

Primary English Vocabulary Acquisition Based on Activity Theory and Multi-modal Learning—A Case Study on Power up 1 Textbook and PEP People’s Education Press Textbook

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Abstract: This study compares two English language textbooks, PEP Compulsory Education English Textbook Grade 1 (2023) and Power Up (2019) Level 1, to identify shortcomings in the teaching design of second language vocabulary acquisition and suggest improvement. Previous studies suggest that Knowledge Representation performs as the premise of vocabulary acquisition, and two representing approaches, Symbolic Representation and Embodied Representation, are widely used in vocabulary teaching. The derived Multi-modal Learning method, which uses multiple senses to promote memory, has also received attention and has been applied. This point is confirmed in both textbooks. To better study the whole process of vocabulary acquisition pretended in textbooks, this paper moves to Activity Theory, using the model of the Activity Triangle to describe and explain activities. With the method of Textual Analysis, three core elements - Subject, Object, and Community - appear in the same way in textbook use. However, compared to *Power Up 1*, the PEP textbook exhibits deficiencies in “rule” and “outcome,” leading to suboptimal learning effects. Further research needs to go beyond the text and introduce more methods to investigate the effects of the two textbooks to put forward more practical opinions and suggestions.

Keywords: vocabulary acquisition, activity theory, multi-modal learning, primary English, textbook.

1. Introduction

For speakers of other languages, textbook learning is one of the most important channels for learning English.

This study focuses on the unit of “animal” from two sets of textbooks: PEP Compulsory *Education English Textbook Grade 1 (Beginning of Grade 1)* (2023) and *Power Up* (2019) *Level 1*. The selection of these textbooks was based on the fact that *Power Up 1* was jointly published with Cambridge

Assessment English, while the PEP textbook is published by the People's Education Press, one of China's largest national educational publishers.

Vocabulary is a set of words, typically in a language or the set known to an individual. Recently, the word has already become a candidate for serious theorizing and model-building with linguistics. Teaching and learning vocabulary have aroused an increasing interest in language teaching just like grammatical competence, reading, and writing [1]. Therefore, the main focus is on the teaching design for vocabulary acquisition in the given textbooks and investigating the similarities and differences between them.

In terms of textbook research, the Activity Theory has been widely used to design and evaluate teaching methods and teaching materials and has proved to be effective. For vocabulary acquisition, it's acknowledged that Knowledge Representations are the premise to understand and memorize vocabulary and Multi-modal Learning is arousing more and more attention. This paper contrasts two textbooks (PEP and *Power Up I*) by using textual analysis to figure out the shortcomings and improvements in the existing textbooks for second language acquisition.

2. Method

The methodologies employed in this study include textual analysis, comparative study method, and literature review. Textual analysis is used to examine the content and structure of the vocabulary acquisition provided by *Power Up I* and the PEP textbook. The comparative study method is utilized to contrast the design and effectiveness of *Power Up I* and the PEP textbook. By comparing these two courses, the purpose is to identify their strengths and weaknesses in terms of language learning and vocabulary acquisition for children aged 6-8. In addition to these methods, a literature review is conducted to gather relevant theoretical frameworks and previous research findings related to language learning and vocabulary acquisition among young learners.

For the two material textbooks, *Power Up I* is a new course created by Caroline Nixon and Michael Tomlinson, jointly published with Cambridge Assessment English. Although not widely used in China, its design is at the forefront of development. The PEP textbook is published by the People's Education Press, one of the largest Chinese national educational publishers. It has been widely used in the Chinese primary education system. Both *Power Up I* and PEP textbook are specifically appropriate for children aged 6-8, a critical period for language learning and vocabulary acquisition. During this stage, children's cognitive development is rapid, so both materials are tailored to this developmental stage.

3. Multi-modal Learning

Knowledge Representation refers to the cognitive process in which the human brain encodes knowledge and extracts its meaning, providing a foundation for cognitive activities such as learning and memory [2]. It's proposed that there are two pathways in the human brain for concept processing—the Symbolic representation derived from abstract language symbol system and Embodied representation from sensory and perceptual experiences, leading to a dual-coding neural framework of human Knowledge Representation [3]. Specifically in the human brain, to represent the knowledge of an object like a “cat” (illustrated in figure 1), the Symbolic representation encodes complex relations among language symbols manipulated by grammar, including pronunciation, spelling, and word meaning of the word “cat.” Independent from language, the Embodied representation is directly related to aspects of sensory experience, like visual (seeing the appearance of cats), auditory (hearing meow), haptic (touching cats' soft fur), and other experiences. In the process of foreign language vocabulary acquisition, learners need to understand the lexical meaning through Knowledge Representation to realize further memory and learning, so Knowledge

Representation is the premise of vocabulary comprehension and memory [4]. Both patterns of representations are often applied in the vocabulary acquisition activity of humans, and this study will further utilize them to analyze the given textbooks.

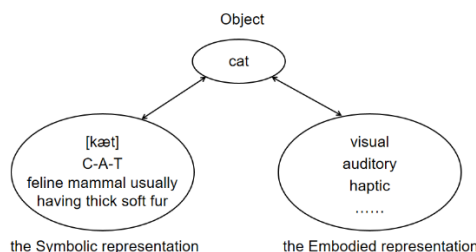


Figure 1: An example of “cat”.

On the one hand, Symbolic representation facilitates learners to quickly obtain the meaning of the learning materials [5]. During the process of vocabulary acquisition in traditional education, learners are taught to combine word meaning with pronunciation and spelling. To be specific, when studying the new word “happy,” students will learn it can be used to describe someone happy has feelings of pleasure, usually because something nice has happened or because they feel satisfied with their life (*Collins English Dictionary*). Then this meaning will be connected firmly with the spelling “H-A-P-P-Y” and the pronunciation /'hæpi/. In terms of second language acquisition, research shows that foreign language learners often use their native language as a Symbolic representation to achieve semantic acquisition of foreign words. For most beginners, the mother tongue exerts a major influence on the representation of the foreign language during the low proficiency stage of foreign language learning. Since this textbook are published by PEP which is designed for Chinese students in primary school, so on pages of the new word “horse” is followed by “马” (the Chinese expression for “horse”), which acts as the Symbolic representation to help students understand and memory. Such methods relied upon instructional approaches that favor text-based learning, which is sometimes referred to as factory methods, characterized by top-down management [6]. Therefore, Symbolic representation, as a convenient and prior approach to semantic access, helps learners quickly understand the meaning of a word for subsequent memorization.

On the other hand, Embodied representation promotes a deeper level of information processing and a better effect of memory retrieval. Nowadays, with the continuous development of education methods, educators are trying to add Embodied representations into language teaching, together with Symbolic representation to help learners better understand and remember new words. Thus, the Multi-modal Learning (MML) based on Multi-modal Theory is proposed and applied in practical teaching. Multi-modality refers to “the use of several representing modes in a symbol or event,” extending the Symbolic language representation to all modes of Embodied representations [7]. The MML uses text, images, videos, audio, gestures, body movement, and other modes to stimulate learners’ auditory, vision, touch, and other senses to strengthen learners’ memory. This view has been demonstrated by many studies. For instance, Liu conducted a teaching experiment for four months and proved that multi-modal vocabulary teaching has an impact on both short-term memory and long-term memory and obviously strengthens students’ short-term memory [8].

For example, compared with “foreign language and mother language,” the vocabulary teaching method of “foreign language and picture” is more conducive to children establishing the direct connection between vocabulary and semantics from the beginning [9]. There are textbooks using illustrations to mobilize the learner’s visual perception. And this method has already been popular on a large scale. Colorful illustrations are shown on pages presenting the object and meaning represented by the word. The combination of picture and text can give the pupils a more comprehensive and

profound understanding of the word, which also conforms to the internalization process of education from image to abstract [10]. *Power Up 1* certainly uses illustrations to aid teaching. Meanwhile, this series of textbooks makes efforts to connect new words with more perception symbols, not only visual sense, which is the embodiment of the multi-model system. The textbooks' authors try to design many kinds of teaching tools and interactive teaching processes to mobilize students' perceptions to participate in the process of vocabulary acquisition. In MML used in teaching activities under the guidance of *Power Up 1*, major contexts within course materials are presented in a variety of modes. Each mode plays a different role in the construction of the entity at hand. Each mode requires the pupils to do a different type of work to understand [11].

In the analysis part, unit 3 in *Power Up 1* is taken as an example. In the teacher's book, teachers are asked to take out flashcards that have animal pictures. Only one picture is concluded in one card. Students will not be provided with pictures at first. According to the sound mimed by teachers, students speak out the word. Then, the teacher will turn around the card to show the class with illustrations. At the end of this part, students are required to repeat the word and mime animals' noise. This circle continues going through all the new vocabulary of animals. In this situation, students can use visual perception to see animal illustrations and auditory hearing to receive animal sounds and then correspond to the pronunciations of new words. In this multi-modal teaching, students' visual and auditory senses work together. Instead of having simple language symbols consisting of English letters, learners can select or negotiate the meanings conveyed from different modalities to construct the conceptions. Embodied representation can provide deep and detailed language processing by using multi-modal information to access semantics, which is also of great significance for foreign language learning and is sensitive to cognitive processing. There is another example using multi-modal perception that is different from the one using both visual and auditory, as described above. In unit 3, when teaching about new adjectives "long" and "short," teachers are required to show a picture of Cameron's tail. Then, teach the new word "long" by using hands to indicate. Relatively, when talking about "short", the teacher needs to move their hands together. Students should watch the movements and follow the gesture then repeat the word. Currently, participants use gestures and visual senses to help them learn new knowledge. Performing gestures and body movements related to the learning material can enhance learners' comprehension and memory of language materials. In their cognition, learning materials are deeply and finely processed. Since the process of Embodied representation to access semantics through multi-modal information should be more complex, it will increase the encoding depth of semantic memory. Therefore, Embodied representation deepens the depth of vocabulary encoding and improves the visual recognition of vocabulary by using multi-modal information through perceptual simulation, thus promoting semantic retrieval at the recognition stage, and finally improving the effect of vocabulary learning implicitly.

The above analysis leads to the conclusion that *Power Up 1* effectively facilitated students' vocabulary acquisition sessions through multi-modal learning. Meanwhile, another set of textbooks, PEP, employ similar strategies to enhance vocabulary acquisition and reflect Multi-modal Learning as well. It will also provide another example to study the application of Multi-modal Learning in vocabulary acquisition sessions. In the PEP student's book, vocabulary acquisition is not distinctly segregated; Rather, it is included throughout the unit as an integral component across all pages. Many parts of it reflect Multi-modal Learning. Taking the "Let's Sing" section as the most typical example. In this part, the teacher first asks students to observe the hanging chart on the opening page in the student book and asks them, "What animal do you see?" and then guides students to answer, "I see a..." based on the animal mentioned by the student, such as a cat, the teacher then points to the animal in the picture and asks, "A cat?" leading the student to answer "Yes" or "No." Next comes learning the song. The teacher plays the song recording, guiding students to learn and sing the rhyme sentence by sentence, encouraging them to follow along. At this point, students can perform corresponding

actions based on the animal vocabulary they hear. The song is printed in the textbook, allowing students to see the words in the rhyme while listening. Additionally, the student book includes illustrations of animals whose movements students can mimic. This approach engages visual, auditory, and kinesthetic modalities to introduce, learn, and reinforce new vocabulary.

4. Activity Theory

Activity Theory, originally proposed and developed by Soviet psychologists such as Vygotsky, Leontyev, and later Davydov, is a comprehensive theoretical framework which describes human behavior, cognition, and learning processes. The theory emphasizes the socio-cultural context of human activity and regards activity as the basic unit of interaction between individuals and the environment [12].

Activity is the most basic and central analytical unit in activity theory. The task of figuring out the structure of activity runs through the development of Activity Theory. Vygotsky took the lead in putting forward “the activity structure of mediation” in his intermediary theory. Later, Leontyev clearly expounded on the concept of activity and discussed the elements of the activity system in detail to establish the overall framework of the activity theory [13]. In the late 1980s, Engeström formally put forward the Activity Triangle Model of the activity system, making it “an interdisciplinary framework for analyzing and studying different forms of human activity” [14,15]. Within the framework of the activity system (illustrated in Figure 2), the three core elements are subject, object, and community. Rules, mediating tools, and division of labor are seen as regulating parts as the secondary component. And the secondary components form the link of the core components [16].

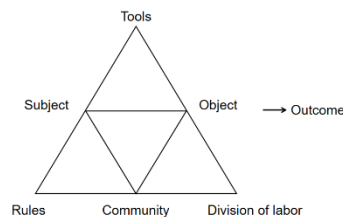


Figure 2: Activity Triangle Model of activity system [16]

This model is of great significance for analyzing and guiding various kinds of human activities and has wide application in areas such as human-computer interaction, information systems, organizational behavior, and education. In the field of education, this Activity Triangle Model of Activity System is widely used to design and evaluate methods in classroom teaching, second language learning, and so on. Sun and Liu apply Activity Theory to examine learning activities, which greatly promotes a deeper understanding of instructional design under the multi-element learning activity system [15]. The research analyzes Gamified Learning based on Activity Theory, which regards the knowledge transferred in the learning process as an activity of knowledge sharing and absorption initiated by the community [17]. These relevant studies discuss important elements in learning activities and figure out the role of teaching materials. From the perspective of Activity Theory, it can be concluded that textbooks not only serve as a tool for learning activities but also serve as a carrier of content and rules directing the learning activity.

Besides the above studies, which focus on the connection between activity theory and teaching activity, there are papers directly applying this theory to study teaching materials, even though the number is limited. Thomas lists four data collection instruments to analyze materials, which are interviews, classroom observation, student journals, and textbook content analysis [18]. In past

research, in order to better understand the actual effects of the teaching materials in the actual teaching, Rezat conducts empirical studies to analyze how students make use of their mathematics textbooks for practicing in the light of Activity Theory [19]. He applies the modified Activity Triangle Model to analyze the concepts of textbook use in detail and emphasizes the principal role of the students as the subject. Wu makes a detailed study of the current situation of the use of Chinese textbooks in elementary schools based on Activity Theory, providing some new ideas to improve the compilation of textbooks from two aspects of students and teachers [20]. Therefore, in view of the relevance of Activity Theory to the current situation of textbook research, it's reasonable to use Activity Theory to study English word acquisition activities under the guidance of the given two textbooks with the method of textual analysis.

Power Up 1 is consistent with research supporting activity theory. In practical teaching activities, which will be mentioned below, subjects are students and teachers who use *Power Up 1* as a textbook, and objects are knowledge and contents that should be mastered. As for community, it can be divided into teacher-student community and student-student community. Such communities have two basic functions: social and knowledge exchange.

A task in unit 3, *Fun on the Farm*, is an example. The teaching objective of the vocabulary session in this unit is to remember the names of animals. After the conventional process, during which the meanings and pronunciations of new words are taught by the teacher, the authors of *Power up 1* design another mission, which requires students to draw their animals and then mime sounds. Based on sounds, other students attending the class should guess the name and call it out. If they are correct, they will receive positive feedback "yes." While doing this activity, participants' cognition can be developed through interaction within the student-student community. Under rules from textbooks or teachers, subjects use various kinds of tools, such as symbols and sounds, to take part in this activity and integrate with other learners. Students who are involved in this mission act as different divisions of labor. Their memories of new vocabulary can be deepened, and teaching objectives will be achieved more effectively and efficiently. In the next sequence of vocabulary teaching, new adjectives are introduced. Based on the first stage of the mission, the second stage is designed. Before students can start taking the mission, rules are also clearly made by student textbooks and teachers' guidance, which helps learners better understand the goal of the activity [15]. Students should mingle in the classroom and ask classmates questions about the characteristics of animals. children who are asked are required to provide clues for guessing. They need to use these new adjectives to describe animals, which they draw on their paper in the first stage. Through this mission, students can review new vocabulary. Additionally, according to psycholinguistics provided by Vygotsky, such guided social interaction occurring in collaborative learner-learner interaction allows learners to creatively use language they have just learned for a variety of purposes. Such interaction allows more flexibility in language use than is evidenced when learners are on display in front of classmates, whether in performance or when answering questions posed by their teacher [21].

Additionally, there is another point which deserves attention. At the end of two missions, *Power Up 1* provides learners with an evaluation form. This process can be considered as an embodiment of evaluation rules, a part of the element "outcome" in the Activity Triangle. Students are asked to do a self-assessment based on their feelings, choosing a smiling face on behalf of "hooray" or a crying face on behalf of "try again." In evaluation rules, learners can get the opportunity to strengthen their sense of control over the activity and better conduct feedback activities, which can enhance their sense of autonomy.

In the section design where activity theory can be embodied in PEP, the three core elements - subject, object, and community - are the same. However, when compared to *Power Up 1*, the PEP student's book exhibits deficiencies in rules, leading to suboptimal outcomes. Students using PEP experience a reduced division of labor relative to teachers, potentially diminishing their engagement

with the subject matter and autonomy. Conversely, *Power Up 1* offers a better distribution of labor in line with the characters of students and teachers to improve the effectiveness of activities.

PEP textbook adheres to a consistent structure with three lessons. Each lesson is further divided into two to three sections, with each section title serving as a directive for students, such as “Listen and Act” or “Let’s Play.” These prompts are designed to facilitate vocabulary acquisition through interactive activities. Regrettably, these directives are terse and ambiguous, relying solely on terms like “act” and “play” to convey instruction without providing clear guidance on the intended activity. Even with accompanying illustrations, students may struggle to decipher their role without explicit teacher guidance derived from the teacher’s manual. In essence, only the teacher, armed with the teacher’s manual, is cognizant of the impending vocabulary acquisition exercise congruent with Activity Theory. In this case, if teachers can’t get access to the teacher’s book for class, then the original teaching purpose that the textbook designer wants to achieve through the activity will not be able to achieve well.

This necessity of intertwining the student’s book with the teacher’s manual underscores the limitations of PEP concerning the “rule” element of Activity Theory. This approach starkly contrasts with *Power Up 1*, which explicitly outlines classroom instructions for students within the student’s book itself. The teacher, utilizing the teaching suggestions in the teacher’s manual, merely needs to orchestrate a more effective execution of the textbook instructions. As well as providing detailed instructions, *Power Up 1* simultaneously preserves a substantial degree of learner autonomy in vocabulary acquisition. The rules pertaining to PEP are predominantly articulated in the teacher’s manual. For instance, in Lesson 1 Part B “Listen and Act,” the teacher’s manual clarifies that this segment aims to forge connections between word sounds and meanings through the “listen and perform actions” activity, thereby reinforcing new vocabulary. Moreover, the teaching advice suggests that this portion necessitates the teacher to instruct students in a game involving listening to commands and acting accordingly. Through physical actions, teachers help students grasp phrases like “Act like a ... (animal),” guiding the class through corresponding motions. Once students comprehend such commands, they should engage in group activities, where one student issues commands related to the six animals studied in the unit, while the other three execute the movements and recite the animal names. The teacher circulates to offer guidance.

Lastly, the “outcome” element of Activity Theory, namely feedback, is entirely absent from the PEP student’s book, whereas *Power Up 1* overtly incorporates a feedback section within the student’s book.

5. Conclusion

In today’s educational environment, Symbolic representation and Embodied representation are both used for vocabulary acquisition. Compared to *Power Up 1* in which symbolic representation is rare, the PEP textbook uses this method more frequently.

Multi-modal Learning (MML), characterized by Embodied representation, has already become an undeniable trend in education. When students are driving their learning, multi-mode can benefit them, for such modes can serve to deeper learning and improve retention of key concepts. Since the process of using information gathered from different modes to get access to semantic understanding is very complex, encode depth will be deepened, and memory retrieval will be easier. Those effects are important in vocabulary acquisition. Combinations of different perceptions, such as videos, audio, illustrations, and gestures, are very common in both *Power Up 1* and PEP textbooks.

As for activity parts, it is possible to find that the authors of the two textbooks are aware of the importance of designing such a teaching process to strengthen and extend the outcome of the study. However, when the Activity Triangle is used to transfer the components of the actual teaching fact, as mentioned above, the activity presented in *Power Up 1* makes a better division of labor and shows

clear rules, which will result in the teaching effect with high quality. In the textbook published by PEP, due to the ambiguous instruction words, students will not have access to know what they should do and what kind of roles they need to play in the activity. In this situation, classes are oriented by teachers and the autonomy of students. Because of this, in further editions of textbooks, the “rule” of activity needs to be figured out for all participants in teaching activities. What’s more, a more scientific feedback process can be used to evaluate the outcomes of activities, which can provide a reference for further improvement of activity design.

This paper focuses on teaching processes presented by textbooks and does text analysis in light of Multi-model Learning and Activity Theory. However, it is not possible to truly evaluate the functions of text until the performance in the classroom is investigated. Because the use of text is a complex social process in which a book, an institution, and many people are intertwined and cannot be separated. In future research, more surveys and experiments need to be conducted to get authentic results and related data. Only under these premises can scientific suggestions and plans for revision and improvement be provided for textbooks.

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