The Role of Scaffolding in Problem Solving Skills among Children

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Abstract. Problem solving skills is vital for children to face challenges in their daily live and in the future. Children who do not acquire problem solving skills during early childhood years tend to be more aggressive toward other people and finally tend to deal with social problems such as peer rejection, involved in criminal behavior and having mental health problem in adulthood. Therefore, scaffolding is an appropriate approach to help children learning more skills and solving problems independently. Scaffolding is a temporary support that will be removed when the children develop, learn and masters the new skills. The scaffolding between an adult and a child within the zone of proximal development (ZPD) will help children to develop more skills and to achieve higher mental functions. This paper has contributed significantly in understanding problem solving skills among children by providing scaffolding based on the needs of the children within the zone of proximal development (ZPD).

Keywords: children, problem solving skills, scaffolding, zone of proximal development

1. Introduction

Study on problem solving skills has been great concern among researchers. Problem solving skills has been defined by Yiğiter (2013) [1] as a cognitive-affective behavioral process that develop through in which an individual or group attempts to identify or discover effective solutions means of coping for problems encountered in everyday life. In Malaysia, thinking skills and problem solving skills were also emphasized in all the subjects taught in schools to prepare students to face challenges in their daily live and in the future [2]. Kanekar and Sharma (2012) [3] noted that problem solving skills is vital competency in children mental development. Based on previous research with children, it was found that children who do not acquire problem solving skills during early childhood years tend to be more aggressive toward other people and finally tend to deal with social problems such as peer rejection, involved in criminal behavior and having mental health problem in adulthood [4]. It has been suggested that scaffolding is an appropriate approach to help children learning more skills and solving problems independently [5]. Scaffolding has been defined as a support and guidance provided by more knowledgeable or capable individual (teacher or parent) to carry out a task that the children would not be able to complete independently [6]. According to Obikwelu et al, (2013) [7] scaffolding is a process of guidance that can bridging the gap between what the child has already known and what the child is supposed to know. However, higher level of scaffolding had a negative impact on the children's ability to accomplish a task independently and depend on instruction provided by others [8].

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Furthermore, Lee (2011) [9] concluded that true learning does not happen if adult simply giving detail instructions and demonstrates the task to the children.

2. Scaffolding

2.1. Definition of scaffolding

The term scaffolding was first introduced by Wood, Bruner and Ross (1976) [6]. They have defined scaffolding as a support and guidance provided by more knowledgeable or capable individual (teacher or parent) to carry out a task that the children would not be able to complete independently [6] [10]. According to Bodrova and Leong (2007) [11], scaffolding is a tool for supporting the process of learning that will be provided and removed constantly. They further explained that scaffolding will not change the task but to simplify and support the process. Other researchers have asserted that scaffolding is a temporary support that will be removed when the children develop, learn and masters the new skills [9] [12]. Wittwer and Renkl (2008) [13] emphasized that the adult must diagnose the children's current levels of understanding before providing the scaffolding. There were three important aspects in scaffolding, that is, contingency, fading and transfer of responsibility [14]. Contingency refers to adapting support to the needs of the children [14]-[15] and it is a significant predictor of success in the given support [16]. The contingent scaffolding can be modified in terms of the elements depend on the children's reaction [17]. Contingent scaffolding helps to ensure that the children never left alone when they have difficulty in completing the task [15]. The second aspect is fading which refers to gradual removal of support and transfer of responsibility refers to the process of transferring the responsibility in doing a task to the children [14]. Belland (2014) [18] has suggested that the role of fading is to enhance children's skill through the process of transferring the responsibility in completing a task from the adult to the children alone.

2.2. Theoretical background of scaffolding

The concept of scaffolding is much related with Vygotsky's sociocultural theory [19]. According to the sociocultural theory [20], there were three important construct in children's learning, that is, social interaction, zone of proximal development (ZPD) and more knowledgeable other (MKO). The first construct in Vygotsky's theory is the social interaction. Vygotsky (1978) [20] emphasized that social interaction played a fundamental role in the process of children's cognitive development since it occurs first on an interpersonal level and later internalized as intrapersonal level. The second construct is the zone of proximal development (ZPD) which refers to the distance between the children's actual developmental level and children's potential developmental level (Figure 1).
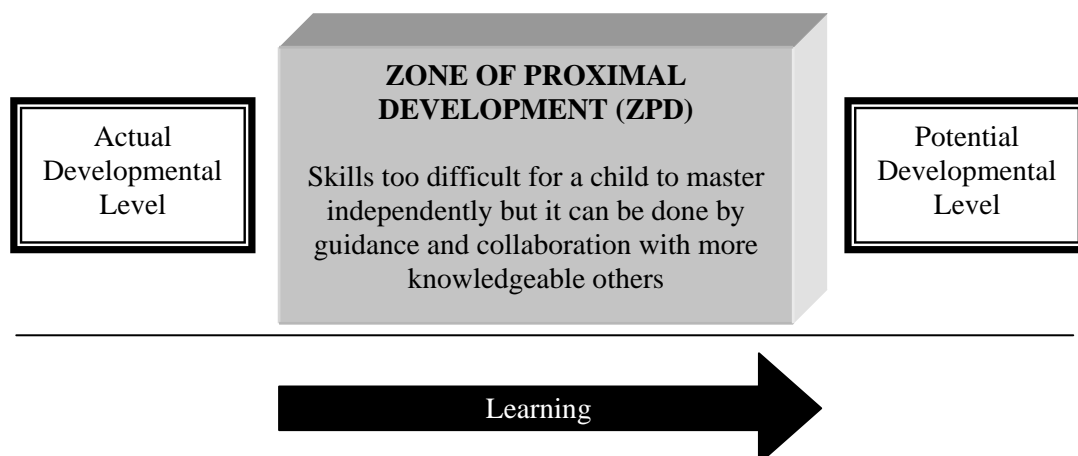

Fig. 1: Zone of Proximal Development

The children's actual developmental level refers to child currents cognitive functioning level based on what the child can achieve independently and the children's potential developmental level refers to what the child can achieve through guidance and collaboration with more knowledgeable others. The guidance and collaboration in the area of ZPD will help children to develop more skills and to achieve higher mental

functions [20]. In terms of scaffolding, the task given to a child must be at the appropriate level within the child's ZPD for the scaffolding experience to be successful and foster development [21] [22]. Vygotsky (1978) [20] believed that the scaffolding between an adult and a child in the ZPD may enhance children's higher level thinking skills and beneficial for children's independent problem solving in their future. He also stated that targeting intervention within the ZPD may generates positive impact to the children and enable them to learn new cognitive skills. Tabak (2004) [23] similarly stated that scaffolding within the ZPD will enhance the actual developmental level. The third construct in Vygotksy's theory is More Knowledgeable Other (MKO). MKO refers to someone who has better understanding or higher ability and skills than the learner (adult, teacher or peers) with respect to a task, concept or process [20]. The guidance given by the MKO is also termed as scaffolding [24].

2.3. Previous studies in scaffolding and problem solving skills

Research on scaffolding, which began in the 1970's, typically involved examining the relationship between parental scaffolding with children's skills in problems solving tasks. In the first study that examined this relationship was conducted by Wood and Middleton (1975) [25] where they investigated on the interaction between mother and children during a problem solving task. The aged of the children involved in the study was three to four years old. Mother had to assist their children to build a toy pyramid by using the five level of scaffolding (verbal encouragement, specific verbal information, indicating material, providing and preparing material for child and demonstrating task. The result of the study showed that mother often used specific verbal information to their children. However, the children were able to complete the task when their mother used all the five levels of scaffolding strategies. They have concluded that adapting support to the need of the children were more effective than giving high level of support such as indicating material and demonstrating task.

Study conducted by Lajoie (1995) [26] also found the relationship between maternal scaffolding and problem solving skills among children. This study involved 20 mother-child dyads (children aged 36 to 55 months). Scaffolding has been measured by The System for Rating Tutor Behaviour (SRTB). The scale measured four categories of scaffolding (task engagement, strategic instruction, transfer of ownership and providing feedback). The children were asked to complete three different tasks (puzzle, pegboard and blocks). The findings showed a significant relationship between maternal scaffolding with children's performance in completing the puzzle task. The above finding is consistent with findings of past studies by Conner and Cross (2003) [27]. They examined the influence of maternal scaffolding on problem solving among children. The sample consisted of forty-five mother-child dyads (children aged 16, 26, 44 and 54 months). Mothers were asked to help their children to build a tower using all blocks in the correct sequence. The scoring method for maternal scaffolding was measured based on the previous research [25] [28]. There were seven level of maternal scaffolding from no parent intervention to parent demonstrates. The findings revealed that mothers who used the contingent scaffolding during problem solving interaction with their children had a positive impact on children's immediate and later competence. The above studies provide evidence that scaffolding by the adult will increase children's learning and able to solve the problems independently.

These results support a study conducted by Bates (2005) [29] where he examined the maternal scaffolding during children's attempt to solve quantity comparison problems in a game context. This study involved 36 mother-child dyads (with children aged between three to five years old). Scaffolding were measured based on six types of response (corrective feedback, give answer, accept child's response, reinforces, allows child to continue and asks child to show knowledge) and six types of feedback (questioning, directing, guiding, pointing, specific pointing and nonverbal pointing). Mother-child interactions in play are observed and videotaped. The results showed that mothers provided various types of response and feedback to their children during the play sessions based on the needs of the children. Recently, Sun and Rao (2012) [30] gave a comprehensive review on scaffolding interaction between adults and children during different problem solving tasks in Chinese society. The sample comprised 57 children from low and high socioeconomic backgrounds status completed a puzzle and school-like task (worksheet) with their mothers and teacher. The results revealed that teachers adjusted their scaffolding more appropriate

compared to mothers. The results also showed that both mothers and teachers gave more skilled scaffolding on school-like task than the puzzle task.

3. Conclussion

In all, this concept paper had aimed to describe the concept of scaffolding and its role in problem solving skills among children. Most importantly, this study had identified and discussed the concept and theoretical background of scaffolding. This paper has contributed significantly in understanding problem solving skills among children by providing scaffolding based on the needs of the children within the zone of proximal development (ZPD). However, further studies are in need to consider other types of scaffolding to determine whether there are specific links between scaffolding and children's problem solving skills.

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5. References

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