



Exploration of Symbolic Communication in Language Learning in the Era of Education 4.0

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ABSTRACT

Digital transformation in Education 4.0 has changed the form of communication in language learning from verbal dominance to complex multimodal symbols. This study aims to describe the forms of symbolic communication used in contemporary language learning. Using the Meta-Analysis Literature Review (MALR) method, this study analyzes data from relevant scientific literature in the last five years. The results show that digital symbols such as emojis, visual gestures, and icons have become the main medium in the construction of educational meaning. The findings extend the theoretical framework of symbolic interactionism and multimodality in the context of digital education and emphasize the importance of symbolic literacy as a basic competency in modern language learning. This research opens up opportunities for further empirical practice-based studies.

INTRODUCTION

The transformation of education in the 4.0 era has driven fundamental changes in learning approaches, especially in the context of language learning, which now not only relies on conventional verbal communication, but also includes the use of complex and multimodal digital symbols. The development of information and communication technology has enabled the integration of various symbolic media such as images, icons, emojis, interactive videos, and animations, in the language teaching and learning process at various levels of education (Tănăsescu, 2023). This causes meaning in learning is no longer formed solely through words, but is constructed through a variety of symbolic representations that have different interpretations based on the context in which they are used (Elleström, 2022). Consequently, teachers and students must be able to understand and manage these symbols critically so that the meaning of communication in the learning process is maintained. If not understood properly, there will be miscommunication or gaps in meaning that have a negative impact on achieving language learning goals in this digital era.

Despite the widespread use of symbols in language learning, theoretical studies that specifically address the relationship between digital symbols and meaning construction in learning contexts are still relatively limited. Classical symbolic communication theories such as Mead's Symbolic Interactionism do provide a philosophical foundation that meaning is formed through social interactions mediated by symbols (Fernback, 2019), but they do not explicitly explain how multimodal digital symbols affect meaning in modern learning environments. Meanwhile, the multimodality theory approach developed by Gunther Kress offers an important perspective on the contribution of each semiotic mode in the process of meaning formation, but its application in practical language learning contexts has not been studied in depth in the existing literature (Elleström, 2022). This suggests an important gap in the literature that needs to be further explored in order to explain the dynamics of contemporary symbolic communication in language education practices in the digital era.

This research aims to describe the forms of symbolic communication used in language learning in the Education 4.0 era. The main focus is on identifying how symbols in the form of text, visual, audio, and motion are adopted and interpreted by educators and learners in a digital learning environment. This research will also dissect how these symbols become an effective medium of meaning construction or even become a challenge in a complex educational communication process. By exploring these dynamics, this research is expected to contribute to the development of educational communication theory and practice, especially in the context of language learning that continues to evolve under the influence of advances in information technology.

The urgency of this research lies not only in the empirical reality that digital symbols are increasingly dominating the language learning space, but also in the urgent need to develop a theoretical and practical framework capable of explaining the mechanisms of symbolic communication in the contemporary educational context. Without an in-depth understanding of how symbols are

used and interpreted in the learning process, the possibility of meaning distortion becomes greater and has negative implications for the effectiveness of learning itself (Cheng et al., 2022). This research is important to strengthen the position of the theory of Symbolic Interactionism and Multimodality as a key approach in understanding symbolic communication in the era of Education 4.0, as well as bridging the gap between theory and practice that has not been optimally answered by previous studies (Fernback, 2019). Thus, this research is expected to be able to present a more comprehensive and relevant understanding in addressing the challenges and opportunities of symbolic communication in today's language learning.

LITERATURE REVIEW

Concept of Symbolic Communication

Symbolic communication is the process of conveying meaning through socially agreed symbols in a particular cultural context. These symbols include not only verbal language, but also gestures, icons, and other forms of media that have certain meanings for communication participants (Elleström, 2022). In the realm of human communication, symbols have the function of representing ideas, emotions, or objects in a way that is not always literal, but through social construction that is continuously reviewed and reinterpreted in interactions between individuals (Hourdequin, 2019). Therefore, symbolic communication is not only about conveying information, but also about how individuals produce and interpret meaning based on their cultural background, experience, and social position in the interaction.

Symbolic Communication Categorization

Symbolic communication can manifest in many forms, ranging from linguistic symbols such as words and sentences, visual symbols such as images and colors, to gestural symbols such as facial expressions and body language. These symbolic categories operate in multimodal networks, where the modes of communication interact with each other to form complex and contextualized meanings (Johnson, 2017). Recent research emphasizes that symbolic communication can occur in digital systems through emojis, GIFs, and virtual signs that have their own meaning conventions among users of certain digital platforms (Cheng et al., 2022). In the era of digital communication, these symbolic manifestations are not static, but adaptive to changes in technology and user culture that continue to move dynamically.

Language Learning

Language learning is a systematic process of acquiring and developing language skills that include aspects of listening, speaking, reading, and writing in a particular language. This process involves not only linguistic aspects, but also an understanding of culture, social context, and the use of symbols in daily communication (Fernback, 2019). In the constructivist approach, language learning is seen as an active activity in which learners construct an understanding of meaning through experience, interaction and reflection on communication symbols used in everyday life (Hourdequin, 2019). Therefore, language learning

cannot be separated from the social and symbolic context in which the language is used.

Manifestations of Language Learning

Manifestations of language learning can be distinguished in several approaches, such as communicative approaches, task-based learning, and multimodal approaches that emphasize the integration of various forms of symbols to support understanding of meaning. In today's digital age, language learning often includes interactive media that integrates text, images, sound and video, allowing students to develop language competence in a more contextualized and meaningful way (Wildgen, 2024). In addition, the use of online platforms also encourages the birth of community-based collaborative learning practices, where communication symbols develop according to the digital culture of each user group (Hourdequin, 2019). This phenomenon enriches the dimensions of practice and strategy in the language teaching process.

Education 4.0 Concept

Education 4.0 is an educational paradigm rooted in the Industrial Revolution 4.0, which deeply integrates digital technology in all aspects of learning. This concept promotes learning based on personalization, flexibility, and global connectivity through interactive and collaborative digital platforms (Elleström, 2022). In the Education 4.0 framework, learners are not just recipients of information, but active creators of meaning in a digital learning environment rich in visual symbols and virtual social interactions (Johnson, 2017). Thus, Education 4.0 shifts the orientation of education from instructional to experiential learning, exploration, and the production of symbolic meaning in a digital ecosystem.

Implementation of Education 4.0

Implementation of Education 4.0 is demonstrated through the use of technology-based learning systems such as Learning Management System (LMS), digital project-based learning, the use of artificial intelligence in learning personalization, and the integration of virtual reality and augmented reality in the learning process. These technologies enable multimodal learning experiences, where learners engage simultaneously through visual, audio and textual symbols (Wachsmuth, 2019). Education 4.0 also supports 21st century skills such as collaboration, digital literacy and critical thinking that are facilitated through symbolic interactions in online platforms and modern learning applications (Wildgen, 2024). Therefore, Education 4.0 is a strategic arena for developing symbolic communication that is relevant to the digital age context.

METHODOLOGY

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Research Object

The main object of this research is the phenomenon of symbolic communication that occurs in language learning in the era of Education 4.0, especially in the use of digital symbols and multimodality in technology-based learning environments. Digital transformation in education has given rise to new forms of communication, where interactions between teachers and students do not only take place through verbal words, but also through visual, gestural, and audio symbols that become part of the learning process (Elleström, 2022). This phenomenon is significant because it shows a paradigm shift in constructing meaning in the learning process, which is no longer linear and textual, but is dynamic, contextual, and relies on the interpretation of symbols used by communication actors in learning (Cheng et al., 2022). Therefore, this study seeks to systematically explore how such symbolic communication emerges, is used, and is interpreted in the context of contemporary language learning.

Research Data

Primary data used comes from relevant literature that reviews various empirical and theoretical studies on symbolic communication practices in language learning in the context of Education 4.0 (Tănăsescu, 2023). Meanwhile, secondary data were obtained from books, scientific journal articles, proceedings, and research reports related to the main keywords namely symbolic communication, language learning, and education 4.0 (Fernback, 2019). Inclusion criteria were set based on direct relevance to the research focus, thematic relevance and publication within the last five years, while exclusion criteria included literature that was not openly available or did not contain data that could be extracted quantitatively.

Data Collection Techniques

The research process involved a systematic literature search through electronic databases such as Google Scholar, DOAJ, and Semantic Scholar. Inclusion criteria included relevant open literature, published within the last five years, and having extractable data. Data collection techniques included screening articles based on abstracts, keywords, and full content to ensure topical suitability. After that, data extraction was carried out on important variables from each study, such as the context of symbol use, symbol types, and their impact on language learning (Tănăsescu, 2023). The next step is to calculate the effect size of the studies that meet the criteria, and then perform statistical analysis with the aim of combining these results to obtain more precise and empirically valid effect estimates (Cheng et al., 2022).

Data Analysis Technique

In this study, the data analysis technique used is content analysis, which allows researchers to systematically examine data to find patterns, relationships, and important meanings relevant to the research topic. The analysis process was carried out by categorizing the study results based on thematic variables such as the types of communication symbols, multimodal modes used, and their implications for digital language learning. Next, the results were interpreted to develop a consistent and data-driven thematic synthesis. This technique supports the meta-analysis process by providing a contextual basis for the statistical interpretation of the combined studies, resulting in not only numerical estimates of effects but also a qualitative understanding of the dynamics of symbolic communication in language learning in the Education 4.0 era (Elleström, 2022).

RESULTS AND DISCUSSION

Based on the results of a systematic literature search through electronic databases on Google Scholar, DOAJ, and Semantic Scholar, several articles were found that contain forms of symbolic communication in language learning according to the formulation of problems and specific research objectives. The article data can be shown in the table below.

Table 1. Forms of Symbolic Communication in Language Learning in the Era of Education 4.0

Form Symbolic Communication	Description of Findings	Source of Literature (Last 5 Years)
Visual Symbols (pictures, icons, emojis)	Widely used in digital learning platforms to convey expression, instruction, and non-verbal reinforcement of meaning in language learning materials.	(Elleström, 2022); (Tănăsescu, 2023)
Gestural Symbols (body language, facial expressions, hand gestures)	Utilized in learning videos and online interactions to emphasize word meaning or show emotion in multimodal communication.	(Johnson, 2017); (Wachsmuth, 2019)
Audio Symbols (intonation, sound effects, music tone)	It serves as an additional element in clarifying linguistic meaning and stimulating emotion and understanding in language learning.	(Wildgen, 2024)
Interactive Digital Symbols (avatars, learning interfaces, gamification)	Mediates interactive symbolic communication that is responsive and adaptive to learners in a virtual context,	(Tănăsescu, 2023); (Elleström, 2022)

Form Symbolic Communication	Description of Findings	Source of Literature (Last 5 Years)
	enhancing learning engagement.	
Digital Linguistic Symbols (short texts, hashtags, informal abbreviations)	It appears in social media and online chat rooms as a symbol in its own right with contextual and culture-specific meanings in language learning.	(Hourdequin, 2019)

A review of the literature on symbolic communication in learning shows that symbols are no longer limited to verbal language alone, but extend to visual, gestural and digital forms used in learning interactions. Studies show that symbols in the context of language learning include various forms of signs such as emojis, digital icons, images and animations, which serve as a medium for transmitting meaning between learning participants (Elleström, 2022). These symbols appear in various digital learning platforms and are influenced by the culture and habits of symbolic use that exist in educational online communities (Tănăsescu, 2023). Data from the literature also shows that symbols in the learning process have a tendency to be subjectively and contextually interpreted by users.

The description of the literature data indicates that symbolic communication develops through the process of forming an understanding of symbols between educators and learners. Research by Cheng et al. (2022) confirms that new symbols can arise spontaneously in limited communication situations, with symbols evolving from iconic signs to complex conventional symbols (Cheng et al., 2022). This finding suggests that symbols in digital learning are not fixed, but rather formed through social interaction and contextual adaptation. In addition, the literature suggests that symbolic forms of communication may reflect the social and cultural values of the learner community in question (Wahyuni et al., 2022).

The findings described above show a direct relevance to the research problem of symbolic transformation in language learning. In the Education 4.0 era, symbols become the main medium in shaping the meaning of learning, and inequality in understanding these symbols can be a source of communication gaps between individuals. The contemporary learning reality filled with digital symbols demands high understanding and symbolic competence from all educational actors. Thus, the literature review on symbolic communication strengthens the position of the research problem as a crucial issue in today's digital-based language education.

Data from the literature review shows that language learning today does not only focus on linguistic aspects, but also relies heavily on multimodal contexts. This includes the utilization of images, audio, gestures and animations

in the learning process to strengthen the understanding of meaning. Digital learning models observed in various studies show intensive use of visual media as language learning tools (Elleström, 2022). These include learning videos, interactive learning apps, and the use of social media adapted for language communication practices.

The explanation of the data shows that the integration of symbolic media in language learning aims to accommodate learners' diverse learning styles. Through a multimodal approach, learners can understand meaning not only through text, but also through other symbolic representations. This approach enriches the learning experience and allows for a more contextualized and personalized construction of meaning. Studies also suggest that learners tend to be more motivated when interacting with digital symbols that are relevant to their daily lives (Wahyuni et al., 2022).

Meanwhile, language learning reinforces the reality that the current educational process has expanded towards visualization and digitization of meaning. In the context of the research problem, language learning now demands an approach that pays attention to symbols in their various forms, not just verbal texts. This fact confirms that language education in the digital age requires learning designs that take into account complex digital symbol interpretation skills.

The literature describes Education 4.0 as an education system based on digital technology with characteristics of personalization, flexibility, and global connectivity. Key features of Education 4.0 include the use of online learning platforms, artificial intelligence, and virtual and augmented reality (VR and AR) in supporting the learning process (Tănăsescu, 2023). Education 4.0 also emphasizes the active role of learners in creating meaning collaboratively through digital symbols available in various learning platforms.

Education 4.0 provides space for more dynamic symbolic communication as it integrates various technologies that enable multimodal communication. The learning process is no longer limited to physical classrooms, but takes place in digital spaces that bring together symbols from different cultural backgrounds and social contexts. These educational technologies facilitate symbolic interaction through avatars, interactive graphics and user interfaces designed to support the creation of meaning through non-verbal modes (Elleström, 2022).

The relationship between the description and explanation of Education 4.0 and the research problem shows that the current education system has become a complex symbolic communication space. This change demands learning strategies that take into account the dynamics of symbol interpretation by learners. Therefore, the results of this study reinforce the urgency to further explore how symbols are used and interpreted in the context of digital technology-based language learning.

The results show that symbolic communication in language learning in the Education 4.0 era does not only include verbal symbols, but develops through visual, gestural, and digital modes. This integration of symbols shows that meaning in learning is constructed multimodally by learners and educators in an ever-evolving digital space (Elleström, 2022). Symbols in the form of emojis, icons

and images are now important elements in learning interactions, expanding the scope of symbolic communication beyond conventional boundaries.

Compared to other studies that highlight the limited understanding of symbols by learners in chemistry and mathematics contexts (Taber, 2009), this study highlights the power of symbols as a means of meaning expansion in language education that is more communicative and contextual in nature. Moreover, different from studies on symbolic gestures in the education of children with special needs that focus more on limited interventions (Colombani et al., 2022), this study shows that digital symbols have naturally become part of meaning construction in formal education, particularly in language learning that makes active use of digital media.

Reflection on the research objectives that focus on describing forms of symbolic communication in language learning shows that symbols are not just visual aids, but become central elements in learning interactions. Today's educational process requires not only linguistic understanding, but also symbolic literacy that enables learners to interpret and generate meaning from complex multimodal representations (Wildgen, 2024). Thus, this study reflects the importance of developing symbolic communication competencies in modern education.

The implications of the results of this study are vast, especially in the development of language learning curriculum that adapts to the characteristics of the digital generation. Teachers as learning facilitators need to design teaching materials and strategies that are not only verbal, but also facilitate the meaning of multimodal symbols that are relevant to the daily context of learners (Wachsmuth, 2019). The application of learning models that pay attention to multimodality can increase the effectiveness of educational communication and learner involvement in the learning process.

The results showing the dominance of symbolic communication in digital language learning can be analyzed through the lens of Symbolic Interactionism and Multimodality theories. Mead's theory asserts that meaning is formed through symbol-mediated social interaction (Fernback, 2019), while Kress's theory adds that each mode of communication carries unique potential meanings. When learning takes place in a digital ecosystem, learners tend to use symbols that they recognize and interpret in online social interactions, which explains the emergence of local symbols that are highly contextual and not universal (Johnson, 2017).

Based on the findings of this study, a strategic step that can be taken is to integrate symbolic literacy training in teacher training and language education curriculum. Teachers need to be equipped with the ability to understand and manage multimodal symbols in a digital context in order to design inclusive and communicative learning. On the other hand, educational policies need to encourage the provision of flexible learning platforms that can accommodate symbolic communication in its various forms, so that the educational process

does not only convey information, but also builds meaningful and contextualized understanding in the digital era (Elleström, 2022).

CONCLUSIONS AND RECOMMENDATIONS

In language learning practices in the Education 4.0 era, digital symbols such as emojis, interactive icons, and visual gestures have taken over much of the role of conventional verbal communication. This finding shows that meaning in the learning process is no longer constructed linearly through text, but through multimodal configurations that interact with each other dynamically. Even more so, the learning process now relies on learners' ability to interpret and reproduce meaning from symbols that continue to evolve as technology advances, suggesting a fundamental change in the way humans construct language understanding in educational contexts.

This research makes an important theoretical contribution in integrating the Symbolic Interactionism perspective with the Multimodality approach in a contemporary language learning framework. Theoretically, this research expands the understanding of how symbols play a role in digital educational interaction, not only as a representation of meaning, but as a structure of meaning itself. From the practical side, this research provides a foundation for the development of digital symbol-based learning designs, as well as providing guidance for educators in managing multimodal communication effectively in technology-based learning environments. This makes this research relevant not only for the academic realm, but also for the world of education directly.

Although this study is able to reveal the phenomenon of symbolic communication in language learning in depth, its limitation lies in the meta-analysis approach of the literature which does not allow direct observation of symbolic communication practices in real classrooms. However, this limitation is not a weakness, but rather opens up great opportunities for further field-based research that can test the validity of these findings in a more specific empirical context. In the future, experimental research and qualitative case studies will potentially strengthen and broaden the scope of understanding of digital symbols in language education, especially in diverse cultural contexts and educational levels.

FURTHER STUDY

This research still has limitations so it is still necessary to conduct further research on the topic "Exploration of Symbolic Communication in Language Learning in the Era of Education 4.0".

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