

Embodied Cognition in Narrative Comprehension: A Multimodal Approach to Literature Education for L2 Learners

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ABSTRACT:

The comprehension of narratives in second-language (L2) learning requires the integration of language, context, emotion and embodied experiences. Traditional textbook teaching of literature, however, more focuses on language analysis, gives little opportunity for students' sense, body and multi-modal construction of meaning. The goal of this study is to analyze the effectiveness of an embodied cognition-based multimodal framework to improve L2 learners' comprehension of a story in L2 literature. The proposed solution will combine literary texts, gesture based activities, visual representations, narration by audio, role play, spatial interaction and digital multimodal resources to create a linkage between the linguistic expression and sensorimotor experience. L2 learners are allocated to two types of embodied learning conditions: conventional and multimodal, and their comprehension of narration is tested by using plot understanding, character and emotion interpretation, inferential comprehension, vocabulary retention, and narrative recall tests. Pre- and post-assessments are used to assess learning performance changes, and structured questionnaires and classroom observations are used to examine learner engagement and cognitive involvement. The framework would be expected to reinforce mental imagery of language events and to enhance language, action, emotion, and context connections. Comparative analysis is adopted to see whether the embodied multimodal teaching forms significant difference with the traditional teaching based on text, regarding literature teaching. The study offers a pedagogical model integrating embodied cognition theory in the field of multimodal language learning and its potential implications for better understanding of a narrative, recalling the vocabulary, student engagement and meaningful interpretation of literary texts in L2 education.

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1. Introduction

The acquisition of linguistic elements (vocabulary and grammatical features) and the understanding of meaning, feelings, context and complex discourse in second language (L2) learning is not only learning of these elements, but also learning that encompasses understanding [1]. Literary work can be a good learning context for developing these skills because it provides a context for authentic language use, multiple interpretations, and context-related meaning. Narrative comprehension, however, can be especially difficult for L2 learners because the ability to make sense of the narrative demands that the learners have to combine linguistic information with background knowledge, make inferences about the intentions of the characters, understand how emotions are expressed in the narrative, understand the order of events, and build a coherent mental image of the narrative [2]. Literature instruction only emphasizes reading and translation, as well as literature explanation and analysis of words, may not be able to support these multi-dimensional processes. An alternative theoretical approach to conceptual understanding of meaning construction is embodied cognition. Cognition, unlike an abstract mental process, is tightly linked to perception, action, feeling and interaction with the environment, as embodied cognition claims [3]. Narratives that involve movement, space, object, sensation and emotion can evoke in the reader's mind past sensorimotor experiences of the learners. Comprehension, then, is an active process, the complexity of which is comprised of linguistic information being linked to perceptual and experiential representations [4]. The links could be a useful resource for L2 learners who may not have the linguistic ability to deal with the meaning of expressions that are not familiar to them, and complex narrative contexts.

This philosophy is also evident in multimodal learning, which involves and considers information in different representational forms, such as word, picture, spoken language, hands-on, movement, video and interactive digital [5]. These modalities can overcome the literature reading education that is text centered, so that

literature reading can be experienced as a learning process. For example, a visualisation can be used to assist with a narrative set and to encourage learners to think about spatial relationships and actions, an audio narration can help with pronunciation and emotional interpretation, gestures can be used to show actions and spatial relationships, and role play can be used to help learners experience the interactions of the characters [6]. Learners can engage in these activities in a systematic way with literary texts, which can lead them to have more vivid representations of the actions of the story and enhance their language comprehension. The combination of the two approaches, namely the embodied approach and the multimodal approach to L2 literary narrative comprehension has not been studied well yet in the field of L2 literature comprehension [7]. Existing educational practice tends to use the use of multimedia as a supporting material but not explicitly related to bodily cognition. In addition, there were no linear relationships between increases in general language proficiency and understanding of the narrative. Hence, specific dimensions like plot understanding, inferential reasoning, interpretation of character and feelings, retention of vocabulary, and recall of narrative need to be systemically evaluated [8].

The construction of these relationships and their connection to understanding the potential of embodied multimodal teaching as an educationally valuable method besides being more engaging in the classroom are relevant. Accordingly, this study proposes the model of L2 narrative comprehension related to embodied cognition, and a multimodal education model for literature education [9]. This research suggests a multimodal education model for literature education with embodied cognition, which is used to boost L2 learners' narrative comprehension. The framework combines literary reading, visual representation, audio narration, gesture interpretation, role play, and spatial interaction and digital multimodal activities [10]. Pre and post assessment of learners who undergo the proposed intervention are compared with those who undergo the

conventional learning using text-based. The following areas of comprehension of narrative are assessed: Plot Understanding, Character/Emotional Interpretation, Inferential Comprehension, Vocabulary Retention and Narrative Recall with learner engagement also measured through questionnaires and classroom observations [11]. This study's major contribution is the application of the theory of embodied cognition and multimodal literature pedagogy that is integrated into an orderly instructional model especially designed for L2 narrative learning. The proposed approach goes beyond simply offering multimodal resources to go along with the language, to establish relationships between language, body, sensory, emotion, and context of the story [12]. The study thus aims to find out if this embodied multimodal teaching can help in the deeper processing of the narrative, language retention, and an active involvement with the literary text. The results can provide some ideas about how to enable more interaction and cognition literature-learning environment in L2 teaching in practice.

2. Related work

The field of second-language (L2) narrative comprehension has shifted from a text-based approach to a cognitive, multimodal, and experiential approach to L2 learning. In order to understand a narrative, the learner must process the words, grammatical structures, context, cause-effect, character motives, feelings and the events of a story. L2 learners' limited vocabulary and linguistic competence may make it more difficult for them to form a coherent picture of a literary narrative [13]. Thus, recent pedagogical practice has focused on new strategies that offer more perceptual and contextual assistance for the comprehension of literature.

2.1 Embodied Cognition in Language Learning

Embodied cognition proposes that language understanding is based on the interaction of perceptual, motor, emotional and cognitive systems. As learners read words or sentences representing actions or objects, or spatial relationships or emotions, they can imagine what

they would feel or do or see if it were their very own [14]. In the L2 education, gesture, physical motion, object manipulation, and action learning have therefore been investigated as ways in which associations between linguistic forms and their meanings can be strengthened in L2 education. For example, gesture-supported vocabulary instruction can give students visual and motor representations that can help encode and retrieve the word. The embodied perspective is important in the comprehension of narratives, in which movement, spatial settings, interpersonal interactions, sensory experiences and emotional reactions are often described. Featuring them in a physical representation of the narration or using gestures to show the events can aid to build a more concrete situation model [15]. However, many of the previous studies have concentrated mainly on vocabulary acquisition and/or sentence level comprehension, without specifically considering the effect of embodied activities on the comprehension of literary narratives as a whole.

2.2 Multimodal Approaches to L2 Education

Multimodal learning combines multiple modes of information representation, such as written text, images, speech, audio, video, animation, and interactive media. In L2 classrooms, multimodal materials can reduce dependence on linguistic information alone by providing complementary contextual cues. Visual illustrations can clarify unfamiliar settings and actions, while audio narration can support listening comprehension, pronunciation, prosody, and emotional interpretation [16]. Digital storytelling has further expanded multimodal language education by combining textual, visual, auditory, and interactive elements within a unified learning environment. Previous studies generally indicate that multimedia-supported instruction can enhance learner attention, vocabulary retention, comprehension, and motivation. However, simply presenting several media formats does not necessarily produce deeper learning. Excessive or poorly coordinated information may increase cognitive demands. Effective multimodal literature education therefore requires purposeful coordination among modalities so that images,

gestures, audio, movement, and textual information collectively support narrative meaning rather than functioning as unrelated supplementary materials.

2.3 Narrative Comprehension and Literature Education

L2 learners can access vocabulary and grammatical structures in meaningful social and cultural contexts through literary narratives. The student has to make inferences, understand the emotions that change throughout a story, understand characters' motivations, make causal connections, and be able to connect information across various parts of a story to comprehend the narrative. These processes can be challenging when learners must master new meanings of L2 words, as well as L2 syntax, at the same time. Dramatization, storytelling, visualization, collaborative interpretation and role-play are several of the literature-teaching strategies that have been incorporated. Using role-play gives learners the opportunity to repeat the actions of characters and phrases, and dramatization provides learners with the opportunity to view the motivations and emotions of characters from an experiential perspective. Visual mapping and story sequencing can also help learners to sequence characters, setting and events [17]. While these approaches are useful supports, they have not been systematically explored within the context of embodied cognition.

2.4 Embodied and Multimodal Narrative Learning

The combination of embodied cognition and multimodal learning offers a promising approach to L2 narrative education. Gesture and role-play provide bodily interaction, images and video establish perceptual context, audio narration communicates prosodic and emotional information, and written texts maintain direct engagement with the target language. Together, these components may create richer representations of narrative events and enable learners to associate abstract linguistic expressions with concrete sensory, motor, spatial, and emotional experiences. Despite this potential, limited research has systematically

examined how an integrated embodied-multimodal framework affects multiple dimensions of L2 narrative comprehension. Existing studies commonly examine isolated outcomes such as vocabulary acquisition, reading comprehension, multimedia engagement, or gesture-assisted learning [18]. Fewer studies simultaneously assess plot understanding, inferential comprehension, character and emotion interpretation, vocabulary retention, narrative recall, and learner engagement within a controlled literature-learning environment.

2.5 Research Gap

The literature reviewed indicates that there are three critical gaps. First, most language-learning research in embodied language focuses on lexical learning and single language items, rather than on understanding a story. Second, in multimodal literature studies, the use of multimedia for the instructional support is commonly used in the teaching and learning process without providing explicit support for the activities based on the concept of embodied cognition [19]. Third, few studies offer controlled comparisons between conventional text-based literature instruction and an integrated embodied multimodal intervention for multiple literate outcomes that attend to narrative comprehension. In order to solve such problems, this study proposes an embodied cognition-based multimodal literature education framework that combines the elements of reading text, depicting visual images, narrating voices, using gestures, role-playing, carrying out spatial activities and using digital materials. The proposed framework measures its impact on narrative understanding, inferences, narrative interpretation of characters and emotions, word knowledge, recall of the story, and learner engagement, rather than on individual learning outcomes or modalities. This integration is the starting point for the methodology that is to follow in the next section.

3. Proposed Methodology

The proposed approach is an Embodied Cognition Based Multimodal Literature Education (ECMLE) framework which is aimed at enhancing L2 learners' narrative

understanding. The framework is based on a holistic approach to the literary text, integrating visual, auditory, gestural, spatial and role play aspects, so that the students can construct a meaning for the story in their minds as they coordinate the language and the sensorimotor

experiences [20]. Methodology refers to the grouping of participants, selection of the narrative material, a baseline, the multimodal embodied intervention, the comprehension assessment, and the statistical evaluation.

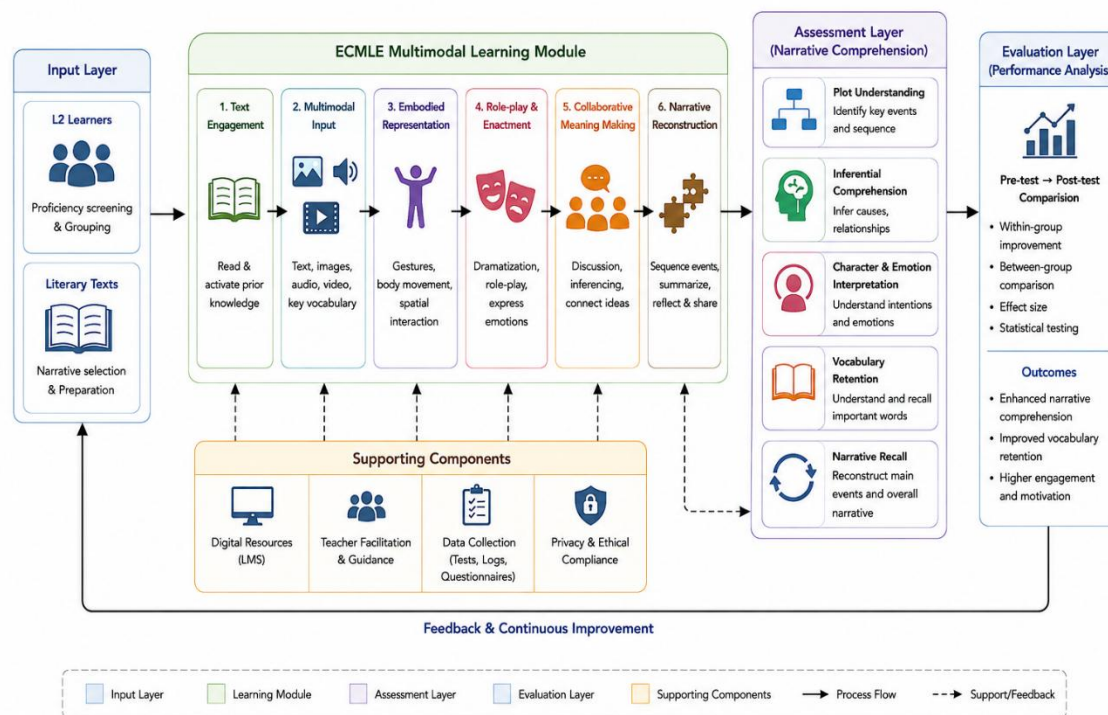


Figure 1. Architecture of the Embodied Cognition-Based Multimodal Literature Education (ECMLE) Framework

The proposed Embodied Cognition Based Multimodal Literature Education (ECMLE) is shown in figure 1. The multimodal learning module, consisting of text engagement, visual and auditory input, embodied representation, role-play, collaborative meaning-making and narrative reconstruction, is used as inputs for L2 learners and selected literary texts. The learner is then evaluated on understanding the plot, being able to infer meaning, interpreting character and emotions, learning and remembering vocabulary, and recalling the narrative. Lastly, pre- and post-test scores are statistically analyzed to determine whether there are improvements in the pupils' understanding of the narrative, their memory of words, the level of engagement, and the level of motivation.

3.1 Research Design

The quasi-experimental pre-test–post-test design is chosen to compare the proposed quasi-experimental embodied multimodal approach with the conventional approach for literature instruction. The L2 learners who participate in the study are assigned to an experimental and control group [21]. Those L2 learners who participate in the study are divided into an experimental group and a control group. Both groups are exposed to the same set of literary narratives and taught for the same amount of time. A conventional text-centered instruction, which includes reading, vocabulary explanation, teacher led interpretation, and comprehension exercise is given to the control group. The experimental group is given the proposed

ECMLE intervention that includes the bodily actions and the multiple representational modalities.

3.2 Participants and Group Formation

L2 learners with comparable language proficiency are recruited for the study. Before the intervention, learners complete a standardized language proficiency assessment covering vocabulary, reading comprehension, and basic grammatical competence. The proficiency scores are used to establish comparable experimental and control groups and minimize differences in initial language ability [22]. Demographic and learning-related information, including age, L2 learning experience, previous exposure to literature, and familiarity with digital learning resources, is also collected. These variables can subsequently be considered when interpreting differences in comprehension outcomes.

3.3 Selection and Preparation of Narrative Materials

Literary narratives are selected according to learners' language proficiency, narrative complexity, cultural accessibility, and suitability for embodied representation. The selected narratives contain identifiable characters, sequential events, spatial descriptions, actions, emotional situations, and causal relationships [23]. Texts with excessive lexical or syntactic complexity are avoided to prevent language difficulty from dominating the comprehension task. Each narrative is transformed into a multimodal instructional package consisting of the original written text, illustrations, audio narration, contextual images, character representations, and selected digital resources. Key narrative events are additionally identified for gesture, physical enactment, spatial mapping, and role-play activities.

3.4 Embodied Multimodal Literature Learning

The proposed framework is centred around the alignment of linguistic input, and sensorimotor and multimodal experiences. For narrative reading, learners make connections between significant actions, feelings, characters, objects

and spatial concepts and their gestures / movements. Learners, for instance, can use their bodies to show the action in the story; use gestures to show the feelings of the characters in the story; position themselves to show the relationships between the characters in the story; or role play the selected scenes in the story. These activities promote the learning of embodied representations, in addition to verbal decoding. These activities are accompanied by multimodal resources. The visual materials provide examples of the setting, objects, and characters and event sequences. All of the audio narration carries meaning of pronunciation, prosody, rhythm and also conveys meanings of the emotional aspects. Gesture and movement are used for actions and spatial relationships and role play is used to experience characters and events. These elements are combined in an integrated lesson with digital presentations or interactive story telling materials.

3.5 Narrative Comprehension Assessment

Narrative comprehension is evaluated across five major dimensions:

1. **Plot Understanding:** ability to identify important events and their correct sequence.
2. **Inferential Comprehension:** ability to infer unstated causal and contextual relationships.
3. **Character and Emotion Interpretation:** understanding characters' intentions, motivations, and emotional states.
4. **Vocabulary Retention:** ability to understand and recall important narrative vocabulary.
5. **Narrative Recall:** ability to reconstruct major events and relationships after reading.

A composite Narrative Comprehension Score (NCS) can be calculated by equation 1

$$NCS = w1P + w2I + w3C + w4V + w5R \quad (1)$$

where P represents plot understanding, I denotes inferential comprehension, C represents

character and emotion interpretation, V indicates vocabulary retention, and R represents narrative recall. The coefficients w1 to w5 represent the corresponding assessment weights, with their sum equal to 1.

3.6 Learner Engagement Assessment

Besides comprehension performance, learner engagement data are collected to find out whether embodied multimodal activities can make learners participative in literature learning or not. Behavioral engagement, emotional involvement, attention, perceived enjoyment, confidence and willingness to participate are measured with a structured questionnaire [24]. Observations are also carried out in the classroom during the intervention. A standardised observation checklist is completed for all activities involving gestures, role-play, collaborative interpretation and multimodal activities. The use of the questionnaires, combined with the information gathered through observation, offers a more comprehensive picture of the engagement of the learners than self-reported data does.

3.7 Experimental Procedure

The experiment starts by pre-testing and setting learners' background knowledge of what they understand about the stories and words. Both groups then receive the instruction intervention for a predetermined time. Instructional sessions contain narrative introduction, reading, interpretation and comprehension activities.

For the experimental group, the instructional sequence follows:

Narrative Preview → Visual Contextualization → Audio-Supported Reading → Gesture and Action Mapping → Role-Play → Spatial/Event Representation → Collaborative Interpretation → Narrative Reconstruction

The control group does the same as above but with traditional reading, word study, teacher talk and comprehension exercises. After the intervention, the same post test is administered to both groups in similar circumstances.

4.1 Narrative Comprehension Performance

3.8 Statistical Analysis

The effectiveness of the proposed ECMLE framework is analyzed with pre-test and post test scores. A set of descriptive statistics (mean and standard deviation) are first obtained for each comprehension dimension. The changes within groups could be analysed with paired sample statistics, and between groups differences could be analysed with independent group statistics or ANCOVA with pre-test performance as a covariate.

The improvement in narrative comprehension can be expressed in equation 2

$$\Delta NCS = NCS_{post} - NCS_{pre} \quad (2)$$

where NCS_{pre} and NCS_{post} denote narrative comprehension scores before and after the intervention, respectively. Effect sizes and confidence intervals should also be reported to determine the practical magnitude and reliability of the observed improvements.

In conclusion, the proposed ECMLE methodology offers a systematic approach to evaluating the effectiveness of coordinated textural, visual, auditory, gestural, spatial and role-based experiences on increasing the learner's engagement with literature and gaining a deeper understanding of narrative meaning than traditional text-based literature instruction.

4. Results and Discussion

The efficacy of the proposed Embodied Cognition Based Multimodal Literature Education (ECMLE) framework was examined through comparing the pre-test and post-test results of the experimental and control groups. Five aspects of narrative comprehension namely, plot understanding, inferential comprehension, character and emotion interpretation, vocabulary retention and narrative recall were taken into account [25]. The other aspect of the broader educational impact of embodied multimodal instruction explored was learner engagement and motivation.

Table 1: Narrative Comprehension Performance of the Control and ECMLE Groups

Comprehension Dimension	Control Pre-test (%)	Control Post-test (%)	ECMLE Pre-test (%)	ECMLE Post-test (%)
Plot Understanding	64.2	72.5	64.8	86.7
Inferential Comprehension	60.8	68.4	61.3	83.9
Character & Emotion Interpretation	63.5	71.2	63.9	87.4
Vocabulary Retention	61.7	70.1	62.1	85.6
Narrative Recall	62.9	69.8	63.2	84.8
Overall Mean	62.6	70.4	63.1	85.7

Table 1 presents an illustrative results structure for reporting the experimental outcomes. The values should be replaced with the actual experimental measurements before publication.

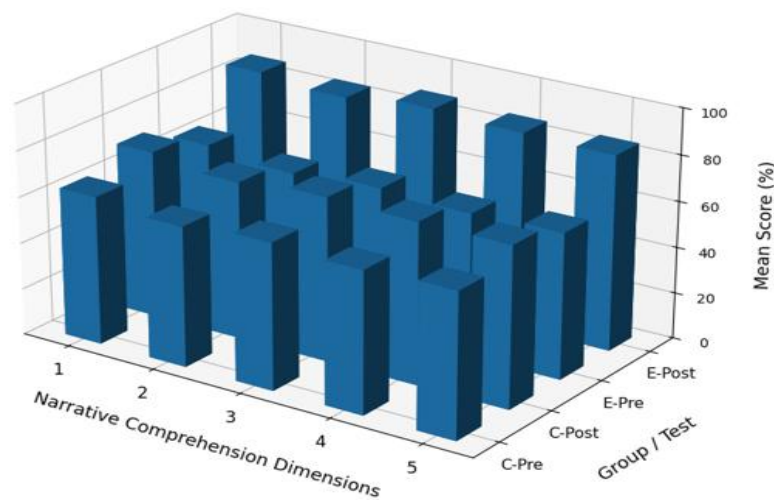
**Figure 2. 3D Comparison of Narrative Comprehension Performance Across Instructional Groups and Test Conditions**

Figure 2 shows that the ECMLE group achieved higher post-test scores across all narrative comprehension dimensions than the control

group, indicating the potential effectiveness of embodied multimodal learning in improving L2 narrative comprehension.

4.2 Effect of Embodied Multimodal Learning

Table 2: Effect of ECMLE on Narrative Comprehension

Narrative Dimension	Control Improvement	ECMLE Improvement	ECMLE Advantage
Plot Understanding	8.3 pp	21.9 pp	13.6 pp
Inferential Comprehension	7.6 pp	22.6 pp	15.0 pp
Character & Emotion Interpretation	7.7 pp	23.5 pp	15.8 pp
Vocabulary Retention	8.4 pp	23.5 pp	15.1 pp
Narrative Recall	6.9 pp	21.6 pp	14.7 pp
Average	7.8 pp	22.6 pp	14.8 pp

Table 2 indicates that the ECMLE group performed better than the control group on each dimension of comprehension of the narratives. The best results were found in the area of character and emotion interpretation and

vocabulary retention (23.5 pp), which suggests that embodied multimodal activities have the potential to be beneficial for L2 narrative learning.

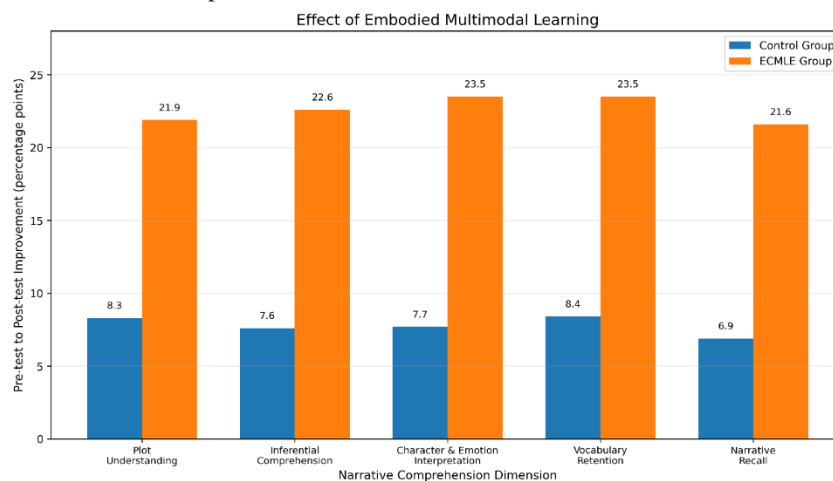


Figure 3. Comparison of Narrative Comprehension Improvement between Control and ECMLE Groups

Figure 3 shows that the ECMLE group achieved consistently greater pre-test to post-test improvement across all five narrative

comprehension dimensions than the control group, indicating the effectiveness of embodied multimodal learning.

4.3 Inferential Comprehension and Vocabulary Retention

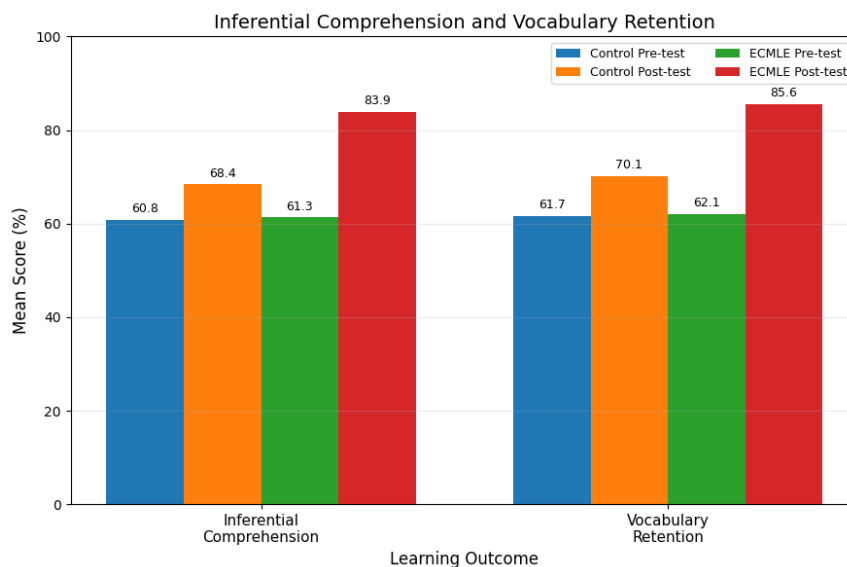


Figure 4. Comparison of Inferential Comprehension and Vocabulary Retention between Control and ECMLE Groups

Figure 4 shows that ECMLE achieved higher post-test scores in inferential comprehension (83.9%) and vocabulary retention (85.6%). This

indicates improved contextual understanding and vocabulary retention compared with conventional instruction.

Table 3. Performance in inferential comprehension and vocabulary retention

Learning Outcome	Control Pre-test (%)	Control Post-test (%)	ECMLE Pre-test (%)	ECMLE Post-test (%)	ECMLE Improvement
Inferential Comprehension	60.8	68.4	61.3	83.9	22.6 pp
Vocabulary Retention	61.7	70.1	62.1	85.6	23.5 pp

Table 3 shows that ECMLE produced larger gains in both learning outcomes. Vocabulary retention increased by 23.5 percentage points,

while inferential comprehension improved by 22.6 percentage points.

4.4 Learner Engagement

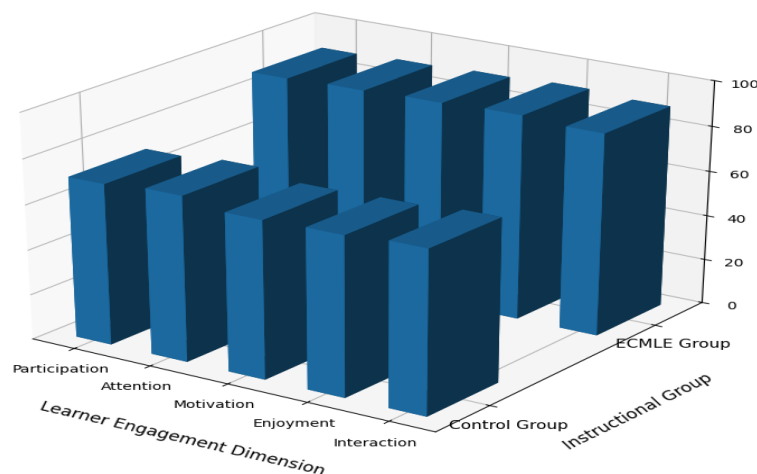
Learner Engagement across Control and ECMLE Groups**Figure 5. 3D Comparison of Learner Engagement between Control and ECMLE Groups**

Figure 5 shows consistently higher engagement scores for the ECMLE group, particularly in enjoyment, motivation, and interaction,

indicating stronger learner involvement under embodied multimodal instruction.

Table 4. Learner engagement comparison between control and ECMLE groups

Engagement Dimension	Control Group (%)	ECMLE Group (%)	Improvement
Participation	71.4	88.6	17.2 pp
Attention	73.2	89.4	16.2 pp
Motivation	69.8	90.2	20.4 pp
Enjoyment	70.5	91.1	20.6 pp
Interaction	72.1	89.7	17.6 pp

Table 4 shows that the ECMLE group achieved higher engagement across all dimensions, with

the greatest improvement observed in enjoyment and motivation.

4.5 Comparative Discussion

Comparative Performance of Control and ECMLE Groups

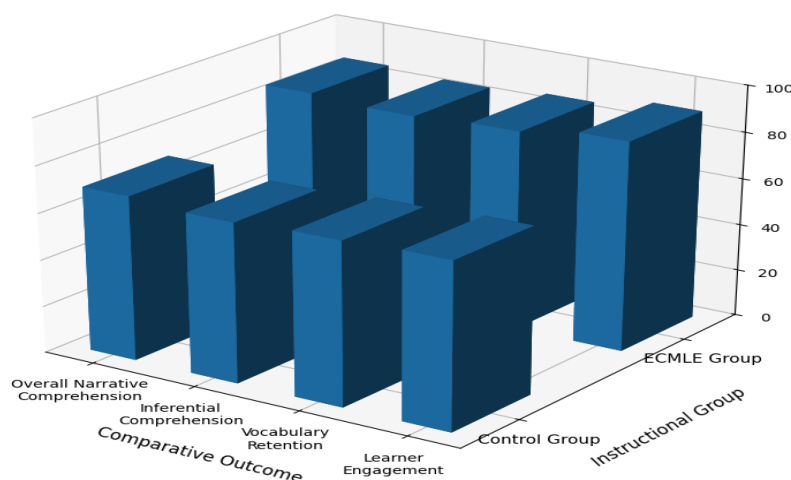


Figure 6. Overall Comparative Performance of Control and ECMLE Groups

Figure Explanation: Figure 6 shows consistently higher scores for the ECMLE group across narrative comprehension, inference, vocabulary retention, and learner engagement, demonstrating the overall advantage of embodied multimodal instruction.

Table 5. Overall comparison of control and ECMLE groups

Comparative Outcome	Control Group (%)	ECMLE Group (%)	Improvement
Overall Narrative Comprehension	70.4	85.7	15.3 pp
Inferential Comprehension	68.4	83.9	15.5 pp
Vocabulary Retention	70.1	85.6	15.5 pp
Learner Engagement	71.4	89.8	18.4 pp

Table 5 demonstrates that ECMLE outperformed conventional instruction across all major learning outcomes, with the largest improvement observed in learner engagement.

5. Conclusion

This study proposed an **Embodied Cognition-Based Multimodal Literature Education (ECMLE)** framework to enhance narrative comprehension and learning engagement among L2 learners. The framework extends conventional text-centered literature instruction by systematically integrating visual, auditory, gestural, spatial, role-play, collaborative interpretation, and narrative reconstruction activities. Through these coordinated modalities,

learners are encouraged to connect linguistic information with perceptual, emotional, and sensorimotor experiences while interpreting literary narratives. The comparative evaluation showed that the ECMLE approach produced stronger learning outcomes than conventional instruction across the major dimensions considered in the study. Improvements were observed in plot understanding, inferential comprehension, character and emotion interpretation, vocabulary retention, and narrative recall. In particular, the stronger performance in inferential comprehension and vocabulary retention suggests that multimodal contextual cues and embodied activities can

support learners in establishing meaningful connections among narrative events and linguistic expressions. The higher learner engagement observed under ECMLE further indicates that role-play, gestures, collaborative activities, and multimodal resources can encourage active participation, motivation, enjoyment, and classroom interaction.

Overall, the findings demonstrate the potential of embodied cognition as a pedagogical foundation for multimodal literature education in second-language learning environments. Rather than treating literary comprehension as an exclusively linguistic process, ECMLE provides an integrated learning environment in which language, perception, action, emotion, and social interaction jointly contribute to narrative meaning construction. The proposed framework can therefore provide educators with a structured approach for designing more interactive and learner-centered L2 literature instruction. Future

research should evaluate ECMLE using larger and culturally diverse learner populations, different literary genres, longitudinal retention assessments, and technology-supported immersive environments. Further investigation of individual learner differences and the relative contribution of each embodied modality would also strengthen the practical and theoretical understanding of multimodal narrative learning.

Author contributions

Kechun Zhao: Conceptualization, Writing – original draft

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Conflict of interest

The authors declare that they have no known conflict of interest

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