Integrating the 5E Instructional Model with Vygotsky's Sociocultural Theory: Vocabulary Learning through Story-Based Instruction to EFL Libyan Year One Students

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استخدام نموذج 5E التعليمي مع نظرية فايقوتسكي الثقافية الاجتماعية لتدريس مجموعة من المفردات الإنجليزية باستخدام قصة لطلاب الصف الأول

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Abstract

This study aims at investigating whether an intervention based on reading the story *The Rainbow Fish* aloud to students and formulating intervention lessons based on a combination of the 5E teaching model and the principles of Vygotsky's sociocultural theory would enhance the vocabulary knowledge of one class of Year One students studying English at an Montessori House International School in Benghazi. The instrument of data collection was a test used as both a pre-test and post-test to measure the students' vocabulary knowledge before the intervention and after. The quantitative results of this study revealed increased mean scores; moreover, paired sample t-test analysis further indicated that the effects of the intervention were statistically significant. Also, the correlation between the scores of both tests indicated that all students improved regardless of their vocabulary knowledge before the lessons. The results attained from this study highlight the effectiveness of using the 5E teaching model and sociocultural principles in teaching English to younger learners. This study concludes that using story-based teaching, social interaction among learners and active learning leads to vocabulary recall in younger language learners.

Keywords: 5E teaching model, sociocultural theory, story-based instruction, vocabulary learning, young language learners

الملخص

الهدف من الدراسة هو التحقق فيما إذا كان التدخل التربوي المبني على استخدام خطوات نموذج 5E التعليمي ومبادئ نظريه فايقوتسكي الثقافية الاجتماعية لتصميم دروس تم تطبيقها على قصته "سمكة قوس القزح" واستخدمت لتدريس طلاب

يدرسون بالصف الأول في مدرسة مونتسوري هاوس الدولية بمدينة بنغازي. لتجميع البيانات لهذه الدراسة كانت الأداة المستخدمة اختبار قبلي وبعدي وذلك لقياس معرفة الطلاب بمفردات القصة قبل وبعد الدروس المصممة. من خلال تحليل البيانات إحصائياً تبين زيادة متوسط الدرجات. كما بين اختبار T أن الدراسة كانت لها دلالة إحصائية عالية مما يثبت فعاليتها. كما أن قياس الارتباط بين درجات كلا الاختبارين القبلي والبعدي أوضح تحسناً ملحوظا لدي الطلاب في معرفتهم للمفردات بغض النظر عن مستواهم قبل البدء في الدروس. يستنتج من هذه الدراسة أن استخدام النظريتين لتصميم دروس باستخدام دروس القصص طريقة فعالة لتمكين الأطفال من تعلم مفردات باللغة الإنجليزية.

الكلمات الدالة: نموذج 5E التعليمي، النظرية الثقافية الاجتماعية، التعليم القائم علي القصص، السرد القصصي، تعلم المفردات، طلاب لغة صغار السن، بنغازي

Introduction

Learning a second or foreign language requires working on the four language skills of listening, reading, speaking and writing, in addition to, learning and practicing grammar. However, without sufficient vocabulary, language students find themselves unable to express their ideas, thoughts and feelings (Rivers & Nunan, 1991; Laufer & Nation, 1999). Wilkins (1972) stresses the superiority of vocabulary over grammar arguing that language learners will not be able to communicate with only grammatical knowledge; Vocabulary is needed for successful communication (Lessard-Clouston, 1994). Schmitt (2010) further prioritizes vocabulary by noting that learners keep dictionaries at hand. Furthermore, in early literacy, vocabulary is essential for reading comprehension and language learning success. Lee (2011) in a longitudinal study of over a thousand participating 2-year-olds studied the impact of expressive vocabulary at that age on later language literacy. Through the following 9 years, it was found that the size of vocabulary predicted later language and literacy outcomes until the fifth grade. Dujardin et al. (2023) also found that vocabulary depth influenced reading proficiency in children ranging in age from 7 to 10. The findings of these studies highlight the vitality of implementing vocabulary that is innovative and effective particularly in younger aged children when literacy skills develop.

Despite the important role of vocabulary development in early education being established through literature, there remains a need in the Libyan EFL context for innovative methods for teaching vocabulary (Louka, 2020; Mohamed, 2017; Abdussalam, 2016). Little research had sought to implement innovative educational approaches for teaching English vocabulary. This research seeks to combine the 5E model with sociocultural principles to teach English vocabulary to Year One students through story-based instruction within a Libyan setting. This paper holds significance because it addresses a critical gap with educational research in Libya; since it provides evidence on the effectiveness of implementing the 5E model combined with the principles of Vygotsky's sociocultural theory in an EFL setting at a Libyan primary school.

Literature Review

The significance of vocabulary knowledge in the process of learning a language cis widely acknowledged, since it serves as the fundamental building block for both effective communication and comprehension. However, traditional vocabulary teaching methods often rely on memorization, a technique that can be tedious and ineffective for long-term retention. Louka (2020) investigated the vocabulary teaching strategies at primary schools in Zawia and found them to be weak due to limitations such as large class numbers, lack of teacher training and the absence of teaching aids. During the research, teachers acknowledged the vitality of using teaching practices that are innovative but lacked implementation support. Mohamed (2017) also explored the vocabulary teaching techniques used by primary school teachers in Sabha. He concluded that teachers relied heavily on simple methods such as spelling or reading. Spencer et al. (2024) found that integrating vocabulary teaching with story-reading intervention significantly

improved vocabulary retention for year one at risk students who are experiencing language-based reading difficulties. These findings align with the broader research literature that advocates for contextualized vocabulary instruction. Thus, this research strives to test the effectiveness of using the 5E teaching model combined with sociocultural scaffolding and a story read-aloud to teach a number of 15 words to a class of 24 students at an international school in Benghazi. The theoretical framework of this study will be discussed followed by a discussion of a number of relevant research studies.

In the middle of the 1980s, the Biological Sciences Curriculum Study developed the 5E teaching model to be used in elementary schools. It was created to foster student active engagement in STEM education (Bybee & Landers, 1990; Bybee et al., 2006). The 5E model distinguishes five subsequent phases which are *Engage*, *Explore*, *Explain*, *Elaborate* and *Evaluate*. In the *Engage* phase, the students' prior knowledge is activated and they are engulfed in the new concept. In the next phase, *Explore*, the students investigate and experiment with the concept. During the *Explain* phase, the students articulate what they have learnt and are guided by the teacher. In the fourth phase, the students Elaborate on what they have learnt by applying these new concepts to new situations to create deeper understanding. In the final Evaluate phase, both the students themselves and the teachers assess understanding and newly learnt skills. Although the 5E was created for use in STEM, it can be adapted in other sciences due to its emphases on active student-centred learning (Bybee, 1997). Melgarejo et al. (2024) studied the effect of the 5E instructional model on secondary students' meaningful learning in science and technology. This study found that the structured phases of the model represented by 73% post-test gains in the *Explore* phase and 77% gains in the *Explain* phase, led to the construction of active knowledge cementing the usefulness of utilising this model in education. These findings though from the fields of science and technology suggest the potential of the 5E model for story-based vocabulary instruction by systematically scaffolding conceptual understanding.

Abdulbaqi (2024) studied the effects of using the 5E model on the motivation and vocabulary acquisition of 100 fifth- graders studying English as a foreign language in Iraq. The participants in this study were divided to a control group and an experimental group; the prior group was taught English skills using traditional methods whereas the latter group was taught lessons based on the 5E model. At the end of the study, the researcher found significant improvements in the motivation and vocabulary levels of the experimental group compared to the control group that showed less development. Septiana (2024) conducted an experimental study on 61 Indonesian students studying in grade 8. The study aimed at investigating the effectiveness of using the 5E teaching model on the students' reading comprehension. The researcher divided the participants into a control and experimental group. After teaching both groups, the researcher found the experimental group which was instructed using the 5E model demonstrated significant progress in their reading skills including the ability to infer vocabulary meaning from context. These research findings provide positive evidence towards incorporating the 5E model in language teaching. However, research literature lacks similar research in the Libyan setting leaving a gap for research to be conducted.

Vygotsky highlighted (acknowledged) the roles of both the social and cultural contexts in the learning process in his sociocultural theory of cognitive development. He explained that cognitive development results when a learner interacts with people who have knowledge more than them; This process happens at what he refers to as the *interpsychological* level. Then these cognitive functions are internalized by the learner which occurs on the *intrapsychological* level. Vygotsky also referred to the Zone of Proximal Development (ZPD) which he explains is the divide between what the learner can get done by himself and what he can do with the guidance

from more knowledgeable people. Within the ZPD, teachers, parents, or adults provide the child with support (*scaffolding*) which enables him to complete activities that go beyond his current capabilities and later become part of his capabilities and knowledge (Saville-Troike, 2012).

In this research, the 5E teaching model and Vygotsky's sociocultural theory are combined to teach vocabulary through story-based lessons. This approach draws on the 5E's structured process and Vygotsky's focus on social interaction and guided learning to provide a complete approach that fits the needs of Libyan classrooms, where interactive, learner-centred methods are rarely used (Louka, 2020; Mohamed, 2017).

The story *The Rainbow Fish* is chosen in this research to be read-aloud to students presenting a context for introducing and discussing words new to the students. Stories make infer meanings and remembering words easier for students through repeated encounters of these words in a coherent context (Klaewharn et al., 2017). This approach also enhances the learners' motivation and positive attitudes toward language learning by making lessons enjoyable (Ellis & Brewster, 2014). Additionally, storytelling encourages both explicit and incidental vocabulary learning, allowing students to acquire words through direct instruction as well as through exposure to language in use. The interactive nature of stories, often accompanied by activities such as role-play and retelling, allows learners to practice and internalize new vocabulary, fostering deeper understanding and long-term retention Research shows that story-based instruction leads to significant improvements in vocabulary mastery compared to traditional teaching methods (Klaewharn et al., 2017).

A myriad of studies have studied the effectiveness of using stories as a tool for teaching vocabulary including a study by Abasi and Soori (2014). The participants of this study were 20 kindergarten children in Iran. The study was a quasi-experiment comprising of one group. The researchers used a pre-test and post-test to measure the difference of the students' vocabulary knowledge before and after storytelling. The study results revealed that students performed better in the post-test. Thus, providing the effectiveness of storytelling in vocabulary teaching. Furthermore, Soleimani and Akbari (2013) studied the effect of storytelling on two classes of Iranian preschool children. Their study was a quasi-experimental one. Also, despite the two classes being from two schools, the independent variables represented by the teacher, the materials and students' level were the same. The students were first given a pre-test of 30 picture cards. Next, the teacher read the story in 5 sessions. Then the pre-test was administered. A paired t-test of the data revealed that storytelling has a positive effect on vocabulary learning. In another study by Hartati and Ardila (2020) that sought to investigate the effect of reading fables on the vocabulary learning of 33 grade 8 students at a school in Indonesia. A total of ten fables were read to the students. A written pre-test and post-test were administered. The results of this quasi-experiment further proved the effectiveness of using storytelling on vocabulary learning. Also, Farizawati (2016) compared between using storytelling and memorization on the vocabulary learning of fifth grade Indonesian students. The students were divided into a control group who were asked to memorize a list of words. The experimental group read or listened to stories. A pre-test and a post-test were administered to gage the students' understanding of 50 words. A t-test analysis found that the experimental group demonstrated significant improvement that exceeded the improvement of the control group. In conclusion, the cumulative body of evidence from a diverse range of educational settings suggests that student-centered, context-rich methodologies such as the 5E model with sociocultural scaffolding and storytelling are systematically more effective than rote memorization when it comes to helping students retain vocabulary over the long-haul, and yet, the lack of research coming from Libyan classrooms points to an imminent

need for empirical inquiry that can inform the shape of ESL pedagogies in similarly under resourced settings in the future.

Methodology

This is a quantitative research with a quasi-experimental design that uses a pre-test and post-test to measure the effectiveness of using intervention to teach vocabulary to a primary one class of Libyan students. It strives to answer the following question.

Q: Does the use of the 5E instructional model combined with Vygotsky's sociocultural theory and story-based instruction enhance vocabulary learning among Year One students?

The participants in this study were one class of Year One students studying at Montessori House International School in Benghazi. The method of participant selection was convenience sampling due to one of the researchers being the class teacher. The children were six and seven years old. The instrument of this research was a vocabulary test comprising of 15 vocabulary words taken from the story *The Rainbow Fish* written by Pfister. For each word, a prompt was given followed by three pictures. One researcher administered the test to all 24 students separately giving all students 15 minutes to complete the test. The reason for having one researcher conduct all tests is for reliability reasons. Also, the presence of the researcher was to ensure that all the students were able to read the prompt, and she provided assistance in reading when needed to ensure comprehension.

Intervention Design

The tests and implementation of intervention required ten lessons in total, two lessons per week for five weeks. The intervention was designed following the 5E instructional model integrated with the principles of Vygotsky's sociocultural theory including scaffolding, social interaction and collaborative learning.

- Lesson one: One of the researchers administered the pretest to all 24 students and recorded the answer in a premade form.
- Lessons two and three (Engage): The researcher introduced the story *The Rainbow Fish*, showed the cover photo and asked questions to elicit the children's predictions of the story. This activated the children's prior knowledge and encouraged social interaction among students. Next, the researcher read the story and introduced the vocabulary words using digital pictures with the words written beneath those pictures. Then the researcher gave simple definitions for the vocabulary words followed by a new example sentence providing a new context for each word. Later, Finally, the researcher led a guided class discussion about sharing and friendship which are the themes of the story. The class discussion reflected Vygotsky's emphasis on learning through activating the Zone of Proximal Development.
- Lessons four and five (Explore): The researcher read the story again to reinforce vocabulary and used the flashcards. Next, the researcher divided the class into small groups and asked them to write a list of descriptive adjectives they have learnt from the story. The researcher provided spelling support and guidance as the groups worked. Then the class created a poster with Rainbow Fish in the middle surrounded by all the adjective vocabulary that the children had written. This activity allowed for peer collaboration and scaffolded learning which is consistent with Vygotsky's theory.
- Lessons six and seven (Explain): The research read the story and reviewed vocabulary flashcards. The researcher elicited sentences from the students where words were used in

new contexts thus cementing their understanding and use of these words. The children were then given worksheets that required them to illustrate the vocabulary in drawings. Sentence strips were given to groups of students with the vocabulary words missing. The students collaborated to supply the missing words while the researcher went around providing support when needed. The activities in this phase facilitate the internalization of language reflecting Vygotsky's notion of moving from external social speech to inner speech.

- Lessons eight and nine (Elaborate): The researcher divided the students in pairs and groups of three and had them act out small scenes from the story using their own language and the words they have learnt. The children also used coloured paper cutouts and foil to glue scales on a work sheet of the Rainbow Fish and wrote two sentences describing the fish. The class practiced authentic language use in a social context in this phase.
- Lesson ten (Evaluate): The researcher administered the post-test assessing the students' vocabulary following the intervention lessons.

Findings and discussion

The marks the students got in both pre- and post-tests were analyzed statistically using SPSS. The results in table 1 demonstrate the paired sample statistics. The enhancement from pre-test mean of 3.46 (SD=1.59) and post-test mean of 14.13 (SD=0.90) suggests that, when considered collectively, students grabbed a great deal of vocabulary as a result of the ten-lesson intervention. This shift also means that a mix of the 5E instructional model (Engage, Explore, Explain, Elaborate, Evaluate) alongside Vygotsky's theories of sociocultural learning (scaffolding, collaborative work, and the zone of proximal development) were able to effectively close the gap in the students' initial vocabulary knowledge and *The Rainbow Fish* target vocabulary.

The change in standard deviation from 1.59 (pre-test) to 0.90 (post-test) indicates that after instruction, students' scores had a higher mean and were more closely bunched together. In other words, the children begun with varied levels of vocabulary knowledge initially, but by the end of the intervention, students not only possessed a greater lexicon, but did so in a more standardized manner. This suggests that the scaffolded, interactive group activities (poster-making, role-playing, and small group sentence completion) were successful in aiding learners of all levels.

Table 1

Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Pre-test	3.46	24	1.587	0.324
Post-test	14.13	24	0.900	0.184

As shown in Table 2, there is a Pearson correlation of r = 0.293 (p = 0.165) between pre-tests and post-tests. Although positive, the correlation is not strong or statistically significant; the following has two important implications:

1. Equitable Gains regardless of Starting Point

Because p value, we have no evidence that students with more knowledge of vocabulary or academic language benefited from the intervention more than their peers with less knowledge of vocabulary at the beginning. Practically, this suggests that the design of the intervention was inclusive of all student levels; All students—novice and relatively more knowledgeable—gained approximately the same advancement of vocabulary.

2. Intervention—not prior competence—resulted in improvement

The weak, non-significant correlation suggests that the conditions of the intervention (story read-aloud with collaborative guided scaffolding) acted as a "levelling field." In fact, students who scored near the bottom at the beginning of the intervention made very strong gains, which provides evidence that structured tasks mediated socially can offset the cognitive strain of knowledge disparity

Table 2

Paired Samples Correlations

	N	Correlation	Sig.
Pre-test & Post-test	24	0.293	0.165

Table 3 provides the results of a T-value that is substantially large in absolute terms along with $p < 0.001$; these combine to suggest that the mean increase in vocabulary scores will be very unlikely to be due to chance effects. In the language of statistics, we can be more than 99.99% confident that the change was due to the intervention—the change was not the result of purely random variation.

A mean improvement of -10.67 points on whatever metric the test used constitutes a very large effect size. Such a large effect indicates this specific combination of 5E activities and sociocultural scaffolding is very powerful for early vocabulary learning.

Table 3
Paired Sample Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. D.	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre-test – Post-test	-10.67	1.579	0.322	-11.333	-10.000	-33.097	23	0.000

Key Trends and Patterns

1. Scaffolding Fostered Similarity: The reduction in score spread (lower SD) signals that teacher-mediated scaffolding (e.g. class discussions, provision of spelling support during work in

groups, in-the-moment feedback while co-completing sentences) worked to bring lower-performing students up to the point where they are at parity with their classmates. Vygotsky's notion of the Zone of Proximal Development (ZPD) asserts that appropriate support allows students to achieve a task just beyond their independent level; the data reflects exactly this level of support.

2. Social Interaction and Collaborative Learning: Each of the three phases (Explore, Explain, Elaborate) relied on students working in peer groups (listing adjectives together, co-creating a vocabulary poster, and acting out scenes from a story as small groups). The similarity in post-test scores indicates that these social interactions involved more than just engaging students: they allowed for co-constructions of meaning to take place and allowed weaker students to "borrow" the linguistic resources of their more advanced friends until the time where they possessed these resources as their own, in line with sociocultural theory.

3. Iterated Experience and Multimodal Reinforcement: The intervention repeatedly dealt with the same story across each phase (Lessons 2/3, 4/5, 6/7). In each phase, students could engage with new tasks (e.g. flashcards, drawing, dramatic play). Such iterations and multimodal experiences in encoding vocabulary (visual-verbal-kinaesthetic) were likely avenues to strengthen memory traces and deepen the semantic understanding in the story, consistent with research which demonstrates that multi-coded experiences enhance retention (Mayer, 2005).

Moreover, Cohen's d was calculated because it quantifies the magnitude of the intervention on vocabulary learning rendering it vital to contribute to evidence-based instruction.

$$\text{Cohen's d} = \frac{\text{mean of the difference}}{\text{standard deviation of difference}}$$

$$\text{Cohen's d} = \frac{10.667}{1.579} = 6.76$$

The intervention using the 5E instructional model and the sociocultural principles demonstrated exceptionally strong efficacy (d= 6.76) greatly exceeding conventional thresholds for large effect sizes (d > 0.8) and demonstrating dramatic improvement in vocabulary retention after the intervention. The standard deviation of differences (1.579) is relatively low compared to the mean gain (10.667) indicating consistency in the students' responses and all students benefiting from the intervention regardless of their background knowledge of vocabulary. These effect sizes exceed established benchmarks (Lipsey et al., 2012) demonstrating a potentially replicable approach to vocabulary instruction.

Ethical Considerations

Before data was collected, permission was asked from the school administration. Confidentiality and anonymity were guaranteed by assigning numbers to the students instead of using their actual names. Moreover, two mothers have willingly agreed to publishing pictures of their daughters in this article. These pictures are in the appendix.

Limitations and Future Research Considerations

1. Absence of Control Group: without a non-intervention comparison group. It is impossible to account for all gains solely to the 5E model and sociocultural design. Maturation, test-retest effects or novelty may contribute. To identify treatment effects, future research should employ random assignment to intervention versus control groups.

2. Short-term Measurement: immediately after Lesson 10, the post-test was given. If vocabulary gains decay over time (e.g., a delayed post-test 1 month after initial instruction), longer term retention would demonstrate whether or not the new knowledge was recalled.

3. Dependence on a Single Story: although having The Rainbow Fish helped ensure consistency, it is not known whether the same intervention structure would have made the same contribution with a different narrative or content theme. Possibly, next research will examine the effects of a few stories or themes as a whole comparison to for themselves (ex. story relevance for students, cultural familiarity) prohibiting with vocabulary outcome measurement.

4. Restricted to vocabulary instruction: it would be interesting to apply the phases of the 5E educational model and the sociocultural principles in teaching other language skills and testing their effectiveness.

In conclusion, Quantitative results —distinctly higher post-test means, and a highly significant paired-samples t-test—all indicate that the combination of 5E model with scaffolding based on sociocultural theory and story read aloud are successful in facilitating vocabulary learning among young EFL learners. The pre-post correlation further suggests that this method would be equally beneficial to students of all levels, through its use of collaborative, multimodal, and scaffolded tasks. This is promising but the study lacks a control group and without delayed testing to justify wider generalization. Future research should explore these barriers to help confirm and expand the current research.

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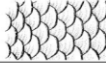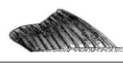
Appendix 1: A sample of the flashcards used

Appendix 2: Pictures of two of the children during the lessons

Appendix 3: A sample of the pre- and post-tests

Which picture shows something that could glide?

Which picture shows something that might shimmer?

Which picture shows someone that looks shocked?

Which woman do you think looks wise?

Which picture shows the word admire?

Which picture shows scales?

Which picture shows a peculiar hat?

Which picture shows an ocean?

Which picture shows something that can be a possession?

Which picture shows a delighted person?

Which picture shows the word emerge?

Which picture shows a mum tucking her son?

Which picture shows the word disappear?

Which picture shows a person glaring?

Which picture shows something made from silver?