

Effect of Game-Based Learning Activities on Children's Positive Learning and Prosocial Behaviours

(Kesan Aktiviti Pembelajaran Berasaskan Permainan terhadap Pembelajaran Positif dan Tingkah Laku Prosocial Kanak-Kanak)

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ABSTRACT

The purpose of this research is to investigate the effect of game-based learning activities (GBL) on children's positive learning and prosocial behaviours. Games in this research are referred to a set of games with rules which are adapted or designed by the researcher based on the National Pre-school Standard Curriculum for preschool mathematics education. The games involved the use of cards, game board, and dice. Children played the games in groups. This research used quasi-experimental with non-equivalent control group pre test/post-test research design. The treatment group consisted of 23 preschool children using GBL while the control group consisted of 24 preschool children who use traditional methods of teaching and learning. An independent-samples t-test was conducted to compare the mean score of children's learning behaviours between treatment and control group. There was a significant difference in the mean scores for treatment group ($M = 38.74$, $SD = 5.5$) and control group ($M = 23.00$, $SD = 14.79$) conditions; $t(45) = -4.795$, $p = 0.00$. Data collected for prosocial behaviour were based on the frequency of occurrence of behaviours that have been identified and presented in the form of graphs. The results showed that the treatment group gained much higher frequency of occurrence in prosocial behaviours compared to the control group. These results suggest that GBL is effective in nurturing children's positive learning and prosocial behaviours. The research can serve as a guideline especially to rural preschool teachers in applying GBL in their classroom.

Keywords: Game-Based Learning; positive learning behaviours; prosocial behaviours; pre-school

ABSTRAK

Tujuan kajian ini adalah untuk mengenal pasti kesan aktiviti pembelajaran berasaskan permainan ke atas tingkah laku pembelajaran positif dan tingkah laku prososial kanak-kanak. Permainan dalam kajian ini merujuk kepada satu set permainan yang disesuaikan atau direka oleh penyelidik berdasarkan Kurikulum Standard Prasekolah Kebangsaan untuk pendidikan matematik prasekolah. Permainan melibatkan penggunaan kad, papan permainan, dan buah dadu. Kanak-kanak bermain permainan dalam kumpulan. Kajian ini menggunakan reka bentuk kuasi-eksperimen ujian pra-ujian pasca dengan kumpulan kawalan tidak setara. Kumpulan rawatan terdiri daripada 23 kanak-kanak prasekolah yang menggunakan pembelajaran berasaskan permainan manakala kumpulan kawalan terdiri daripada 24 kanak-kanak prasekolah yang menggunakan kaedah pengajaran dan pembelajaran tradisional. Ujian-t sampel-sampel bebas dijalankan untuk membandingkan min skor tingkah laku pembelajaran kanak-kanak antara kumpulan rawatan dan kawalan. Terdapat perbezaan signifikan dalam skor kumpulan rawatan ($M = 38.74$, $SP = 5.5$) dan kumpulan kawalan ($M = 23.00$, $SP = 14.79$); $t(45) = -4.795$, $p = 0.00$. Data untuk tingkah laku prososial dikumpul berdasarkan frekuensi kewujudan tingkah laku yang telah dikenal pasti dan dipersembahkan dalam bentuk graf. Keputusan ini menunjukkan bahawa kumpulan rawatan mendapat frekuensi kewujudan tingkah laku prososial yang lebih tinggi berbanding dengan kumpulan kawalan. Keputusan kajian mencadangkan bahawa pembelajaran berasaskan permainan adalah berkesan dalam memupuk tingkah laku pembelajaran positif dan tingkah laku prososial kanak-kanak. Kajian ini boleh dijadikan sebagai panduan terutamanya kepada guru-guru prasekolah di luar bandar dalam menggunakan pendekatan permainan di dalam kelas mereka.

Kata Kunci: Pembelajaran berasaskan permainan; tingkah laku pembelajaran positif; tingkah laku prososial; prasekolah

INTRODUCTION

Promoting young children's readiness to learn is the most important key towards successful learning. Unfortunately,

many parents do not understand the main purpose of early childhood education as well as its importance to the pupil's development from various aspects. Parents are more concerned about the mastery of reading, writing and

counting skills (Sharifah Nor et al. 2009) that teachers need to focus more on formal approaches to fulfill the parents' wishes and to prepare the children for learning in Year One which evince academic importance only (Zakiah et al. 2011). Thus, many young children are stressful at a very young age and these learning environments are not healthy being too academic.

Early childhood education should focus more on the nurturing of positive learning behaviour because it is really crucial, particularly positive attitude towards oneself and the willingness to learn (Tarr et al. 2008). Positive behaviour encourages learning with the presence of self-awareness and self-commitment (Vellymalay 2011) and initiative and enthusiasm for learning (Abdul Rahim 2001). The strength of attitude formation and positive behaviour towards learning will determine a person's success. This is because self-aspiration is the primary foundation of the children's drive and intrinsic motivation to achieve meaningful learning.

Prosocial behaviour refers to the voluntary behaviour that will benefit others or show harmonious relationship with others (Bergin & Bergin 2012). As such, prosocial behaviour becomes an important indicator to social and emotional competency and subsequently influences a person's development for a long period of time. Therefore, the nurturing of prosocial behaviour among preschool children is crucial, especially through their daily activities (Catapano 2005; Honig 2007) that take into consideration values of teamwork, discussion and sharing of ideas, tolerance, fairness, open-mindedness, and mutual respect. Social interaction through activities can give advantage to the child in terms of flexibility of behaviour in interaction with peers of different backgrounds.

Findings from research locally and abroad show that one of the effective ways in nurturing positive learning behaviour (Pareto et al. 2011; Moore 2012; Offenholley 2012) and prosocial behaviour (Honig 2007; Shaffer & Kipp 2010). Unfortunately, many teachers are not adopting this practice of learning through playing. This can be explained through the view that playing does not facilitate learning, particularly in terms of academic aspect. Children only have fun playing without learning anything important. This view and perception among parents once again put pressure on the teachers and school such that they ignore the importance of playing in the development and wellbeing of children. Moreover, teachers are generally not skilled in applying the principle of learning through play (Sharifah Nor et al. 2009; Sharifah & Aliza 2012).

Therefore, this research integrated games-based learning approach (games-based learning) (GBL) into the teaching and learning process of early mathematics education for the preschool level focused on number concept and number operations. It is hoped that this effort could help nurture positive learning behaviour and prosocial behaviour among the preschool children.

RESEARCH OBJECTIVES

- (a) To investigate any difference between GBL and traditional method in nurturing pupils' learning behaviour.
- (b) To identify the effectiveness of GBL in nurturing pupils' prosocial behaviour.

RESEARCH QUESTIONS

1. Is there any difference between GBL and traditional method in nurturing pupil's learning behaviour?
2. Does the use of GBL nurture prosocial behaviour among the pupils?

RESEARCH HYPOTHESIS

- H_{01} : There is no significant difference in the mean score of learning behaviour between the pupils of the treatment group and the control group.

METHODOLOGY

This research used quasi-experimental with non-equivalent control group pre-test/post-test research design (McMillan 2008). This quasi-experimental design was used to replace the actual experimental design because this study was carried out during school hours by using the available classes, in that the research subject for the treatment group and control group could not be selected randomly (Chua 2006). This study involved 47 preschool pupils from two rural national schools in Miri, Sarawak. The treatment group consisted of 23 preschool pupils while the control group consisted of 24 preschool pupils. All the respondents were 5-6 years old. The teacher in the treatment group integrated games in the teaching and learning of number concept and number operations while the teacher in the control group used the traditional approach.

Games with rules were played in group of four which involved the use of cards, board games and dice. There were simple game rules which helped children to begin the game playing and they may change the game rules whenever necessary.

Pupils' learning behaviour was measured using a Learning Behaviour Scale (LBS) checklist that was evaluated by their respective teachers at the beginning of the study and at the end of the study. LBS is a checklist related to preschool children's learning behaviour that was developed and checked for reliability by McDermott, Leigh, and Perry (2002) with the original name of *Preschool Learning Behaviour Scale* (PLBS). PLBS was translated from English to Malay. In order to validate the instrument according to the Malaysian context, reliability test was carried out using *Split-Half* (Chua 2006). The statistics showed that the reliability index was 0.929, which means high reliability of instrument as stated by Pallant (2007). The LBS has 27 items, each presenting a specific learning-related behaviour (e.g., "Easily gives up activities," "Resistant or fearful

about new activities," "Doesn't pay attention to teacher" and "Unwilling to accept needed help").

Prosocial behaviour was assessed through video recordings and observations using the observation table adapted from Weir & Duveen (1981); Tremblay et al. (1992). Interobserver reliability was carried out using Two-by-Two Data (Hartmann 1977). From the calculation, Kappa value equal to 0.92, which means almost perfect agreement as stated by Landis & Koch (1977). The observation table has 13 indicators, each presenting a specific prosocial behaviour (e.g., "Offers to help other children who are having difficulty with a task in the classroom," "Volunteers to help clear up a mess someone else has made," "Can work easily in a small peer group," and "Tries to be fair in games").

Learning behaviour data were analysed using independent sample t-test while the prosocial behaviour observation data were collected by using time sampling where the number of frequencies was presented in the form of graph. Pretest for learning behaviour was undertaken to identify if there was a difference between groups at the beginning. Pre-test results are shown in Table 1.

TABLE 1. T-test results of independent samples for the pre test

Independent Variable	df	t	Sig.	Mean Difference
Group	45	-0.370	0.713	-1.25

Table 1 shows the results on learning behaviour in the pretest for both the treatment group and control group. Analysis showed that there is no significant difference between the two group at the beginning, $t = -0.370$ and $df = 45$, $p > 0, 05$.

RESULTS

Table 2 shows the descriptive statistics on learning behaviour in the post-test for both the treatment group and the control group.

TABLE 2. Descriptive statistics of learning behaviour

	Post-test	
	Treatment	Control
Learning Behaviour		
Mean	38.74	23.00
S.d	5.50	14.79
Minimum	32.00	2.00
Maximum	50.00	46.00

In the post-test, the lowest score of learning behaviour for the control group is 2.00 and the highest is 46.00, while the mean score of learning behaviour is 23.00 (s.d. = 14.79).

The lowest score of learning behaviour for the treatment group is 32.00 and the highest score is 50.00, while the mean score of learning behaviour is 38.74 (s.d. = 5.50). The mean score of learning behaviour for the treatment group is higher compared to the mean score of learning behaviour for the control group which is 15.74.

To test the null 1 (H_{01}) hypothesis, Independent Sample t-test was carried out to determine the differences, if any, between the pupils in the treatment group and the control group.

TABLE 3. T-test results of independent samples for the post-test

Independent Variable	df	t	Sig.	Mean Difference
Group	45	-4.795	0.000	-15.74

Table 3 shows the Independent Sample t-test results of the dependent variable which is learning behaviour of the post-test according to groups. Analysis showed that there is a significant difference between the two groups, $t = -4.795$ and $df = 45$, $p < 0.05$. Therefore, the H_{01} hypothesis is rejected. This result shows that there is significant difference in post-test scores between the treatment group and the control group.

From the data collected, it was found that the frequency of occurrence of prosocial behaviour demonstrated by the pupils of the treatment group is above that of the control group. Figure 1 shows that the frequency of occurrence of prosocial behaviour shown by the pupils of the treatment group is higher than the pupils in the control group across time. This indicates that the use of GBL can foster prosocial behaviour among pupils.

DISCUSSION

Integration of game activities in teaching and learning shows the effectiveness in nurturing positive learning behaviour compared to traditional method. It can be explained through three main aspects, namely competence motivation, attention/persistence, and attitude towards learning.

COMPETENCE MOTIVATION

Success or failure in an activity undertaken will affect views and perceptions of that activity. The same goes with the learning process as stated by Freiberg and Driscoll (2005) in that the learning process is equally important as the learning outcome. The learning process is a continuous process that requires a person to act on his or her own initiative which is driven by a form of motive as a result of the person's own experience and having a reason on the action taken (Brophy 2010). In games, the main motive is to win the game, and winning itself is a form of encouragement that is not a result of material

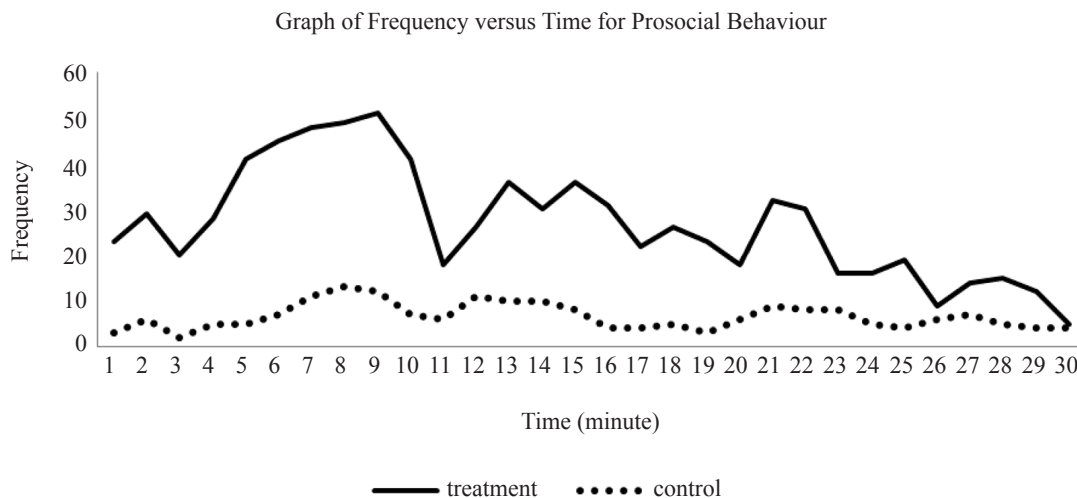


FIGURE 1. Graph of frequency versus time for prosocial behaviour according to group

reward. This encouragement is produced from intrinsic motivation because children love to play and the playing activity is a reward for the children as argued by Lillard (2013). Similarly too, the motive of winning a game will motivate the young child to achieve success.

The game activities provided in this study coincide with the effort to help children in terms of competence motivation or in other words, having high motivation in their daily tasks. When a child loses in a game scenario, he or she still has the chance to repeat the game until he or she gets the chance to win in the next round. The advantage from this repetition allows children not to be worried or afraid of trying even though the possibility of losing is always there. This is crucial especially in helping children to be ready to face situations of failure and to be brave in accepting the blow of defeat. Undoubtedly, there are some children who are afraid of taking risks in trying out new activities and subsequently this makes the process of learning difficult and tedious. The situation is worst when the children choose to avoid from attempting the tasks which could lead to failure. In learning mathematics for instance, many students experience phobia and despair because they often fail in the subject to the extent that they are no longer motivated in learning.

Accordingly, the game activities provided in this study actually offer an important platform in helping children foster competence motivation in themselves. This is clear when the motivation itself is seen as an outcome of two main strengths which are self-expectation to achieve the goal and the value of the goal to the individual (Woolfolk 2014). As elaborated previously, the characteristics of repetition inherent in the game activities provide the children with expectations of achieving the goal of winning and the triumph experienced becomes a form of confidence for them. Self-confidence consequently helps to increase competence motivation in other things endeavoured. At the same time, the value of the goal of playing is clear and meaningful because the games provided are appropriate to

the experience and related to the daily life of the children, in addition to having fun throughout the process of playing.

ATTENTION/PERSISTENCE

The ability and skill to concentrate or focus as well as to stay or remain on the task logically affect learning. Concentration on the task improves the children's involvement time in the learning activity and subsequently facilitates the learning process in the classroom (Pianta & Stuhlman 2004). Longer involvement allows learning to occur. In this study, the children were given the chance to play games and more time was given for them to think and then respond to the activities such as organising the steps in the games. This action is appropriate as concentration is an important element in information processing and is an important path towards learning (Zook 2001) by associating the new information with existing knowledge in long term memory. However, concentration on new information that can give meaning to a person or relevant to the activities carried out should be emphasised and among these is the activity of playing games.

Involvement in game activities not only can attract the attention of children but it can also affect the duration in which a piece of information can be stored in working memory because of the characteristics of games that allow the process of repetition. Repetition in games helps in terms of information processing because information processed in the working memory will disappear within 15 to 30 seconds if not repeated (Driscoll 2005). In this study, basic mathematical concepts such as number concept and number operations are applied in the games which have been designed by the researcher. Therefore, repetition in game activity not only increases the length of time the information is stored in the working memory but it is also a form of learning which can essentially enhance conceptual understanding of mathematics that is applied in the games and reinforces procedural skills. When

children repeat the steps in a game, hence indirectly it will enable them to practice the number concept and number operations until it becomes procedural skills that in the end become knowledge that is stored in their long term memory. Both conceptual understanding and procedural skills are important elements especially in learning of mathematics.

ATTITUDE TOWARDS LEARNING

Positive attitude towards learning is an important component in the effort to make the learning meaningful and subsequently leads to knowledge and cognitive development. Attitude is the situation when an individual is influenced to act positively or negatively towards others, ideas or an event (Alwaih Alsagoff 1983). At the preschool level, children are always influenced by the current situation or current activities undertaken or attempted. In this study, the game activities give satisfaction and enjoyment to the children. At the same time, they are exposed to the basic concepts of mathematics that have been integrated in the games. Such an approach enables the children to learn through playing in a situation that is less stressful for them. Thus, learning becomes a simple process and their interest towards mathematics can also be fostered.

In short, this effective and fun learning process can help children foster positive attitude towards learning especially in mathematics. From the explanation on the importance and application of attention/persistence skills in tasks, nurturing of competence motivation or intrinsic motivation and finally to the nurturing of positive attitudes to learning, it is therefore clear that these efforts have had an impact on the nurturing of more positive learning behaviours among the children.

PROSOCIAL BEHAVIOUR

Nurturing prosocial behaviour among preschool children is crucial since they learn a lot from social interactions among themselves. In this study, children who displayed prosocial behaviour more frequently throughout the teaching and learning process can be linked to the integrated game activities. Interaction with peers, teachers and games activities became the source for the occurrence of positive social interaction. The planned and organised activities provided the opportunity for the children to practice social skills especially when group activities were involved.

In games, group activities were carried out which required the children to learn to follow or obey rules, wait for their turn and mutually help one another. Group work also required them to work together and cooperate, in addition to being fair especially in playing the game activities prepared. As the game activities involved movements such as spinning, throwing the dice and getting the materials for the games, hence opportunity was created for the children to learn to wait for their turn and avoid the situation of fighting over the games or taking someone else's turn. The

situation of differing opinions in the game activities also created conflict among the children. Due to the fact that they were of the same age, they therefore did not have the autonomy to make the final decision. This situation actually opened up new opportunities for the children to solve the conflict through discussions even though the discussions seemed as though they were fighting; however, it did not involve violent physical actions.

Several rules were set such as only the group leader was allowed to take the games from the teacher and bring it to the group's respective places. These rules had to be followed by all children even though there were times when a small number of children would gather around the teacher to get the games. However, they had to abide by the rules and return to their respective groups until the respective group leaders got the games from the teacher. This situation educated the children in that they have to comply with the rules for the benefit of everyone including avoiding the possibility of accidents occurring as a result of the chaotic situation. In this matter, the teacher played the role of explaining to the children the reasons for the action of following those rules. The teacher's action of using victim-centered induction is more easily accepted by the children, in addition to improving the moral values and developing prosocial behaviour.

The action of tidying the materials used for the games together and handing them over to the group leader to be returned to the teacher was also part of the children's routine. They voluntarily helped to tidy up the mess including returning the chairs to their original place and arranging the tables according to the original arrangement. They would remind each other if there were friends who did not return chairs to their original place and left the place untidy with the games' materials.

Since children can easily learn something from observation and modelling, the actions from the teacher therefore also influence learning and nurturing of prosocial behaviour among children. In this study, the teacher was someone who was easily approached by the children and always appreciated the actions of the children who cooperated and gave assistance to the teacher. Expressions of gratitude were uttered to the children even though the assistance they provided was only in the form of picking up pieces of paper that had fallen on the floor. The action of the teacher is a very influential modelling (Trawick-Smith 2014) and this view is in line with the view of Latifah, Wan Nasyrudin & Nurul Hidayah (2012) who stated that children find it easier to follow what the teacher does compared to what the teacher tells them to do.

Additionally, the professional action of the teacher is also one of the main sources for the children to behave prosocially. Among them, the teacher was always ready to help the children who needed academic or non-academic help or assistance, fulfilled promises, praised the work effort of the children orally, not hurting the children's feelings, and gave oral reinforcements when the children showed prosocial behaviour. Among the oral

reinforcements given by the teacher are such as “It’s good of you to help,” “You are so clever today,” and “Teacher likes children who follow rules,” as recommended by Grusec (1991) and Tomasello (2008).

In short, children need to be encouraged to perform social actions well and voluntarily through opportunities to practice such skills as well as modelling the right behaviours. In addition, good actions should be made part of the routine of the teacher and children so that it becomes ingrained in their life. This means that with the collaboration of the teacher, the activities provided in this study are suitable and effective in nurturing prosocial behaviour among the pre-school children.

SUGGESTIONS FOR THE FUTURE RESEARCH

Further studies may consider gender as a variable to identify if there is different impact from the game activities. In terms of learning behaviours, it is proposed that LBS assessment instruments are also rated by the parents to get more detailed information about children’s learning behaviours at home. Duration sampling also needs to be carried out other than the frequency sampling to show the extent to which any such prosocial behaviours exist and is sustained through game activities.

CONCLUSION

The education system should inculcate passion for learning amongst children through games. Teachers should help them build meaningful learning and stimulate their development by exposing them to learning experiences that are enjoyable. The learning experience should subsequently have impact on the pupils’ interests and motivation. Interest and motivation additionally will trigger curiosity and subsequently lead to further and deeper exploration of what they are doing. Therefore, the integration of games in the teaching and learning process showed favourable outcomes where the pupils showed positive changes in their learning behaviour. The children learned how to cooperate, take turns, share materials, and mutually correct their mistakes throughout the process of play.

Teachers should play an important role as facilitators and should always provide guidance at the appropriate time and situation. This is because the use of games in the teaching and learning process does not mean that pupils are allowed to play without direction and without the supervision of adults. Playing is an important task in the world of children because they actually learn a lot through playing activities. Hence, it is hoped that the results of this study can serve as a guide for teachers in integrating play activities as part of the children’s task in the classroom.

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