

A Practical Study on the Integration of English Vocabulary Acquisition and Physical Education Curriculum on the Motivation of Second Language Learners

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Abstract

The purpose of this study is to analyze the practical study of English vocabulary acquisition and physical education curriculum on the learning motivation of second language children, with a special focus on the motivation of vocabulary acquisition learners. By combining physical education and English, the applicability of this approach in Chinese primary school environments is investigated. A 15-week intervention was conducted on children aged 6 - 7, with samples from schools in Beijing, China. Compare and analyze the experimental results of pre-test and post test on participants separately (n = 73). Conclusion: Classroom-based physical activities have a positive impact on vocabulary learning and motivation among children aged 6 - 7 in China. English vocabulary acquisition and physical education courses can become effective resources to promote the learning motivation of second language children.

Keywords

English Vocabulary Acquisition, Physical Education Curriculum, Second Language Learning, Motivation

1. Background

The decreasing amount of time children spend participating in sports activities

as they age is a common problem in countries around the world (Lubans et al., 2010). According to statistics, during the COVID-19 epidemic, only 15% of people maintained their sports level before the epidemic (Gassner et al., 2022). A significant decline in the participation rate of exercise would make children's motor skills unsatisfied, leading to an increase in chronic diseases, such as sedentary and obesity. Furthermore, insufficient motor skills can also lead to a lack of confidence in children's participation in the classroom, thereby affecting their mental health and even their future lives. The positive relationship between body movements and cognitive function has been well established (Cichy et al., 2022). In addition, participating in sports activities can improve cognitive functions such as behavior (Mahar et al., 2006) and attention (Carrillo-López et al., 2018) which can help improve academic performance (Palmer et al., 2013). We mainly explore whether English vocabulary acquisition and physical education courses will affect the second language acquisition of Chinese elementary school students.

1.1. The Correlation between Physical Activity and Cognition

Recent research findings support the specific characteristics of learning, indicating that learning is a cognitive process with intricate connections between the body and the world. The development and understanding of expressive concepts promote the development of cognition and learning. Conceptual development is closely related to motor development, and learning and creating meaning are based on sensory and motor participation (Volta & Volpe, 2018). Research has shown that the combination of interesting stories and rhythmic songs in activities has a certain positive impact on the human body's senses (Albaladejo et al., 2018). Through the participation of several senses, more associations with the learned elements have been generated, improving learning and retaining multisensory teaching. It has been proven that enhancing communication skills can provide students with learning opportunities. In early second language learning, the methods surrounding multisensory development are as follows: a) The "The Good Start Method for English" aims to stimulate different senses (visual, auditory, motor, and tactile) of 5 - 7 years old children. This is achieved by combining language learning with visual elements, graphics, and motor activities (Ghisio et al., 2017). For example, incorporating English songs into action learning, children sing while pointing at the joints of their bodies in physical education classes, At the same time, students can clearly provide feedback on the number of tasks given by the teacher (Bogdanowicz & Bogdanowicz, 2016). b) The "whole body response technique" method is basically composed of listening to slogans and using the body, as well as using gestures and simulating actions (Asher, 1969). Recently, research by scholars in children and adults (8 years old and above) has confirmed that students become very active and actively interact with teachers in courses that combine English songs with physical activities, resulting in a significant increase in vocabulary retention after a class (Harrasi, 2014).

1.2. Existing intervention studies

Toumpaniari et al.'s (2015) study found that gestures and physical activity have a very good effect on learning vocabulary for school-age children. He also confirmed that classroom based physical activities, such as the Energizers project, are beneficial for learning, as they can improve task behavior and regulate memory function and reaction time. In addition, Padial-Ruz et al. (2019) conducted a 5-week exercise intervention for children aged 4 - 7 in Honduras, with the main intervention program being the "Energizers" project. His intervention experiment results confirmed that the combination of gestures and exercise activities can promote vocabulary learning for learners (Padial-Ruz et al., 2019). Meanwhile, some studies have confirmed a positive relationship between physical activity and academic performance (Palmer et al., 2013). In the development of cognitive content in teaching, it can become an effective tool because games and sports are the most important resources for children.

Padial-Ruz et al. (2019) found that using a combination of upper and lower limb jumping and running in English classrooms can attract students' attention and promote learning motivation. For example, the "Energizers" sports activity plan is a teaching method that combines activities with academic content, and English songs and performance games have been included in the classroom teaching content (Chlapana & Tafa, 2014).

The study by Mahar et al. (2006) also found that the Energizers program can increase daily school physical activities and enhance the stability of focus during teaching. Students who participate in Energizers activities have stronger persistence during school than those who do not receive Energizers intervention activities, and exhibit better task behavior (Mahar et al., 2006). The theme of "Space Jam" in "Energizers" is beneficial for children to learn from a young age. In the task list, they follow the teacher to explore the mysteries of the space station, complete corresponding tasks at different stages, and increase physical activity in the classroom driven by memory and task functions. Scientific evidence confirms that the use of a combination of cognitive and motor activities in the curriculum has a positive effect on learning, mainly reflected in improving student focus and increasing their motivation to engage in activities. Furthermore, the combination of motor activities and cognitive content learning has a positive impact on learning (i.e. improving attention processes, better retaining content, and increasing learning motivation for students by using interesting and meaningful activities).

At present, the interdisciplinary thematic learning of China's national sports and health curriculum design has not yet involved courses related to English or content related to English. For example, the combination of vocabulary acquisition and sports activities enables Chinese students as second language learners to exercise their bodies and enrich their vocabulary acquisition.

1.3. Aim

The purpose of this article is to explore the impact of English vocabulary acqui-

sition and physical education curriculum on the learning motivation of second language children, as well as the benefits and incentives for Chinese primary school learners in vocabulary learning. The intervention lasted for 15 weeks, with a sample of 73 children aged 6 - 7 from public schools in Beijing, China.

1) Does the content of physical education curriculum affect the motivation of second language children learners?

2) How can physical education curriculum tasks be used to support English vocabulary acquisition in primary school environments in China?

3) How does Hypothesis 3 address the cross curriculum integration between sports and English regarding vocabulary learning and learner motivation? How does the interdisciplinary integration of sports and English promote vocabulary learning and increase learning motivation.

2. Research Methods

2.1. Participants

The participants are 73 elementary school students from public schools in Beijing, China, with 40 males and 33 females aged between 6 and 7 years old. The total duration of the experiment is 15 weeks. Due to the infeasibility of randomly assigning participants, these two classes were randomly assigned to one of the three conditions of the study before the experiment began.

2.2. Materials and Methods

For this study, teachers and participants do not require additional preparation time or special equipment. The teaching is completed by experimenters and conducted in primary school classrooms. The participants learned 22 new words in a foreign language (i.e. English), all of which belong to the category of body names. Using flashcards related to the body for word teaching, first say its name in Chinese, and then say its name in English. Regarding two experimental conditions (word expression through physical activity and gestures, and word expression through gestures), the physical activity described in the Energizers program was used. More specifically, in the discourse reflected through sports activities and gesture state activities, children point to different parts of their body (head, shoulders, shoulders, feet, etc.). Learners perform or point out body parts through the teacher's gestures 22 words are taught in each class, which lasts for 40 minutes per day, with three classes per week for 15 weeks. Before the start, each class is randomly assigned to one of three research groups. (Control group) N = 21 (traditional method), (Experimental group 1) N = 26 (gesture), (Experimental group; 2) N = 26 (gesture + physical activity), (**Figure 1**).

In three cases, the experimenter (teacher) began displaying the names of body parts on a flash card, and the learner attempted to find the English names of these parts. If someone does not know the English name displayed by the experimenter, the experimenter will shout out the name again in Chinese, and then shout out the name in English, for example, "shoulder" in English and "shoulder" in Chinese. Afterwards, the activity begins and repeats for 40 minutes.

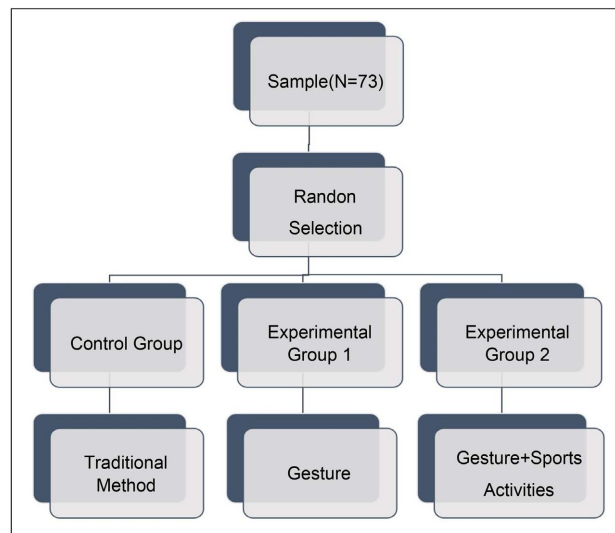


Figure 1. Sample and allocation of the research group.

Control group: No physical activity or gestures, repeating the names of body parts in two languages (Chinese and English). Flashcards are used to teach the vocabulary involved in the classroom

(see:

<https://www.ixl.com/ela/grade-1/complete-the-sentence-with-a-noun-to-match-the-picture>), For example, how to say the shoulder in English?

Experimental Group 1:

The intervention in Experiment 1 group used gestures, mainly based on the theme “It’s a Zoo in Here” of Energizers for Grades K-2. This content requires teachers to choose actions or students to choose an animal, such as Monkey, Bear, Snake, Elephant, Giraffe, Kangaroo, Lion, or Tiger. Then, students must mimic the way animals walk or move around desks or classrooms for at least 30 seconds. The students continued to practice until the teacher signaled them to move like the next animal. The changing factors are: Creating cards with animal names for use as flash cards (grades 1 - 2). Children can pronounce these names and perform them. In addition, add music selected from Head Shoulders Knees And Toes see: <http://bit.ly/TheSuperSimpleApp>.

Experimental Group 2:

The intervention of Experiment 2 group was conducted through a combination of gestures and physical activities, mainly based on the “Frozen Vocabulary” of Energizers for Grades K-2. Activity rules: First, have students stand at their desks to do an activity, such as jumping, twisting, jogging, jumping, jacks, hopping knee, lifts, playing air guitar. Furthermore, students can continue their activities for 30 seconds or until the teacher correctly calls out the vocabulary in the sentence. Next, the teacher requires volunteers to use vocabulary correctly in sentences. Finally, when students use vocabulary correctly in sentences, resume activities or start new ones. The changing factors are: a) Students can define vocabulary. b) Students can spell words. c) Students can say synonyms or anto-

nyms. d) For mathematics, students can provide the sum, difference, or quotient of two numbers. Post intervention testing: The entire teaching process lasted for a total of 15 weeks, and at the end of week 14, a separate post test was conducted for all learners in each group, consisting of two parts. The intervention plan of this study was adapted from Toumpaniari et al.'s implementation intervention plan. In the first part after the test, elementary school students evaluated their teaching methods by answering two questions on a five point Likert scale using verbal tags and smiling faces (Jäger & Bortz, 2001).

The Smiling Face Scale was used in two studies on 239 adult participants. The results show that the scale is reliable and not affected by age, gender, or educational level. It raises two questions with three levels ("yes", "I don't know", and "no") that must be answered with emoticons: a) Did you enjoy this course? b) Do you want to learn in this way in the future? The researchers read out the questions and labels, and the children had to indicate their answers on the smiling face scale. In this study, an internal consistency coefficient of 0.69 (Cronbach's α Coefficient).

In the second part of the post test, learners were individually tested to determine how many words they could remember. The test is conducted in the form of prompts for retrieval. In this case, the experimenter says words about body parts in Chinese, while elementary school students say words about the same body part in English. Checked these words with a list containing all the words taught. If a word is memorized correctly, researchers will check it in the "yes" box, and if not, cross it in the "no" box.

2.3. Research Design

In a quasi experimental study, three levels of independent variable type implementation were compared in the subject design (word expression through physical activity and gestures, word expression through gestures, and control without physical activity and gestures). Due to the impossibility of randomly assigning children to these three conditions, these two classes were randomly assigned to these three conditions. The relevant variable is the performance of the total number of words that learners can remember (the number of recalled words) after 15 weeks of intervention, reflecting the average score of the knowledge and teaching method evaluation they have acquired.

2.4. Statistic analysis

A one-way analysis of variance (ANOVA) was conducted to determine the main impact of independent variable teaching conditions, and a directed independent t-test was conducted to determine specific hypothetical differences between teaching conditions. Using IBM SPSS® Statistical analysis was conducted using 22.0 software (Jäger & Bortz, 2001). Frequency and median are used for basic descriptive analysis. The relationships between variables are checked using contingency tables or cross tables.

3. Results

The descriptive results in **Table 1** show that the average age of the sample is 6.5 years old ($SD = 0.691$), with 45.2% ($N = 33$) being females and 54.7% ($N = 40$) being males. The education levels of parents are doctoral (9.5%), master's (54.7%), bachelor's (27.3%), and college (8.2%), respectively.

Table 2 reports the data obtained during pre testing. This indicates that 100% of the samples had no knowledge of the intervention target vocabulary before participating in the study. Perform correlation analysis on estimated variables through contingency tables. The following results were found: The number of words recalled by participants was divided into three categories (0 - 6 words, 7 - 13 words, and 14 - 22 words). A statistically significant difference ($p < 0.001$) was determined based on the examination conditions for these three types of intervention measures. Further research results indicate that this difference is caused by the higher number of words learned by learners in experimental conditions 1 and 2.

In Experiment Condition 2 (gesture + motor activity), 72.4% of children learned 62.4% of their vocabulary, which belongs to the maximum vocabulary (13 - 22 words), while 56.5% of learners in Experiment Condition 1 (gesture) learned 30.5%. People who participated in the control conditions only learned 13.4% of the vocabulary (**Table 3**).

The one-way analysis of variance for testing performance showed statistically significant differences among the three experimental conditions, with $F(2,794) = 8.447$ and $p < 0.001$, $\eta^2 = 0.21$, indicating a moderate to large effect size. The directional t-test showed that using gestures and physical activity and gestures to reflect words achieved higher test scores than learning words in traditional ways (without the need for gestures and physical activity). $t(64) = 2.77$, $p < 0.001$ (single tailed). In addition, word expression through task related physical activities and gestures showed higher overall test performance than word expression through gestures, with $t(64) = 3.26$ and $p < 0.001$.

Table 1. Sample data.

Gender		
Female	45.2%	N = 33
Male	54.7%	N = 40
Age		
	N = 73	M = 6.5
Parental education level		
Doctoral	9.5%	N = 7
Master	54.7%	N = 40
Bachelor	27.3%	N = 20
College	8.2%	N = 6

Table 2. Vocabulary already understand by learners before intervention (pre test).

Teaching Method	Method				
	Vocabulary	Control conditions	Gesture	Gesture + Actions	Total
0 - 6		28.76% (N = 21)	31.50% (N = 23)	39.72% (N = 29)	100%

Table 3. Intervention group and number of assimilated words (post test).

		Learning Vocabulary		Total	
		0 - 5	6 - 12		
Control Conditions	Learning Vocabulary	23.8% (N = 5) 63.5%	65.2% (N = 15) 52.4%	20.6% (N = 6) 13.4%	100% (N = 21) 31.4%
	Gesture	17.3% (N = 5) 63.5%	43.4% (N = 10) 39.2%	56.5% (N = 13) 30.5%	100% (N = 23) 24.0%
Gesture + Sports Activities	Learning Vocabulary	6.8% (N = 2) 2%	48.2% (N = 14) 45.2%	72.4% (N = 21) 62.4%	100% (N = 29) 47.2%

Table 4. Average and standard deviation of recall words and evaluation of teaching methods as a function of teaching conditions.

	Recalling words		Course evaluation		<i>p</i>
	M	SD	M	SD	
Control Conditions	16.62	3.41	3.88	0.48	0.41
Gesture	15.17	2.07	3.84	0.41	0.53
Gesture + Sports Activities	16.92	1.47	4.15	0.46	<0.001***

N = 73. Code as 1. male; 2, female; Gesture + Sports Activities, *** $p < 0.001$.

The teaching evaluation of analysis of variance is a question of comprehensive grades. Do you enjoy these courses? The three questions “Are you willing to receive such education in the future?” show significant differences between the three situations, $F(2,794) = 4.824$, $p = 0.011$, $\eta^2 = 0.15$, indicating a moderate effect size. The directional t-test showed that children evaluated expressive words more positively through physical activity and gesture conditions, as well as through gesture conditions, compared to traditional teaching methods, with $t(62) = 0.01$ and $p < 0.001$. In addition, the study also found that children prefer to express words through physical activity and gestures rather than just using gestures, $t(64) = 2.517$, $p < 0.001$ (Table 4).

4. Discussion

In addition, this study suggests that combining sports activities with task related vocabulary can lead to better learning performance in terms of suggestive recall.

As mentioned in the introduction, by combining sports activities with task related vocabulary, learners can benefit from both cognitive and physiological benefits. In addition to these benefits, children prefer to stay active and make gestures in the classroom. Multiple studies have confirmed the benefits of physical activity and the positive relationship between physical activity and academic performance (Palmer et al., 2013). This makes it an effective tool for developing cognitive content (Cichy et al., 2022), as games and exercise are important resources for children. Through this approach, attention (Carrillo-López et al., 2018) and learning motivation have been improved (Padial-Ruz et al., 2019). Specifically, the use of game and exercise based programs in English teaching can improve early learning of cognitive content, behavior, and health (Albaladejo et al., 2018). Further studies introducing similar intervention measures have also found that confirming the results of this study, the motivation and performance of vocabulary memory tests related to second language have been improved compared to traditional teaching methods.

Chinese primary school learners should further increase their English vocabulary learning, as researchers believe that vocabulary learning is a core part of English language learning (Lightbown & Spada, 2006; Cameron, 2001). In addition, the results of this study confirm that learning English in physical education courses is helpful in improving English vocabulary acquisition. Students enjoy imitating and displaying words in physical education courses (Padial-Ruz et al., 2019).

5. Conclusion

This study adopts a combination of motion imitation (upper limb gestures and lower limb movements) and multisensory methods to enhance students' interest and focus on learning content. The results confirmed hypothesis 1 that using physical education curriculum tasks can support English vocabulary acquisition in Chinese primary school environments. These results are consistent with previous research, indicating that classroom based physical activity plans, such as Energizers, are beneficial for academic performance, such as improving task behavior (Tomprowski, 2006), better memory function and reaction time, and can also be useful resources for teachers. Therefore, this interdisciplinary collaboration approach should be highly praised as an effective motivational method to promote the learning of English vocabulary for second language children.

6. Limitations

Teachers need to provide opportunities for interdisciplinary activities between disciplines, but implementing cross curriculum learning activities may encounter challenges. Before initiating, Wiseman (2018) suggests that teachers should preferably study the second subject, as it can be a waste of time. The integration of interdisciplinary sports and English requires systematic training for teachers and principals.

This study was conducted on a small scale, and future researchers can increase the sample size to study and discuss participants of different ages.

Data Availability Statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding authors.

Ethical

The research plan has been submitted to the institution used for research and has been ethically approved in accordance with the university guidelines. In this research project, all information will be collected using the ethical standards set by the Derby University Research Ethics Committee, the British Educational Research Association and the 1998 Data Protection Act. The participants provided their written informed consent to participate in this study.

Author Contributions

W-qs designed the experiment, participated in exercise intervention, collected and analyzed data, and wrote a manuscript. Q-yz participates in exercise intervention, design content, and analyze data. T-sp proofreading intervention content and analyzing data. H-ly and HH participated in the data analysis. All authors have reviewed the manuscript. The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Conflicts of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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