

Exploring the Impact of Kinesthetic Experiences and Spatial Metaphors in Teaching Practice
on Second Grade Students' Comprehension of Abstract Verbs

Xiao Yao & Xia Hongyu

Deng Xiangjun

English

College of International Studies

Shenzhen University

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Table of Contents

Introduction.....	3
Literature review	5
Methodology	9
Research design	9
Participants, Materials and Procedures.....	9
Data analysis	11
The specific data of six subjects	11
Result	11
Interpretation	12
Discussion	14
Implications	14
Limitation	15
Conclusion	16
Acknowledgments.....	17
Appendix I Pre-test and Post-test Papers	19

Introduction

Language acquisition plays a crucial role in children's cognitive development, social interaction, and academic success. The effective teaching of language, particularly abstract concepts such as verbs, significantly influences children's comprehension and learning experience. Abstract verbs pose challenges for both teachers and young learners as they represent non-tangible actions and concepts. Traditional teaching methods often rely on text-based instruction or linguistic explanations, which may not effectively engage children's cognitive processes in understanding abstract verbs, while alternative approaches rooted in embodied cognition and conceptual metaphor theory offer innovative ways to facilitate language acquisition.

It is a study to explore the impact of different teaching methods on the comprehension of abstract verbs among second-grade students, aiming to evaluate the effectiveness of two cognitive approaches, namely the embodied cognition theory and conceptual metaphor theory, in this process. Specifically, the research questions guiding this study are: Does incorporating kinesthetic experiences and spatial metaphors in the teaching of abstract verbs enhance second-grade students' comprehension of these words? As experimental research, the study will employ a pre-test and post-test design to assess accuracy improvement rate of the participants, who will be divided into three groups: two experimental groups and a control group, before and after receiving instruction of abstract verbs.

Why is the research worth doing? First and foremost, the research is conducted against the backdrop of an evolving education landscape. With the rapid advancement in educational research and the greater emphasis on effective teaching methodologies, it is imperative to investigate innovative approaches in the context of language learning. Secondly, the semantic complexity and abstract nature of abstract verbs, particularly in Chinese, where they often

lack tangible referents, render the precise elucidation and distinction of these words a formidable challenge for educators. However, the existing corpus of literature is bereft of empirical studies examining the application of embodied cognition theory and conceptual metaphor theory in the instruction of abstract verbs to children, seldom associating these theories with practical educational applications.

In conclusion, this experimental research investigates the effectiveness of the embodied cognition theory and conceptual metaphor theory in teaching abstract verbs to second-grade children by incorporating kinesthetic experiences and spatial metaphors into teaching. By exploring innovative teaching approaches, the study may enhance language learning outcomes and provide valuable insights into effective instructional practices that contribute to relevant educators, ultimately fostering children's language development and cognitive growth.

Literature review

Language acquisition is a remarkable and complex process, especially when it comes to the learning of abstract verbs. Compared to concrete concepts, abstract concepts do not have a single, bounded, identifiable referents that can be perceived with our senses (Borghi et al., 2017). Similarly, definitions of abstract verbs are often based on comparisons with concrete concepts. Abstract verbs such as *adore* and *solve* are not as strongly associated with physical movements as concrete verbs like *run*, so abstract verbs refer to verbs that do not seem to correspond to strong physical actions and lack obvious sensory-motor associations (Rodriguez-Ferreiro et al., 2011). Gentner (2006) also discusses the difficulty of verb learning, especially abstract verbs, and offers some ideas about why it is challenging for children, such as structure-mapping theory, relational relativity and context dependence. This literature review aims to provide an overview of the macroscopic theories and microcosmic perspectives in this field, focusing on three key stages of the acquisition.

Macroscopic Perspective

This acquisition phenomenon can be viewed from the macroscopic theoretical perspective, including the nativist, the empiricist, the constructivist and the cognitivist approaches. Among them, Jean Piaget (1952), a renowned Swiss psychologist, proposed a theory of cognitive development that outlines four distinct stages of intellectual growth in children. These stages are the sensorimotor stage (0-2 years), the preoperational stage (2-7 years), the concrete operational stage (7-11 years), and the formal operational stage (11 years and older).

Therefore, in our research, we choose second-grade students as participants based on Piaget's theory, who are 7 to 8 years old, experiencing the transition from the preoperational stage to the concrete operational stage. During this stage, children demonstrate significant advancements in language development, symbolic thinking, and pretend play. They are

capable of representing objects and events through words, images, and symbols, showing increased imaginative and intuitive abilities.

Microcosmic Perspective

This topic will be also explored from two microcosmic perspectives and theories, each supported by specific theories and prominent scholars. Firstly, the “embodied cognition theory” emphasizes the role of sensory-motor experiences and actions in shaping the development of concepts. Glenberg (1997) proposes that the abstract words can be understood by conceptualizing them in concrete ways that is the “patterns of possible bodily interactions”, and his views explain how children understand abstract verbs by simulating concrete actions. “Embodied cognition theory” views that semantic processing is the result of the body and brain’s perceptual simulation of the symbolic signified in situated action, emphasizing that the bodily states and situated action are the basis of cognition (Barsalou, 2008). According to the definition of concrete and abstract words, concrete words refer to the actions that can be perceived by the body, so the embodied semantics can directly ground? sensory-motor system and real situation (Yu & Lu, 2021). Abstract verbs refer to intangible objects that the body cannot perceive, so their grounding problem is a challenge for embodied cognition approach (Borghi et al., 2017).

Another influential theory is “conceptual metaphor theory”, proposed by Lakoff and Johnson, which means that abstract concepts are understood and expressed through metaphors that map them onto more concrete domains of experience. They think “understanding is seeing” and “argument is war”, as in “I see what you’re saying” and “I’ve never won an argument with him” (Lakoff & Johnson, 1980). They argue that these metaphors are not arbitrary but reflect the embodied nature of human cognition and language. For example, in English, we often use *grasp* to mean understanding an abstract concept, as in “She finally grasped the concept”. Here, *grasp* connects understanding of an abstract concept

to the concrete act of grasping, making the abstract concept easier to understand. They also talked about the metaphor of spatial position. For instance, they think “having control or force is up, being subject to control or force is down”, using these sentences as examples: “I have control over her. I am on top of the situation. He is under my control. He fell from power” (Lakoff & Johnson, 1980). They claim that metaphors are learned through exposure to linguistic and cultural patterns, and that they shape the way we think and communicate about abstract domains.

Despite the many theories explaining the acquisition of abstract verbs, there is a lack of practical research on applying these theories to teaching. As for teaching methods, building upon the existing literature, this study primarily adopts the perspectives of the embodied cognition theory and conceptual metaphor theory to inform the instructional approaches employed in teaching abstract verbs. From the embodied cognition theory, the study extracts a crucial feature of abstract verbs—the motor feature, whose definition refers to features of “sensory and motor experience, including vision, hearing and movement”, and then this feature can affect the participation of the sensorimotor system in the representation of abstract verbs, which supports the application of embodied theory in abstract concepts (Jin & Li, 2022). From the conceptual metaphor theory, the study draws upon another essential characteristic of abstract verbs—the spatial feature. About the theories related to it, in both concrete verbs and abstract verbs, some of them have significant spatial orientation, because the characteristic of metaphor of these abstract verbs is expressed through spatial orientation (Yao & Zhang, 2010).

As for participants, with high plasticity and learning potential and having already possessed certain cognitive ability and language expression ability, second-grade students align with Piaget’s framework of cognitive development for the developmental process of understanding abstract concepts, better revealing the influence of abstract verb teaching on

children's understanding of abstract concepts and providing targeted guidance for educational practice. Thus, the study integrates these perspectives into instructional methods named "kinesthetic experiences" and "spatial metaphors," aiming to explore the impact of different teaching methods on the comprehension of abstract verbs among second-grade students.

In conclusion, this literature review provides an overview of theories and perspectives on the acquisition of abstract verbs. It explores the macroscopic and microcosmic aspects of language acquisition, highlighting the importance of embodied cognition theory and conceptual metaphor theory. By applying these theories, the study aims to develop effective teaching methods, such as kinesthetic experiences and spatial metaphors, to enhance the understanding of abstract verbs among second-grade students.

Methodology

Research design

The study will be quantitative in nature and experimental because it includes both control and experimental groups to compare the effects of different teaching strategies. The study will involve original data collection, and the data analysis will be both descriptive and inferential.

Participants, Materials and Procedures

The study will involve 6 second-grade Chinese students with normal vision and hearing who are currently enrolled in primary education. The students will be randomly assigned to three groups, each comprising 2 students.

The test will be recorded using a video camera for later analysis, with the consent of the participants. PPT for six Chinese abstract verbs and visual aids will be prepared for introducing and teaching the abstract verbs. And pre-test and post-test papers will be devised to evaluate the students' comprehension and usage of these verbs. The principle of choosing verb pairs is that they must be relatively new words, but not too difficult for second-grade students, and they have a common word, so it is difficult to tell them apart.

Table 1 Comparison of six abstract verbs in Chinese and English				
	Chinese	English	Chinese	English
1	“把握” (bǎ wò)	grasp or hold	“把守” (bǎ shǒu)	guard or defend
2	“提振” (tí zhèn)	boost or invigorate	“提炼” (tí liàn)	refine or extract
3	“重建” (chóng jiàn)	rebuild or reconstruct	“重组” (chóng zǔ)	reorganize or restructure

The study comprises four main stages: pre-test phase, introduction phase, experimental phase and post-test phase. At the pre-test phase, initially, all 6 students will undertake a pre-test that requires them to choose the appropriate usage of ten abstract verbs based on textual context and images. At the introduction phase, the students will be introduced to three pairs of abstract verbs and provided with explanations of their meanings (form, sound, and dictionary definitions). At the experimental phase, the 6 students will be randomly divided into three groups (A, B, and C) of 2 students each. Group A (Kinesthetic Experience Group) will learn the verbs through kinesthetic experiences using bodily language and expressions. Group B (Spatial Metaphor Group) will learn through spatial metaphors. Group C (Control Group) will continue learning through text materials, showcasing the usage of verbs in textual contexts. At the post-test phase, after the learning phase, all participants will undergo a post-test similar in format and difficulty to the pre-test, but with different specific questions to assess their understanding and usage of the abstract verbs.

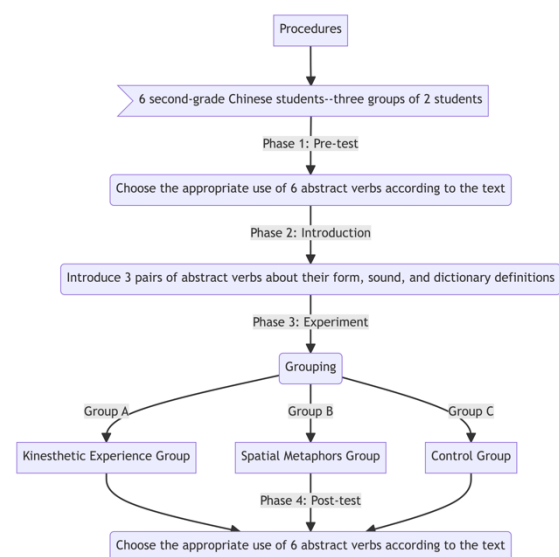


Figure 1 Research procedures

The average of pre-test and post-test accuracy rates for each of the three groups will be calculated, and then the post-test accuracy rate will be subtracted from the pre-test accuracy rate to get the accuracy improvement rate. The data collected from the pre-test and post-test will be organized into a structured format and be interpreted clearly.

Data analysis

The specific data of six subjects

Table 2 Specific Data of Each Subject and Average Accuracy Improvement of Each Group											
Grouping	Subject	Test	1	2	3	4	5	6	Accuracy	Accuracy Improvement	Accuracy Improvement Rate
Group A: Kinesthetic Experience	1	Pre	x	x	x	x	x	x	0%	66.67%	58.33%
		Post	√	√	x	√	x	√	66.67%		
	2	Pre	x	x	√	√	x	x	33.33%	50.00%	
		Post	√	x	√	√	√	√	83.33%		
Group B: Spatial Metaphor	3	Pre	√	√	x	x	x	x	33.33%	33.34%	41.67%
		Post	√	√	x	√	x	√	66.67%		
	4	Pre	√	x	x	x	√	√	50%	50.00%	
		Post	√	√	√	√	√	√	100%		
Group C: Control Group	5	Pre	x	√	√	x	x	√	50%	16.67%	8.33%
		Post	√	x	√	x	√	√	66.67%		
	6	Pre	√	√	x	x	√	√	66.67%	0%	
		Post	√	√	x	x	√	√	66.67%		
Note: The data presented in the table reflects the performance of individual subjects in each group (Group A, Group B, and Group C) before and after the experimental intervention. The “Accuracy” percentages indicate the proportion of correct answers for each subject in the pre-test and post-test, and the “Accuracy Improvement” column is calculated by subtracting the pre-test accuracy from the post-test accuracy, and “Average Accuracy Improvement” column refers to the average “Accuracy Improvement” of all subjects in the same group.											

Result

From the data of Group A, it can be calculated that the first subject's accuracy improvement is 66.67% and the second subject's accuracy improvement is 60%, so the average accuracy improvement of two subjects is $(66.67\% - 0\% + 83.33\% - 33.33\%) / 2 = 58.33\%$.

From the data of Group B, it can be calculated that the third subject's accuracy improvement is 33.34% and the fourth subject's accuracy improvement is 50%, so the

average accuracy improvement of two subjects is $(66.67\% - 33.33\% + 100\% - 50\%) / 2 = 41.67\%$.

From the data of Group C, it can be calculated that the fifth subject's accuracy improvement is 16.67% and the sixth subject's accuracy improvement is 0%, so the average accuracy improvement of two subjects is $(66.67\% - 50\% + 66.67\% - 66.67\%) / 2 = 8.33\%$.

Interpretation

From the above three sets of data, it can be seen that Group A in which the subjects learned abstract verbs through the kinesthetic experience, has the highest average accuracy improvement, followed by Group B in which the subjects learned it through the spatial metaphors, and Group C, which uses the text throughout the test as the control group, has the lowest average accuracy.

According to the average improvement accuracy of Group A and Group B, it can be concluded that explaining the abstract verbs through kinesthetic experience and spatial metaphor does have a certain positive effect on children's understanding of abstract verbs. By comparing the average improvement accuracy of Group A and Group B with that of the control group, we can see that both groups have a higher average improvement accuracy than the control group. To a certain extent, it can be explained that the method of explaining the kinesthetic experience and spatial metaphor to present the motor features and spatial characteristics of abstract verbs can be used to improve the comprehension of abstract verbs, which is better than simply using text to explain them.

The average improvement accuracy of Group A is higher than that of Group B, which can be explained to some extent that using kinesthetic experience will be better than using spatial metaphor. Through the specific data of each subject's answers to each question, it can

be found that among the data from Group A and Group B, the wrong answers to the questions of a pair of abstract verbs in the pre-test would become correct or wrong again when the same verbs were answered again in the post-test after explanation, but for the same pair of verbs, the right answers to the questions in the pre-test would not get wrong in the post-test after explanation. However, in the control group, the questions that were correct in the pre-test were likely to be wrong after the explanation. It suggests that it is possible that explaining the abstract verbs merely through text would be counterproductive to children's understanding of abstract verbs, resulting in confusion to the comprehension.

Discussion

Implications

According to the comparison between the data of three groups, the reason why the use of kinesthetic experience and spatial metaphor to represent the motor features and spatial features of abstract verbs can show better accuracy in the experiment is that the motor features and spatial features of abstract verbs may be closer to the characteristics of concrete things in reality, so it is more vivid and easier for children to understand. In other words, when explaining an abstract verb, it is much easier for children to imagine a specific spatial picture or a specific action than to understand a paragraph of text because compared with a spatial picture or a specific action, a paragraph of text is relatively more abstract.

Therefore, it is also in line with Piaget's theory of cognitive development. The children of the subjects are now in the transition from the preoperational stage to the concrete operational stage where the children have a preliminary development of the understanding of abstract things (1952). But generally speaking, they still have not reached the formal operation stage where they have a relatively deep understanding of abstract things, that is to say, the understanding of abstract things or abstract words at this stage needs to be based on the concrete things, corresponding to the characteristic of this stage. Hence, for children at this stage, the methods of explaining kinesthetic features and spatial metaphor methods just meet their needs for understanding abstract words with the help of relatively concrete things.

As for the comparison between the effects of kinesthetic experience and spatial metaphor, the reasons why kinesthetic experience group performs better than spatial metaphor is that the spatial features have certain limitations. Some abstract verbs do not reflect spatial features, and some spatial features can only be reflected in a specific context. Moreover, when the spatial features are applied to a wider context, the context itself which

has other spatial features may affect the spatial features of this abstract verb, resulting in increasing the difficulty of children's understanding of the abstract verbs.

Limitation

First, the size of the sample is too small, while the number of questions in the test is not enough to reflect the upper limit of students' improvement. Second, the vocabulary level of each group was different, especially the performance of the control group in the pre-test which reflected that they had learned most of the verbs, so the data of the control group's average improvement accuracy could not accurately reflect the acquisition of the subject. Third, the design of the verbs chosen in the test did not consider the question of word frequency like *tizhen*, which may influence their acquisition. Fourth, when explaining the spatial features of abstract verbs, it is difficult to get rid of the influence of motor features, since some Chinese words have a very obvious action tendency that is difficult to ignore. Lastly, there is a possibility that participants would answer incorrectly because they did not understand other parts of the question.

Conclusion

Based on two theories of abstract vocabulary acquisition, embodied cognition theory and conceptual metaphor theory, this research attempts to explore whether there are more new perspectives to promote children's acquisition of abstract verbs. Therefore, this research selects a perspective from these two theories, the motor features and spatial features of abstract verbs, and tries to apply them to the teaching of abstract verbs, which are the methods of kinesthetic experience and spatial metaphor. Then a preliminary experiment was conducted to compare these two methods with the text-based method, and we could draw a preliminary conclusion that these two methods can promote the acquisition of abstract verbs of children compared with the text-based method.

Among the research on abstract vocabulary, few literatures apply the theory of abstract vocabulary acquisition to teaching practice, so this research has the power to innovate language teaching methods for abstract concepts in young learners, making a significant impact on teaching practices, linguistic theories, and children's learning experiences.

Acknowledgments

We would like to express our sincere gratitude to Professor Deng Xiangjun for her invaluable guidance and insightful suggestions throughout the entire research process. Her expertise and feedback greatly influenced the conceptualization, design, and resolution of the challenges encountered in this study. We are also deeply grateful to Yu Yinkai, a friend from the Department of Physics at Sun Yat-sen University, for his assistance in conducting the experiments, including recording experimental data and providing valuable suggestions for the experiments. And we would like to extend our appreciation to the students and parents who participated in the experiments, their enthusiastic cooperation and support were instrumental in the successful completion of this research. Furthermore, we would like to thank our parents for their tireless efforts in helping us contact the participants and facilitating the smooth progress of our study. We acknowledge the contributions of all individuals and organizations mentioned above, as their support played a vital role in the completion of this research project.

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Appendix I Pre-test and Post-test Papers

亲爱的同学们，欢迎来到我们的语言学习小天地！现在我们来看看一些题目。仔细阅读每个句子的意思，然后选择正确的词语写入空格中。

每句话中的两个空，要填不同的词语哦！

如果觉得有点难没关系的哦，我们稍后一起来学习吧！相信你们一定能做得很棒！加油！

1. 青少年_____着祖国的未来，大人们_____着青少年的健康成长。(把握/把守)
2. 敌方派了很多士兵_____城门，但我们的战士们_____先机，最终冲了进去。(把握/把守)
3. 小鸟仔细_____了鸟妈妈成功飞行的秘诀，_____精神，一飞冲天。(提振/提炼)
4. 在演讲比赛前，老师一边_____同学们的自信，一边帮助同学们_____语言。(提振/提炼)
5. 洪水过后，我们_____了医生的人员安排，然后_____了我们的家园。(重建/重组)
6. 参与_____游乐园的工人们排成一排，老板按照他们的身高从高到低_____了他们的排列顺序。(重建/重组)

亲爱的同学们，欢迎再次来到我们的语言学习小天地！我们已经学习了这些词语，现在我们再来看看一些题目。仔细阅读每个句子的意思，然后选择正确的词语写入空格中。

每句话中的两个空，要填不同的词语哦！

相信你们一定能做得很棒！加油！

1. 老母鸡认真_____着自己的小鸡们，但是老鹰还是_____住机会把小鸡叼走了。(把握/把守)
2. 在足球比赛中，一些人要_____宝贵的时间，获得更多的分数；另一些人要_____球门，以免对方得分。(把握/把守)
3. 在课堂上，老师从故事中_____出励志的观点，来_____同学们的学习动力。(提振/提炼)
4. 我们学校的足球队在输球之后，需要老师_____他们的士气，但他们也要学会从中_____经验教训。(提振/提炼)
5. 新的学年，老师_____了同学们的座位安排，同学们之间_____了坚固的友谊。(重建/重组)
6. 爸爸不小心把积木房子弄倒了，他悄悄_____了这个积木房子，但是却_____了不同颜色积木的位置，最后还是被小明发现了。(重建/重组)

Appendix II Consent Form

知情同意书

尊敬的家长们：

欢迎您参与本研究项目！我们非常感谢您和您的孩子参与我们的教育研究项目。此信旨在向您介绍我们的研究，并征求您对您孩子参与的同意。在进行研究之前，请您仔细阅读以下知情同意书，并在完全理解和同意后签署。

研究目的：本研究的目的是探索肢体动作体验和空间隐喻在教学实践中对二年级学生抽象动词理解的影响。我们希望通过本研究了解和探索这些教学方法是否能提高二年级学生对抽象动词的理解。

参与者：本研究的参与者为6名二年级的中国学生。

研究流程：您的孩子将参与一个关于抽象动词教学的研究实验。在实验中，我们将采取不同的教学方法，包括运用肢体语言和动作表情以及利用抽象动词的空间特征，以帮助孩子更好地理解这些词语的含义。实验将分为预测试、讲解阶段、实验阶段和测试阶段。

数据保密：我们非常重视参与者的隐私。所有收集的数据将仅用于本研究目的，并且在报告和出版物中将不会泄露任何个人身份信息。我们将使用匿名方式呈现研究结果，以保护您和您的孩子的隐私。

风险和利益：我们预期本研究不会给您的孩子带来任何身体上的伤害。然而，我们将密切注意任何可能的问题，并及时采取必要的措施。通过参与实验，您的孩子有机会提高抽象动词的理解能力，这有助于他们在语言学习和学术发展中取得进步。此外，您的孩子还可以从不同的教学方法中获益，拓宽他们的思维方式和学习策略。

自愿参与和撤销参与权：

参与本研究是完全自愿的，您和您的孩子有权随时退出，而无需解释或承担任何后果。退出研究不会对您或您的孩子的任何权益产生任何负面影响。

如果您有任何问题或疑虑，请随时与我们联系。感谢您的参与！

如果您同意让您的孩子参与这项研究，请签署以下声明：

我已阅读并理解了上述信息，并同意让我的孩子参与此教育研究项目。

家长签名：_____

日期：_____

再次感谢您的支持和参与。

钟希芳

钟希芳

杨小凤

李萍

陈娟美

杨小凤

Consent Form

Dear Parents,

Welcome to our research project! We greatly appreciate your participation and your child's involvement in our educational research study. This letter aims to introduce our study and seek your consent for your child's participation. Before we proceed with the research, please carefully read the following informed consent form and sign it after fully understanding and agreeing to its contents.

Research Purpose: The purpose of this study is to explore the impact of kinesthetic experiences and spatial metaphors in teaching practice on second-grade students' comprehension of abstract verbs. We aim to investigate whether these teaching methods can enhance the understanding of abstract verbs among second-grade students.

Participants: The participants of this study are 6 second-grade Chinese students.

Research Procedure: Your child will participate in a research experiment related to the teaching of abstract verbs. In the experiment, different teaching methods will be employed, including the use of body language, facial expressions, and the utilization of the spatial features of abstract verbs to help children better understand the meanings of these words. The experiment will consist of a pre-test, explanation stage, experimental stage, and test stage.

Data Confidentiality: We highly value the privacy of our participants. All collected data will be used solely for the purpose of this study and will not disclose any personal identification information in reports or publications. We will present the research results anonymously to protect the privacy of both you and your child.

Risks and Benefits: We anticipate that this research will not pose any physical harm to your child. However, we will closely monitor for any potential issues and take necessary measures promptly. By participating in the experiment, your child has the opportunity to improve their comprehension of abstract verbs, which can contribute to their language learning and academic development. Additionally, your child can benefit from exposure to different teaching methods, broadening their thinking and learning strategies.

Voluntary Participation and Withdrawal: Participation in this research is entirely voluntary, and you and your child have the right to withdraw at any time without providing any explanation or facing any consequences. Withdrawing from the study will not have any negative impact on you or your child's rights or benefits.

If you have any questions or concerns, please feel free to contact us. Thank you for your participation!

If you agree to allow your child to participate in this research, please sign the following statement:

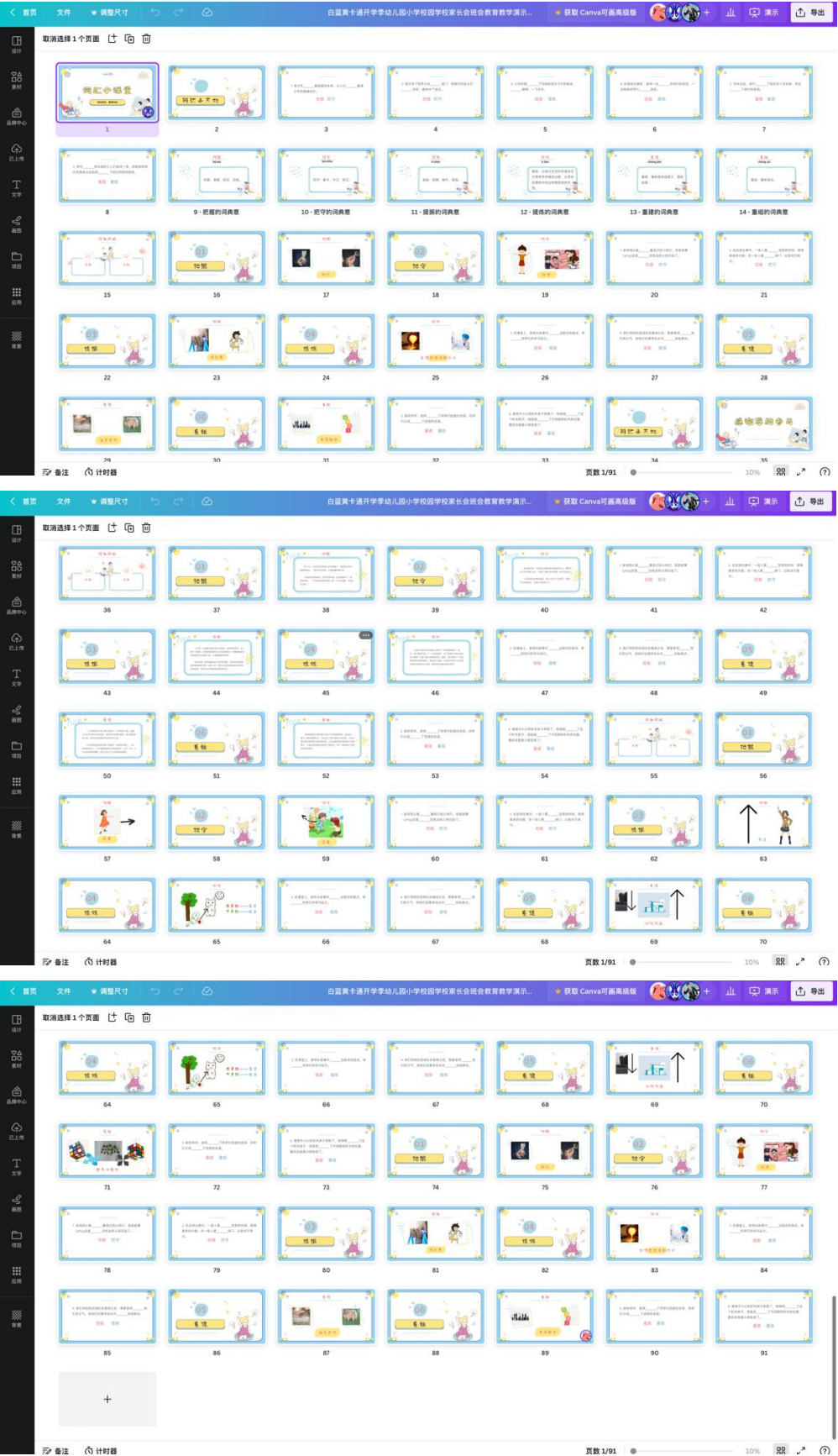
I have read and understood the above information and consent to my child's participation in this educational research project.

Parent's Signature: _____

Date: _____

Thank you once again for your support and participation.

Appendix III Instruction Materials



Author Contributions

Experiment: 夏红煜 & 肖瑶

Writing: 夏红煜 & 肖瑶

Editing and Reference Format: 夏红煜 & 肖瑶

The two authors participated in the whole process together, and it is difficult to distinguish contributions.