and carried out taking into account school holidays, school schedules etc. If a child was absent for a session, the session was postponed. All the dyads stayed in the study throughout. After the last session, the children were thanked for their cooperation. The teacher of the children received books as presents for her class. In June 2004, the subjects were tested with respect to emergent mathematics.

Results

Comparision of groups with respect to mathematical knowledge

We expected that an intervention including opportunities to play would improve mathematical knowledge. The findings related to this hypothesis are presented in Table 4.

Table 4: Means and standard deviations on number sense, counting and ordering by school and by research condition

	RPS: e-condition		RPS: c-condition		SPS: e-condition		SPS: c-condition	
N	24		14		12		6	
	M	SD	M	SD	M	SD	M	SD
Number sense	23,0	2,70	25,4	2,10	21,4	5,18	14,8	3,49
Counting	4,5	1,12	5,2	0,58	3,8	1,94	2,3	1,86
Ordering	2,6	1,12	2,5	1,09	3,4	1,00	4,8	0,41

An ANOVA with task behaviour and emotional stability as covariables revealed that performance on the number sense tasks was higher in the experimental condition than in the control condition ($F(3) 11,492, p .000$). The same results were found with respect to ordering ($F(3) 7,310, p. 000$).

An ANOVA with task behaviour as a covariate revealed that number sense ($F(1) 4,533, p .041$) was better in the control condition of the regular primary schools than in the experimental control condition.

An ANOVA with task behaviour and emotional stability as covariates showed that performance on ordering ($F(1) 12.210, p .007$) was better in the experimental condition of the special primary schools than in the control condition.

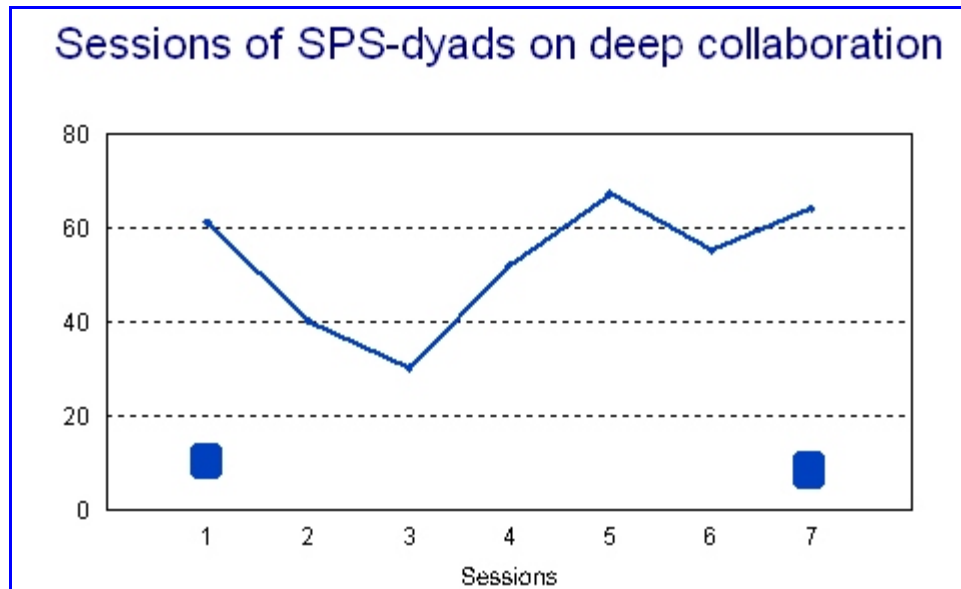
The findings suggest that mathematical knowledge as assessed by a norm-referenced test was higher in the experimental condition than in the control condition. With respect to the schools, this finding was due to the results in the special primary schools.

Two examples of microgenetic analyses with respect to social play and emergent numeracy

The findings presented below relate to the in-depth analyses of dyads with respect to social play and emergent numeracy displayed during social play. We chose this example to describe the processes that may underlie the results on mathematical knowledge.

Figure 1 allows for a visual inspection of the microgenetic analysis undertaken with dyads from a special primary school, that is, two dyads from special primary education from the experimental and the control condition. The dyads, both pairs of boys are derived from different schools.

Figure 1: Microgenetic data with respect to deep collaboration from the experimental dyad (diamonds) and the control dyad (blocks) during episodes



The histogram reveals the number of times that deep collaboration occurred with the two dyads from special primary education in the experimental and the control condition. The findings reveal that there is a rise in collaboration as to be expected with the dyad in the experimental condition. Collaboration in the control condition was barely existent.

Figures 2a and 2b allow for a visual inspection of the occurrence of the emergent mathematics for each session.

Figure 2a: Microgenetic data with respect to emergent mathematics from Reginald (experimental group: diamonds), Richard (control group: wedges) and during episodes (crosses)

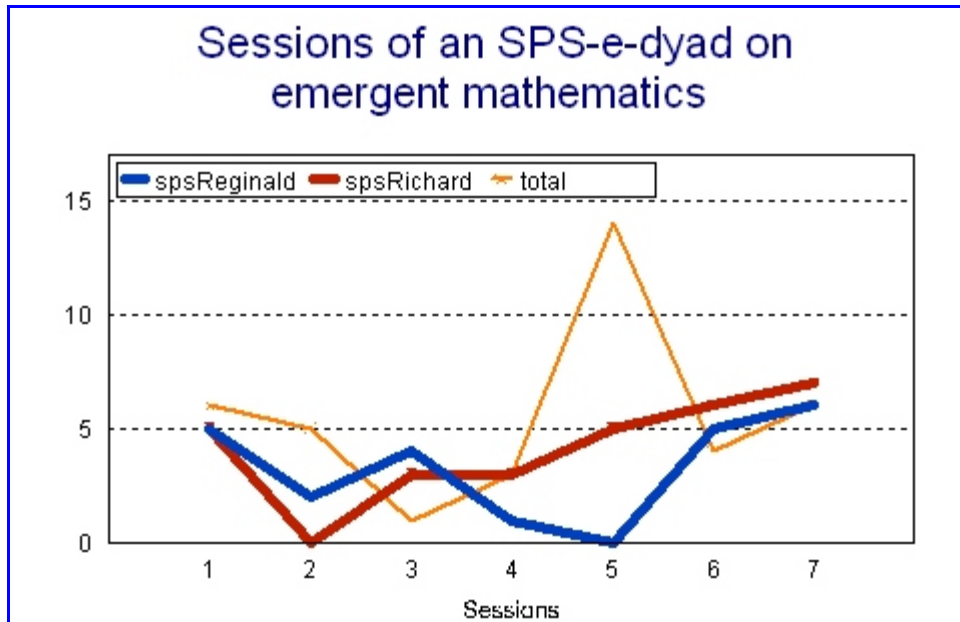


Figure 2a shows that both the boys utter more or less comparable mathematical remarks separately as well as during collaboration. Session 5 reveals a high number of utterances during episodes. The conversation of the dyad is typical in that many conversations relate to size, numbers etc. such as discussing the size of the animals that would fit in the cages.

Figure 2b: Microgenetic data with respect to emergent mathematics from Andy (experimental group: diamonds), William (control group: squares) and during episodes (triangles)

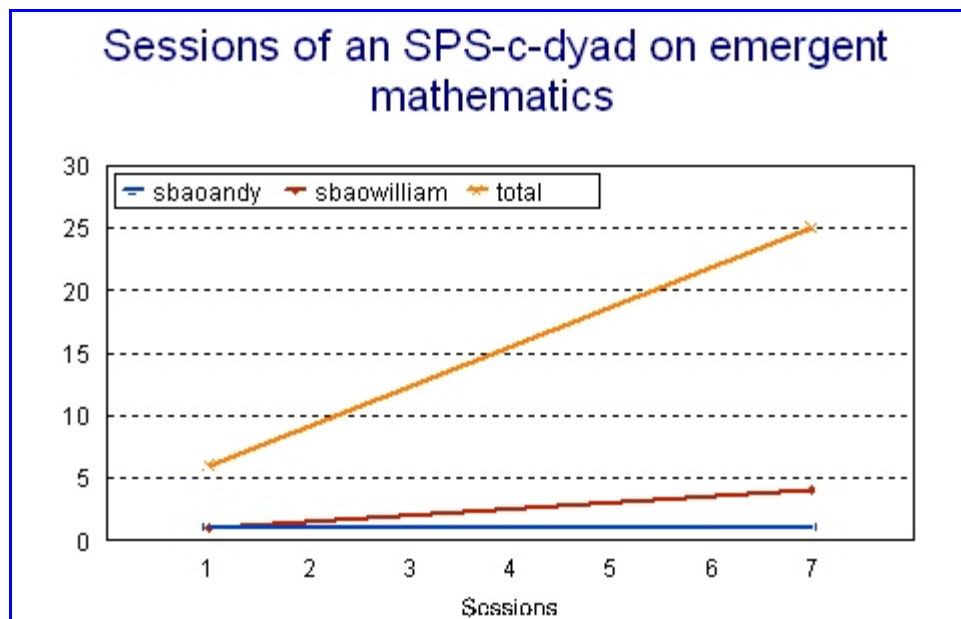


Figure 2b shows that both the boys utter a comparable number of solitary mathematical utterances in session 1. Session 7, however, reveals an increase in utterances during episodes as well as an increased number of utterances by William.

Summary and conclusion

The study was undertaken to explore whether development of social play of at-risk children in regular primary education would differ from those placed in special primary education.

The comparison on group level revealed that emergent mathematics came forward stronger in the experimental condition than in the control condition. The findings suggest that mathematical knowledge was higher in the experimental condition than in the control condition. This finding was due largely to the results in the special primary schools.

The results available with respect to processes during sessions do not allow us to conclude on the findings at this point in time. Therefore, the findings on collaboration and utterances of emergent numeracy were presented with respect to dyads from two special primary schools. All the dyads in the experimental condition revealed that utterances of emergent mathematics were evident more often in episodes than during solitary play. The figures, however, show that the starting point of collaboration and emergent mathematics differs remarkably between dyads. An ANCOVA is required to decide whether the patterns found are related to differences between experimental conditions.

The findings presented in this study provide insight into the role of the classroom as a community of practice. Profiting from collaboration may be more significant for children attending special primary schools than for those from regular primary schools. All the children in the study made efforts to achieve shared understandings and actions. They were eager to take part in the sessions and displayed rich imagination in responding to the materials offered. By using a multi-step procedure, we can compare findings both quantitatively and qualitatively between conditions. The transcripts allow us to follow separate dyads and relate their interactions during social play to child characteristics (Anfara, Brown and Mangione, 2002; Rourke, Wozniak and Cassidy, 1999). Moreover, we expect that the study presented will clarify the role of school type in how young at-risk children intertwine social play with developing concepts of academic knowledge within the school as a context. A pilot-study, preceding the study presented here, allowed us to gain insight in how children-at risk develop skills to play together (Van der Aalsvoort, Van Tol and Karemaker, 2004).

Finally, the social play did not seem to be constrained by the poor language level of the participants. Moreover, the participants showed even within a very short period of time, their potential to collaborate and exchange their emerging knowledge on numbers and use of mathematical knowledge thus inviting teachers to make use of their potential in the classroom. The design of the study presented here suggests that there are many opportunities to observe the process of development in a child.

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