

Effects of Dialogic Reading on the Creativity Development of a Chinese Student

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Abstract

This study aimed to explore the effectiveness of Picture Book-based Dialogic Reading (PBbDR) in enhancing a 3rd grader's creativity. The intervention program of picture book-based dialogic reading included four reading steps (PEER), and five prompt methods (CROWD). PEER is an acronym of Prompt, Evaluate, Expand and Repeat, and CROWD is an acronym of Completion prompts, Recall prompts, Open-ended prompts, Wh prompts, and Distancing prompts. We adopted a multiple-baseline design across three behaviors (language divergence, graphic divergence, and language convergence). The results indicated that the scores of three behaviors were improved after intervention, and had a good maintenance and generalization effect. The results were discussed and social validity was also obtained.

Keywords

Dialogic Reading, Picture Book, Language Divergence, Language Convergence, Graphic Divergence

1. Introduction

Creativity is a person's ability to generate an idea or a product that is deemed by experts as both unique and appropriate in a certain domain (Amabile, 1996; Kaufman & Beghetto, 2009; Sternberg & Lubart, 1999). It is crucial in the contemporary world, and it has attracted more and more researchers' attention. In terms of the creative development of primary school children, some studies have

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found a decline in the fourth grade, that is, the creative development of primary school students increases from the first grade to the third grade, but suddenly drops in the fourth grade and recovers in the fifth grade (Torrance, 1968). It has been observed in different countries, including China (Dong, 1993; Krampen, 2012; Wo et al., 2009). However, other studies have painted different pictures, in which creativity was boosted in this age group (Charles & Runco, 2001; Zhang, 2013). Charles and Runco studied children's creative development from the 3rd to 5th grades, using TTCT to measure creativity. They found that the 4th grade had the highest mean scores on all measures.

Therefore, children in the middle of primary school (pre-puberty), such as students in grade 3 and grade 4, have some changes in creativity, either rapid growth or significant decline. It is also a critical time for cognitive development in grade 3 and grade 4 (Piaget & Inhelder, 1973). Children in this stage develop diversely, showing distinct individual characteristics. So, it is particularly important to conduct an individualized creative development program for children in grades 3 or 4. The purpose of this study is to design an effective picture book reading method to improve children's creativity.

2. Literature Review

2.1. Four C Model and Measurements of Creativity

Creativity can be manifested on different levels. Kaufman and Beghetto (2009) proposed a Four C Model of creativity, in which four levels of creativity are recognized from Mini-C, Little-C, Pro-C to Big-C. Mini-C refers to the kind of creativity with personal meaning. It emphasizes a person's subjective and introspective side of creativity. Little C addresses everyday creativity such as decorating a house or making new dishes. It is a type of creativity that adds novel interpretation to life and makes a small contribution to society. Pro-C often refers to contributions made by professionals, who can reach certain levels of prominence such as professional musicians, scientists, and artists. Big C refers to legendary creative work, a real breakthrough in an area, or a genius work recognized by experts in a field, such as winning a Nobel Prize or Academic Award. For primary school students, certain behaviors and ideas may not contribute much to society but maybe novel and useful to themselves (Cho et al., 2013), which can be called mini-c or little-c. Focusing on mini-c or little-c can help teachers better understand students' creativity in classes.

The Four-C model can also help to identify a suitable approach to measure creativity. Most earlier creativity research focuses on using divergent thinking to measure creativity, such as Structure of the Intellect (SOI) (Guilford, 1967) and Torrance Test for Creative Thinking or TTCT (Torrance, 1968). Some have argued that these measurements only capture mini-C, otherwise adopts product-orientated methods via Consensus Assessment Technique (CAT) to measure creativity, which seems to be able to study the Little C. There is also self-report measurement, such as creative behaviors and creative activities, which captures mini-

C and little-C (Sternberg, 2020; Beghetto et al., 2011). No one measurement seems to be sufficient to capture one's creative potential. In their Amusement Park Theoretical (APT) model of Creativity, Kaufman and Baer (2005) proposed that creativity is a complex structure with multiple dimensions. Therefore, creativity should be assessed in terms of individuals' creativity in professional fields.

In 2011, Lubart et al. (2011) developed a new creativity assessment tool named *Evaluation of Potential for Creativity* (EPoC), which captures little-C. EPoC was designed to measure two key creative thinking-process clusters (divergent-exploratory and convergent-integrative) in multiple domains (currently verbal-literary and graphic, with forthcoming extensions in social problem-solving, scientific and musical domains). The profile of EPoC can provide the scores of subjects in two fields and two aspects, thus making it possible to individualize creativity education (Xu & Xin, 2013).

2.2. The Intervention of Children's Creativity

Some researchers are contributing to designing educational programs to improve children's creativity, such as carrying out creative teaching strategies, drawing, and book reading. The results showed that these training methods effectively improved students' creative thinking (Hu et al., 2013; Ruini et al., 2020).

For creative teaching strategies, Duan (2001) selected 1,252 fourth grade primary school students by class as the subjects and conducted a three-year experiment on creativity cultivation by using creative teaching strategies (i.e. Carry out creative activities, divergent questioning, brainstorming, and logical reasoning). As a result of the intervention, creative teaching strategies can cultivate students' creativity. Putri et al. (2019) demonstrated the effectiveness of project-based learning (PBL) intervention program on creativity thinking skills for forty-five 5th grade primary school students. The results showed that the students in the experimental group had better creative thinking skills rather than the students in the control group.

In terms of drawing, Dziedziewicz et al. (2013) investigated the effects of a doodle-book program intervention (the program entitled *Creative Doodle: The Adventures of Dragonfly Grazka*) on creative imagination and divergent thinking on figural material of sixty-seven 4- to 6-year-old children by age group. The intervention was found to be effective in developing children's imagination and the fluency and originality of thinking.

Lastly, in terms of book reading, Segundo Marcos et al. (2020) divided 60 fifth grade students into experimental groups and control groups. The experimental group received structured reading and writing activities in the cooperative learning classroom, while the control group received the standard 5th-grade reading and writing plan. Sixty 5th-grade students from a primary school in the south of Spain participated over two months: half received reading and writing activities in a cooperative learning classroom (experimental group, n = 30), and half received the standard 5th-grade reading and writing program (control group, n = 30). In the study, a structured program of reading and writing activities was developed for

children of the 5th-grade of primary, which was based on the contents of the Language and Literature area of the official curricular proposal of the Spanish educational system. Creative thinking was assessed through a divergent thinking task (CREA Test), and Grade Point Average (GPA) was used as an index of academic achievement. The findings are consistent with the idea that creative thinking (divergent thinking) can be enhanced with reading and writing activities implemented through cooperative learning in school-age children. Liu and Mu (2019) used the “Torrance Picture Test” as a tool and used creative reading in picture books as an intervention method to explore the influence of creative reading in picture books on the development of creative thinking in children aged 4 to 5 years. The study found that picture book creative reading can effectively improve the creative thinking of 4-5-year-old children. Apart from these, some studies have shown that children’s creativity can be improved through an intervention based on picture book reading (Abdi & Rostami, 2012; Wang, 2015; Doron, 2017; Liu, 2019).

The above studies have intervened in creative thinking, creative imagination, and divergent thinking by group, which has universal applicability. However, creativity is a complex structure with multiple dimensions and the development of creativity has individual differences (Zhang et al., 2015). Therefore, in this study, we will focus on individual differences to intervene in a child’s creative thinking in different domains.

2.3. Dialogic Reading Interventions

Shared-book reading is considered to be one of the most important practices for improving creativity, including dialogic reading, topic anticipation, dynamic reading, and story retelling (Noble et al., 2020; Cleave et al., 2015). For pre-school and primary school children, the way of shared-book reading between teachers and students is helpful to promote students’ understanding of the story (van Kraayenoord & Paris, 1996), have a good interaction with teachers, and stimulate children’s creativity. Dialogic reading, a popular form of shared-book reading, is a commonly used strategy to cultivate the creativity of a child. Whitehurst and his colleagues (1994, 1988) formalized a set of dialogic reading techniques based on Vygotsky’s social-cultural theory (Vygotsky, 1978; Gámez et al., 2017). Dialogic reading is a reading activity that includes asking questions, giving feedback, adding information, and retelling stories between parents and children. It’s also widely used in teacher-student reading activities (Wang et al., 2017). Dialogic reading includes four reading steps (PEER) and five prompt methods (CROWD). In specific, the former is Prompt, Evaluate, Expand and Repeat (PEER), and the latter is Completion prompts, Recall prompts, Open-ended prompts, Wh prompts and Distancing prompts (CROWD). According to children’s abilities, adults guide children to express themselves freely from different perspectives and explore more novel content through the four steps of PEER (He, 2018). Dialogic reading was a child-centered reading strategy, and researchers identified it as producing positive outcomes for different kinds of children (Urbani, 2019; Lever & Sénéchal, 2011; Huennekens &

Xu, 2016). Previous studies have shown that conversational reading can improve students' reading initiative, reading curiosity, reading ability, emotional cognition, and emotional regulation ability (Yan, 2016; Zhu, 2014; Correa et al., 2015).

The research using dialogic reading to cultivate creativity is relatively more limited, but preliminary studies using this kind of reading technique have shown promise for improving children's creativity. Hui et al. (2020) adopted a quasi-experimental design, and 78 kindergarten children aged from 4 to 5 years old in a cluster group were randomly assigned to the experimental and control groups, to investigate the learning effectiveness of reading picture books with EMPA-THIC (Emotion and Empathy, Meaning and Motivation, Perseverance, Agency and Autonomy, Time, Habits of Mind, Intelligence, Character Strengths, and Self Factors) elements using dialogic reading techniques in enhancing young children's creativity. After 12 sessions over 8 weeks' intervention, the creativity of the experimental group was effectively improved. The findings demonstrated the dialogic reading can effectively enhance creativity. Aerila and Rönkkö (2015) combined reading literature and telling stories as a creative learning process. 10 pre-school children aged 6 - 7 participated in the study. The results showed that the integrated learning process could be an effective and creative way of working in a preschool group.

To summarize, the creativity intervention studies were mostly based on a certain domain or a certain discipline, which has good effects on most children but may not be able to address children with unbalanced creative development or disciplinary issues. Additionally, 3rd to 5th-grade creativity develops rapidly, which is the key period of creative development. The research also confirmed the fourth-grade slump phenomenon. Therefore, researchers should try to propose intervention methods to deal with the phenomenon to promote children's creativity. Picture books present information in multiple sensory channels, which plays an important role in improving children's expressive and receptive language. They can also inspire children's open-mindedness and help them produce unique ideas (Liu, 2015). While picture books and dialogic reading interventions appear to be improving children's creativity, researchers have not yet examined the efficacy of dialogic reading combine with picture books on children.

3. Current Study

Based on previous studies, this study aimed to examine the effectiveness of picture book-based dialogic reading on children's creativity development. We based on picture book content to design question situations and using the five prompts and four stages of dialogic reading to carry out an individualized creative reading intervention. To fully stimulate children's creativity, in Repeat, instead of asking the participant to repeat what we talked about in Extend, we asked her to come up with new ideas. In terms of research methods, researchers mostly use the single-case design to intervene in special groups. In this study, the intelligence of the participant is high while her creativity is low. Therefore, the single-case design was used to evaluate the efficacy of PBbDR on the acquisition, maintenance, generalization, and we also adopted the creativity assessment (EPoC) that considers both domains and

thinking processes to evaluate the child's creativity. Moreover, the social validity of the procedures and outcomes were assessed. We attempt to provide a reference for schools to develop creative education and empirical support for relevant studies.

4. Method

4.1. Participant and Setting

Lily, an eight-year-old girl, a 3rd grader of a general primary school, participated in this study. She scored a 119 on the Raven's Standard Progressive Matrices. Her parents and headteacher reported that Lily seldom has new ideas in her study and life, and the solution to the problem was very simple, and lacks imagination. It can be reflected in composition writing.

With the permission of the family and Lily, we measured Lily's creativity with EPoC. To obtain the mean score (M) and standard deviation (SD) for each dimension as the reference standard for Lily's creativity level, we had used the EPoC to evaluate 90 third-year students. Lily scored 3 (M = 7.74, SD = 3.60) on the language divergence dimension, 9 (M = 9.78, SD = 2.58) on the graphic divergence dimension, 3 (M = 3.96, SD = 0.98) on the language convergence dimension and 4 (M = 3.48, SD = 1.37) on the graphic convergence dimension. It can be seen from the comparison that, except for the graph convergence score higher than the average, Lily's scores in the other three dimensions were below average.

The study was conducted in a reading room of a primary school in Zhejiang Province, China. The room contained a square table and two chairs. Lily sat with her back to the door, with the experimenter who conducted intervention seated to her left. A camera was placed near the table and recorded all sessions. The entire experiment was conducted in Mandarin. During the experiment, only Lily and the experimenter were present in the reading room to minimize distractions.

4.2. Materials

4.2.1. Training Materials

We selected 9 world-classic picture books as training materials (see **Table 1** for the list of books). Three principles were used to guide the selection process of picture books: 1) all picture books were interesting to Lily; 2) the difficulty of picture book content matched the cognitive level of Lily; and 3) All picture books were rich in illustrations and imaginative contents, which helps stimulate

Table 1. Use of picture books for each session.

Sessions	Picture book
Pre-experiment	Grandpa Gray and Strawberry Thief
baseline	Pigs Can't Fly, Rosie's Walk, The Snowman, Moonlight, The Magical Black Bear, Alice the Fairy, A Day in Luxembourg Park, How Luck Is So Good Today
Intervention	Pigs Can't Fly, Rosie's Walk, The Snowman, Moonlight, The Magical Black Bear
Maintenance	Pigs Can't Fly, Rosie's Walk, The Snowman, Moonlight, The Magical Black Bear
Generalization	Alice the Fairy, A Day in Luxembourg Park, How Luck Is So Good Today

children's creative thinking.

4.2.2. Measurement Materials

Two measurements were adopted to monitor the change in Lily's creativity. First, we used EPoC to evaluate Lily's creativity before and after the experiment. It consists of four sub-scales—language divergence, graphic divergence, language convergence, and graphic convergence. In this study, we selected three of them—language divergence (2 tasks), graphic divergence (2 tasks), and language convergence (2 tasks). A sample task for language divergence is to create as many endings as possible according to the beginning of the story provided. A sample task for graphic divergence is to make as many drawings as possible using an “abstract” or “concrete” form, which is the picture of a common stimulus (Lubart et al., 2019). A sample task for language convergence is to create an interesting and unique story based on the three elements. The divergent scores were calculated according to the number of valid responses, one point for a response. Responses to the convergence are rated on a scale of 1 to 7 points, with a “1” representing “The participants only told the simplest story (on the whole, there was only one sentence that collected the given title elements), or a story that deviated from the topic. If the participants do not put forward anything, the default score is 1 point,” and a “7” describing “The participants tell a very unique story, which integrates the constraints (title or character) proposed by the test with many details.”

Based on EPoC, we developed a house-made measurement—Creative Potential Questionnaire (CPQ) to assess target behaviors during the experiment, which are open-ended questions according to the content of picture books. Each picture book set two questions. The language divergence questions are based on the picture book story and start with “what” to ask the participant to answer the next possible things; Questions of language convergence are to let participant make a story according to the three elements in the picture book; Question of graphic divergence is to let participant draw according to a simple figure in the picture book. The responses to CPQ open-ended questions are coded and scored like EPoC.

4.3. Dependent Variables and Data Collection

The dependent variables of this study were the language and graphic divergence (i.e. many ideas from a stimulus plan) scores, and language convergence (i.e. produce only one solution integrating several elements) scores. Scores are obtained through the two measurement tools EPoC and CPQ. The language divergence and graphic divergence scores were assessed by calculating the number of valid responses. The language convergent scores were rated from 1 to 7. Data on all responses were collected in both paper-pen and video formats. For the graphic dimension, the experimenter prepared 20 pieces of B5 paper for each question. The participant was asked to draw on each piece of paper and name the drawing. For the language dimension, the experimenter transcribed the message from the video into text and recorded the responses of the participant.

4.4. Experimental Design and Procedure

A multiple-baseline design across three behaviors (language divergence, graphic divergence, and language convergence) was used to evaluate the effects of Picture Book-based Dialogic Reading (PBbDR) on participant's creativity. We chose this design because it can reduce the time involved in measurement and it suits irreversible behavior. The multiple probe procedure involves: a) an initial baseline probe session for three behaviors in sequence; b) intervention on behaviors in the order of language divergence, graphic divergence, language convergence; c) after five intervention sessions of each behavior, five maintenance probe sessions were conducted. Generalization probe sessions occurred three times during the intervention and maintenance stage for each behavior.

4.4.1. Pre-Experimental

Before the baseline sessions, Lily was asked to read the *Grandma Gray and Strawberry Thieves* and answer the corresponding questions, which can make Lily familiar with the experimental process to a certain extent, thereby reducing errors caused by unrelated factors.

4.4.2. Baseline

During the baseline, no intervention was implemented. Lily read picture books independently and completed corresponding questions in CPQ. Baseline data were collected until Lily's creativity demonstrated stability. In this study, we collected eight baseline sessions before the intervention commenced for each behavior.

4.4.3. Intervention

There are five sessions for each target behavior intervention and each session lasted approximately 15 - 20 minutes. Based on Whitehurst et al. (1994), we conducted the Picture Book-based Dialogic Reading method. There were at least three problem situations for each intervention session. More specifically, each problem situation contains four teaching steps (Prompt-Evaluate-Expand-Repeat). During Step 1, the experimenter used one of the specific types of prompts of DR to ask questions. The five prompts including Completion prompts, Recall prompts, Open-ended prompts, Wh prompts, and Distancing prompts. During Step 2, Evaluate Lily's response using diverse and specific words. During Step 3, Expand Lily's response by adding some new information, During Step 4, Guide Lily to repeat the information to make sure that she has learned it. The four steps of DR are explained in **Table 2**.

To ensure that Lily was rewarded in every question situation, we have designed the mastery criterion for entering the next situation. For divergent behavior, the adopted criterion was that Lily came up with at least three novel ideas during the repeat step. For convergent dimension, as long as Lily gave a novel idea, it was regarded as meeting the criterion. If Lily failed to meet a criterion, the experimenter encouraged her to try again. If she still did not meet it after one attempt, the experimenters ignored it and moved to the next question situation.

Table 2. Intervention process and examples.

Stages	Key points of intervention	Examples
Prompt	Adopt Open-ended questions, Wh questions, etc. to induce students to talk.	“Can you tell me what else can make the piglet looks like the zebras”(Open-ended prompt) “Can you recall which animals the piglet encountered before?”(Recall prompt)
Evaluate	Adopt an open evaluation method and a diversity evaluation method. Completion Prompts and Recall Prompts can be used depending on the condition.	“Wow! You’ve thought many possibilities. It’s great!” “How creative your idea is! I hope it can come true one day! “
Expand	Expand based on picture books or participant’s answers. Open-ended prompts, Wh prompts and Distancing prompts can be selected depending on the condition.	“Because stripes are characteristic of zebras, we can wear striped clothes to make ourselves look like zebras” “We can also learn zebra barking”
Repeat	Ask the questions in the “Induction” to guide the participant to say more novel ideas or answers, and encourage or comfort her if she fails to answer. Open-ended prompts, Wh prompts and Distancing prompts can be selected depending on the condition.	“We just talked a little bit more, can you tell me more about what might happen?” “It’s okay, you’ve said so many imaginative thoughts, and that’s enough”

4.4.4. Generalization and Maintenance

Generalization with novel picture books was assessed during the intervention and maintenance stage of this study. The first generalization session was conducted after the second session in the intervention stage, and the other two sessions were conducted in the maintenance stage for each target behavior. During generalization sessions, novel picture books were provided for Lily, such as *Alice the Fairy*, *A Day in Luxembourg Park*, and *How Luck Is So Good Today*.

After stable accuracy data were observed during the intervention, we withdrew the intervention program and conducted five maintenance probe sessions. Lily was allowed to read the same picture books as in the intervention sessions independently and answered the corresponding questions. During data collection for the generalization and maintenance measure, the data collection criteria in these sessions were identical to those in the baseline sessions.

4.5. Inter-Observer Agreement and Procedural Fidelity

The experimenter recorded and scored Lily’s response during each session. To ensure the reliability of the rating, a graduate student who majored in creativity was invited to independently score Lily’s response. Throughout the study, Inter-observer Agreement (IOA) data were collected for 30% of the total sessions and evenly distributed across conditions. An agreement occurred when both the experimenter and the graduate student gave an identical score for a probe item. The percentage of agreements was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. The agreement between the two raters was 89%, which met the criterion (80% - 85% or more).

We also assessed procedural fidelity. An observer independently scored the experimenter’s implementation of procedures by watching 30% of the intervention videos. Each intervention session was evaluated using a checklist (shown in **Table 3**), which was the steps that the experimenter must complete (e.g., use five

prompt methods to induce the participant to talk according to the content of the picture book.). Procedural fidelity was calculated by dividing the number of correct steps by the total number of steps (6 steps) and multiplying by 100. The procedural fidelity of this study reached 100%.

4.6. Social Validity

After the intervention stage, Lily's mother completed the social validity questionnaire to assess the social validity (see **Table 4**). It consisted of 10 items, the items 1 to 3 were related to the intervention's acceptability (needs, intervention materials, and behavior), items 4 to 6 assessed the feasibility (periods, location, and procedures), and items 7 to 10 were measured parents' satisfaction with the intervention and the perceived helpfulness of the target skills. Each item was rated on a 5-point Likert scale (ranging from "1 = strongly disagree" to "2 = disagree," "3 = neither disagree or agree," "4 = agree," and "5 = strongly agree.") in

Table 3. Procedural fidelity checklist.

Intervention steps	Intervention videos				
	1	2	3	4	5
1 All required materials were well prepared.					
2 Intervene with the participant in a planned place.					
3 Use five prompt methods to induce the participant to talk according to the content of the picture book.					
4 Wait for the participant to answer and make an evaluation.					
5 Expand the program based on picture books or the participant's answers.					
6 Ask the questions in the "Induction" to guide participant to say more novel ideas or answers, and encourage or comfort her if she fails to answer.					
Procedural Fidelity = the number of correctly executed items/the total number of items × 100%					
Number of steps completed correctly _____; Percentage of steps completed correctly _____.					

Table 4. Mean responses and standard deviations for the social validation of questionnaire.

	Questionnaire item	M	SD
Intervention acceptability	1. The experiment met your needs		
	2. Satisfied with experimental materials	4.67	0.58
	3. Satisfied with selected behaviors		
Intervention feasibility	4. Satisfied with the time periods		
	5. Satisfied with experiment location	4.67	0.58
	6. Satisfied with the experiment procedure		
Intervention satisfaction	7. Satisfied with the experiment on the whole	4.5	0.71
	8. Satisfied with the change of your child		
Intervention helpfulness	9. It is helpful for improving your child's compositions	4.5	0.71
	10. It helps your child to solve problems		

addition, Lily's mother also provides her overall perceived helpfulness, suggestions, and experiences from the intervention.

Moreover, the experimenter also interviewed Lily about: 1) her satisfaction with the picture books; 2) her experience with the intervention process; 3) her satisfaction with the time and the setting of intervention; 4) her satisfaction with the entire intervention; and 5) the changes in creativity she felt before and after the intervention.

5. Results

5.1. Changes in Creative Potential Questionnaire

Figure 1 displays Lily's scores changes during the pre-experiment, baseline, intervention, and maintenance conditions across three behaviors. The sessions are depicted on the x-axis, and the scores of the dependent variables are depicted on the y-axis. The black circles represent the scores across sessions, and the triangles represent the generalization sessions.

5.1.1. Language Divergence

During the pre-experiment, Lily scored 2 in language divergence. For the baseline, Lily averaged 2.9 (range 1.5 - 3.5). With the introduction of the Picture Book-based Dialogic Reading (PBbDR) program, Lily averaged 4.6 (range 2.5 - 6.5), which was higher than the baseline in language divergence. During the maintenance stage, the average score of divergent thinking was 14.3 (range 7.5 - 21.5). The intervention effect was well maintained.

5.1.2. Graphic Divergence

In the baseline, Lily averaged 4.8 (range 4 - 5.5) and had a rapidly increasing trend during the intervention. The scores of the five intervention sessions averaged 8 (range 5.5 - 9.5). In the maintenance, not only the average score increased significantly but also each probe session data ($M = 19.1$, range 14.5 - 31.5) was higher than that in the intervention, which showed the intervention effect of continuous growth.

5.1.3. Language Convergence

In the baseline, Lily averaged 3.1 (range 2.5 - 3.75). During the intervention, Lily's language convergence scores were slightly higher than the baseline level, with an average of 4.3 (range 4 - 4.75). The results represented significant immediate effects with poor stability. In the maintenance, the mean language convergence score improved compared with the intervention ($M = 4.9$, range 4.5 - 5.25), which represented a stable maintenance effect of the experimental intervention.

5.1.4. Generalization

The scores of the generalization sessions across materials for language divergence, graphic divergence, and language convergence are depicted by the triangle in **Figure 1**. As shown, the score of generalization sessions during the intervention

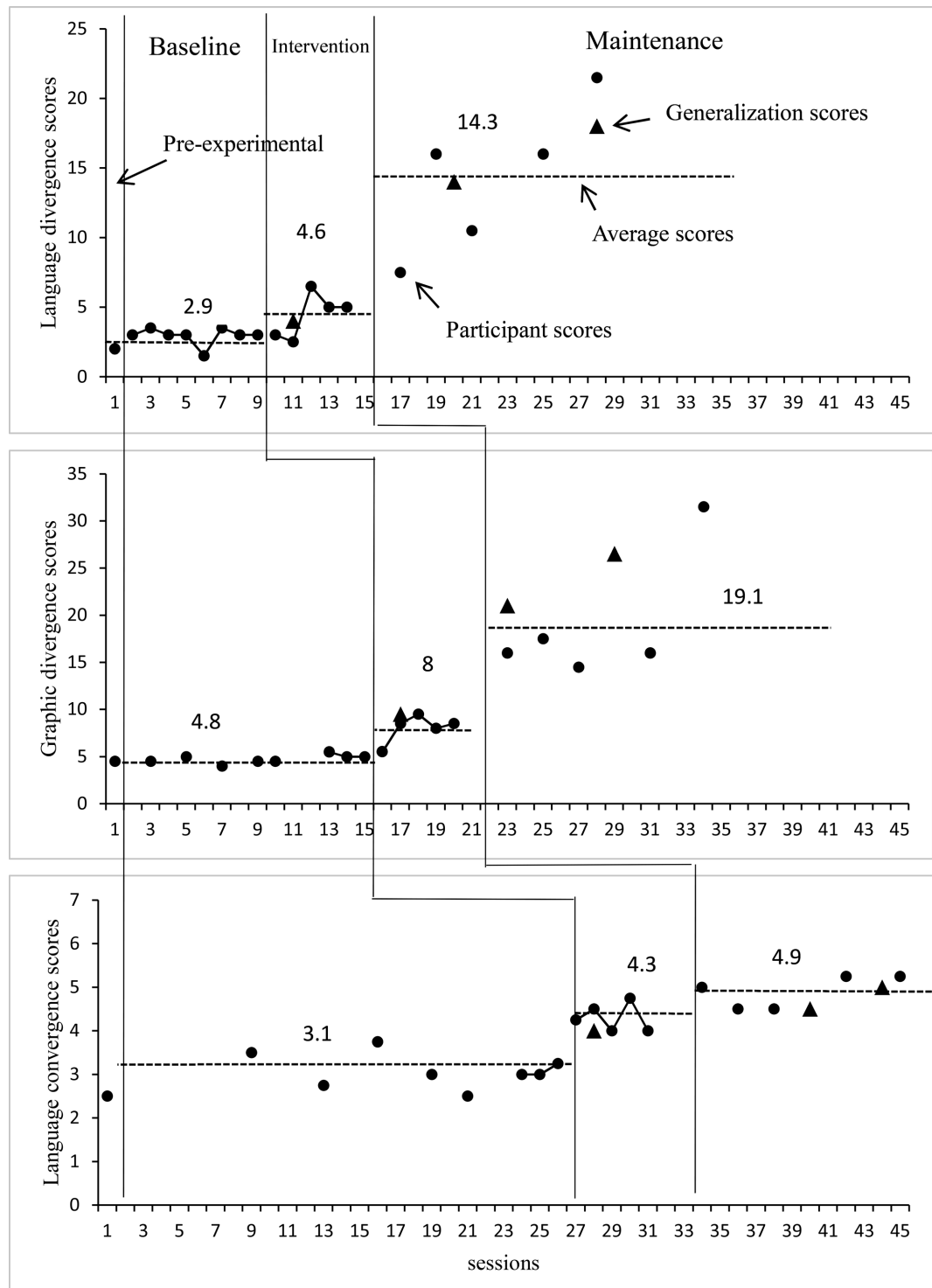


Figure 1. Score of language divergent, graphic divergent and language convergence behaviors in pre-experiment, baseline, intervention, and maintenance condition.

was higher than the initial baseline level across the three target behaviors. After the intervention ended, generalization data were higher than those of the intervention in language divergence and graphic divergence. The score of the second generalization session in the maintenance was higher than that of the interven-

tion in language convergence. The results showed that the intervention effects could be well generalized to novel materials.

5.2. Change in EPoC Scores

Lily completed the EPoC before and after the intervention as the reference for the intervention effect. As shown in **Table 5**, Lily's creativity scores improved throughout the intervention. For language divergence scores, it was 7 times higher than the pre-test. For graphic divergence, it was 2.7 times higher than the pre-test scores. The language convergence scores increased slightly compared with the pre-test score with a difference of 1. The post-test score for graphic convergence was the same as before. The results indicated that the intervention program had significant effects on language divergence and graphic divergence and had a certain degree of effect on language convergence. There was no migration effect of the intervention in graphic convergence.

5.3. Social Validity

Results of the validity social questionnaire are shown in **Table 4**. The average ratings were 4.67 (SD = 0.58) on acceptability to the intervention, 4.67 (SD = 0.58) on intervention feasibility, 4.5 (SD = 0.71) on intervention satisfaction, and 4.5 (SD = 0.71) on intervention helpfulness. The parents reported their observations of the positive changes in Lily's compositions and drawings. Lily also reported that she enjoyed the picture books and was especially interested in the creative ideas in them. For example, Lily said, "she loved *Snowman* because it is a wordless picture book, which tells a story only using drawings." In addition, Lily was satisfied with the experimental time and place, and enjoyed herself during the experimental time. Regarding the changes before and after the experiment, Lily proudly stated that she was full of imagination when painting.

6. Discussion

This study used the multiple-baseline design across three behaviors to evaluate the effectiveness of Picture Book-based Dialogic Reading on the creativity of a primary child with a lower creative level in the third grade. Hence, similarly to previous studies (e.g., Hui et al., 2020; Shao, 2019). The results provided preliminary evidence that the PBbDR intervention can stimulate the child's creativity. We observed that Lily's language divergence, graphic divergence, and language convergence scores all increased significantly in the intervention sessions and

Table 5. The results of evaluation potential of creativity (EPoC).

	Language divergence	Graphic divergence	Language convergence	Graphic convergence
Pre-test	3	9	3	4
Post-test	21	24	4	4
Difference	18	15	1	0

followed steady upward trends in the maintenance sessions. These effects were also generalized to non-intervening materials. In addition, the results of the EPoC test showed that all the three target behavior scores of participant's creativity improved throughout the intervention. Moreover, both the procedural fidelity and Inter-observer Agreement in this study reached international standards. The importance, validity, suitability, and satisfaction of this study were fully affirmed by the parents and child via the questionnaire and interview. This study had good social validity. This result is to some extent consistent with the conclusion that children's creative thinking can be improved through creative activities, creative curriculum, or creative training (Putri et al., 2019; Ge & Bai, 2007).

Firstly, the reason for the effect of the intervention is mainly reflected in the effectiveness of the design and implementation of PBbDR. The intervention program activities with four steps and five prompts effectively stimulated the development of creativity. Specifically, in the Prompt stage, using open-ended prompts encourage Lily to talk about the picture book according to her comprehension capacity and cognitive level, translate into an increase in imagination and thoughts (Ryan, 1973). In the Evaluate stage, providing inspiring, supportive and targeted evaluations also increase positive interaction between the teacher and Lily and stimulate Lily's intrinsic motivation. A higher intrinsic motivation is a positive factor for creative thinking development (Amabile, 1985). In addition, Completion prompts and Recall prompts were used to help Lily rethink the thoughts generated in the Prompt stage and produce new thoughts. In the Expand and Repeat stages, Open-ended prompts, Wh prompts, and Distancing prompts were adopted to inspire Lily to break through her current mindset, thus promoting her divergent thinking. Therefore, a series of dialogic reading techniques (PEER and CROWD) can effectively enhance the development of creativity.

Secondly, as showed in **Figure 1**, though the changes of divergent thinking scores were higher than those of convergent thinking scores in the intervention course, convergent thinking score was better than divergent thinking score in the maintenance effect. It has been speculated that convergent thinking may reflect the ability of individuals to think about problems from different perspectives, discover unique connections between different parts of a problem, and then propose novel solutions (Guilford, 1967), with an emphasis on logic and reason (Cropley, 1990; Cheng et al., 2018). In this study, Lily was a student in the third grade (8.7 years old), whose cognitive development still needed the support of specific objects (Piaget, 1970). That is, it is difficult for Lily to learn how to integrate novel ideas into logical and organized thinking in a short period. For example, Lily generated some novel ideas, but she could not integrate them more completely and reasonably due to being limited by her logical thinking. Therefore, to effectively stimulate the development of convergent thinking, in the experiment, we not only encouraged Lily to explore and find novel connections between unrelated things so that Lily would acquire the skills to explore uncon-

ventional ideas and improve the uniqueness of her ideas but also guided Lily to extract the commonality of things through logical thinking and form a reasonable and complete idea. As time goes on, the thinking strategies and skills acquired during the intervention were gradually internalized, and both the uniqueness and integrity of ideas could be taken into account. Therefore, in the maintenance, Lily's convergent thinking showed a steady upward trend.

7. Limitations and Future Research

Some limitations of this study must be noted. The first one is that the number of picture books was not enough in the experiment. As the number of sessions increased, Lily read the same picture books multiple times, which might decrease her curiosity and internal motivation, eventually decrease her creativity. Thus, a database of picture books should be built in future studies. An additional limitation is that the study intervened in three target behaviors of one participant and fewer intervention sessions were conducted. Future studies should increase the number of participants and add more sessions in the intervention condition. Another limitation is that Lily's emotions were not given enough attention during the intervention sessions. In this study, language divergence presented a sudden drop in the second intervention session. This was probably because Lily just argued with her parents, which put her in a poor mood during the test. The positive effect of emotions on creativity has been well suggested by numerous studies (Chen et al., 2016). Thus, a participant's emotional regulation during the intervention must be a concern in future studies.

8. Implications

The results of this study have important implications for educators and practitioners to cultivate children's creativity in school. Firstly, whether the children's creativity is at a low point in grade 3 and grade 4 or not, using the single-case design and designing an intervention program based on picture books can help children improve their creativity.

Secondly, the intervention program used in this study provides a choice for teachers to promote the balanced development of primary school students' creativity. What's more, dialogic reading has been widely used in group teaching in groups or classes and has achieved positive teaching results. In this study, the intervention program of PBbDR is easy to be operated by teachers and the instructor not associated with the study found the procedures to be socially valid, indicating that these procedures might apply to and be acceptable in regular schools.

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Consent to Participate

Informed consent was obtained from all participants included in the study.

Conflicts of Interest

The authors declare that they have no conflict of interest.

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