

Visual Content Assignment and Future Teaching Skills: Pre-Service Teachers Perceptions

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Abstract

The integration of digital technology in English as a Foreign Language (EFL) education has transformed teaching practices by encouraging the use of visual and multimodal learning materials. Visual content creation assignments have been recognized as potential learning activities that enhance students' engagement, digital competence, and understanding; however, limited studies have explored how pre-service teachers perceive these tasks as part of their professional preparation. This study aimed to investigate pre-service English teachers' perceptions of visual content creation assignments, particularly regarding learning engagement, teaching preparation, and understanding of meaning. This research employed a descriptive quantitative approach involving 85 students from the English Language Education Program at Universitas Brawijaya. Data were collected through a 13-item Likert-scale questionnaire distributed via Google Forms and analyzed using descriptive statistics, including mean scores, frequencies, percentages, and standard deviations. The findings revealed that participants demonstrated highly positive perceptions across all measured dimensions. Visual content creation assignments increased students' motivation and engagement in English learning, strengthened their confidence in utilizing digital media for teaching, and supported their ability to connect English learning materials with real-world contexts. The results indicated that visual content creation tasks functioned not only as learning activities but also as meaningful experiences for developing future teachers' digital and pedagogical competencies. Therefore, integrating visual content creation assignments into EFL teacher education programs is recommended to support the development of digitally competent and innovative teachers.

INTRODUCTION

The use of digital technology in English as a Foreign Language (EFL) classrooms has transformed teaching practices and learning experiences in significant ways. English language teaching is no longer limited to textbooks and written exercises. Instead, students increasingly engage with visual materials, videos, digital graphics, and other multimedia resources as part of their regular learning activities. Digital tools have become widely integrated into language education because they present information through diverse and engaging modes, which can enhance students' attention, comprehension, and learning outcomes compared with text-only instruction (Mayer, 2021).

The use of visual and multimodal materials in language learning is supported by two interconnected theoretical perspectives. Multimedia Learning Theory, proposed by Mayer (2021), suggests that learners process and retain information more effectively when verbal and visual representations are presented together rather than through a single mode of representation. Building upon this perspective, Multimodality Theory (Kress, 2010) emphasizes that meaning-making in contemporary communication extends beyond linguistic elements and incorporates images, spatial arrangements, colors, and digital design as resources for constructing and interpreting messages. These theoretical frameworks demonstrate that visual content is not merely an additional resource in language teaching but a fundamental component of meaning construction and communication in digital environments (Mills 2015; Reyna et al. 2018; Vu et al. 2021).

An increasing number of studies have examined the role of visual and multimodal learning tools in EFL contexts. Carcamo and Carmona (2025) investigated the effects of an infographic-based multimodal literacy program on EFL reading skills. Their findings indicated that students who participated in the program demonstrated greater improvements in reading comprehension compared with those who received conventional instruction. Classroom observations and teacher records further indicated the effectiveness of the program in supporting learning processes. Similarly, Carcamo and Pino (2025) demonstrated that infographic-based activities contributed to the development of students' multimodal literacy and sustained engagement compared with traditional text-based activities. These findings align with broader research on digital multimodal composing (DMC), which indicates that engaging learners in meaning-making through multiple representational modes, such as infographics, digital stories, and presentation slides, can enhance motivation, creativity, and audience awareness (Jiang & Hafner, 2024). Serafini (2022) further argues that learning environments integrating textual and visual resources facilitate deeper and more meaningful understanding compared with approaches relying on a single mode of representation. Collectively, these studies highlight that visual content creation represents a valuable pedagogical approach for EFL learners (Bobkina et al. 2025; Tran et al. 2025; Yeh et al. 2026). However, a significant limitation within this body of research is that most participants have been general language learners rather than pre-service teachers. Furthermore, previous studies have primarily focused on learning outcomes, engagement, and multimodal communication practices, while providing limited insight into how future teachers perceive and experience these activities as part of their professional preparation.

The ability to utilize digital and visual resources has become increasingly important in teacher education. In contemporary classrooms, future teachers are expected not only to possess strong subject knowledge but also to design and deliver instruction through digital technologies and diverse media formats. Falloon (2020) argues that these competencies are best developed through authentic, task-based learning experiences rather than isolated technical training, as emphasized in the Teacher Digital Competency (TDC) framework. Belda-Medina and Calvo-Ferrer (2022) examined pre-service language teachers who participated in technology-based assignments and found that practical digital projects improved their digital competence and fostered more positive attitudes toward technology integration compared with conventional technology courses. Similarly, Kamalvand and Khany (2024) identified visual literacy as a measurable and essential competency for English language teachers, suggesting

that it should be explicitly incorporated into teacher preparation programs rather than expected to develop naturally. Irasuti (2024) further demonstrated that structured visual literacy training significantly improved Indonesian EFL teachers' ability to develop creative and innovative teaching materials. These findings support the importance of intentionally integrating visual content creation training into teacher education curricula (Davis 2017; Dockendorff et al. 2018; Eilam 2015).

The Technological Pedagogical Content Knowledge (TPACK) framework developed by Mishra and Koehler (2006) provides a comprehensive perspective for understanding the relationship among technological, pedagogical, and content knowledge. TPACK emphasizes that effective teaching in digital environments requires the integration of technology, teaching strategies, and subject knowledge rather than mastery of these domains independently. Tondeur et al. (2021) conducted a mixed-methods study and found that involving pre-service teachers in digital content creation activities was an effective approach for developing their TPACK competencies. Similarly, Instefjord and Munthe (2017) reported that digital competencies embedded within subject-specific teacher education were more sustainable and more frequently applied in professional contexts than competencies acquired through separate technology courses. Visual content creation assignments within EFL programs align with this integrated approach because they simultaneously promote digital competence development and contextualized language learning experiences. Jiang and Hafner (2024) further noted that second language teacher education remains one of the underexplored areas within DMC research and emphasized the need for further investigation into how future teachers are prepared to design and implement multimodal tasks involving images, sounds, and texts. This study addresses this research gap.

A growing number of studies have begun examining how digital content creation contributes to EFL teacher preparation. Sari et al. (2023) found that Indonesian pre-service English teachers who used Canva to develop instructional materials demonstrated increased creativity, technological confidence, and competence in producing educational content. Hafner and Ho (2020) reported that digital multimodal activities in second language learning environments helped learners connect formal classroom language with authentic, context-based communication. These studies demonstrate the value of digital content creation in EFL teacher education; however, they primarily examine students' products, digital skills, or classroom performance. Limited attention has been given to how pre-service teachers perceive these tasks and the meanings they attribute to such learning experiences.

Despite the growing body of evidence, an important research gap remains. Existing studies have predominantly examined comprehension, engagement, or skill development among general EFL learners rather than focusing on pre-service teachers as the primary research participants. Specifically, limited research has explored how future English teachers perceive visual content creation assignments across three interconnected dimensions: whether these activities generate interest and motivation as learning experiences (learning engagement), whether they are perceived as valuable components of teacher preparation (teaching preparation), and whether they contribute to deeper understanding of the English content they will later teach (understanding and meaning). This perspective is important because pre-service teachers' perceptions of learning activities may influence their readiness and willingness to adopt similar approaches in their future classrooms (Tondeur et al., 2021). Without

understanding students' responses to visual content creation assignments, teacher educators have limited evidence for evaluating whether these activities achieve their intended outcomes or require instructional refinement. Therefore, this study aims to address this gap by examining pre-service teachers' perceptions of visual content creation assignments across three key dimensions, providing insights for designing and integrating such activities into EFL teacher education programs.

METHOD

This study employed a descriptive quantitative design to investigate pre-service teachers' perceptions of visual content creation assignments in the context of English language teaching. A descriptive quantitative approach was selected because it enabled the researcher to systematically describe and interpret participants' responses using numerical data and statistical analysis (Creswell & Creswell, 2018).

The study involved 85 students from the English Language Education Program at Universitas Brawijaya. A purposive sampling technique was employed, with participants selected from the 2022 cohort based on the criterion that they had previously completed assignments involving visual content creation.

The research instrument was a questionnaire distributed through Google Forms in March 2026. The questionnaire consisted of 13 closed-ended items measured using a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The items were adapted from previous studies related to multimedia learning, visual literacy, and digital competence (Mayer, 2021; Redecker, 2022). The questionnaire covered three dimensions: engagement and motivation, learning effectiveness, and relevance to pre-service teachers' preparation.

The research procedure consisted of four stages. First, the questionnaire was developed based on relevant literature. Second, the instrument was validated through expert review and pilot testing, followed by a reliability assessment to evaluate internal consistency. Third, the validated questionnaire was distributed to participants through an online platform. Finally, the collected data were analyzed using descriptive statistical techniques.

Data analysis was conducted using descriptive statistics, including mean scores, frequencies, percentages, and standard deviations. The mean scores were interpreted based on the categories presented in Table 1.

Table 1. Mean score Interpretation

Category	Mean Interval
Very low	1.00 - 1.80
Low	1.81 - 2.60
Moderate	2.61 - 3.40
High	3.41 - 4.20
Very high	4.21 - 5.00

These categories facilitated the interpretation of participants' perceptions regarding visual content creation assignments. To ensure the reliability of the instrument, internal consistency was examined using Cronbach's Alpha coefficient. A Cronbach's Alpha value of 0.70 or higher indicates acceptable reliability (Field, 2018).

Table 2. Reliability Statistics

Cronbach's Alpha	N of items
0.924	13

The reliability analysis revealed that the questionnaire obtained a Cronbach's Alpha coefficient of 0.924, indicating excellent internal consistency. This result suggests that the questionnaire items consistently measured the intended constructs and that the instrument was reliable and suitable for data collection in this study.

RESULTS AND DISCUSSION

Learning Engagement

The first indicator assesses learning engagement. This indicator examines students' perceptions of the use of digital tools in the learning process and how visual digital media are applied in assignments. The descriptive statistics are presented in Table 3.

Table 3. Learning Engagement

Code	Item	Mean	SD
Q1	The task of creating visual content has made me more engaged in learning English.	4.25	0.64
Q2	Creating visual content increases motivation in English learning activities.	4.33	0.63
Q3	The task of creating visual content makes learning English more interesting.	4.32	0.70
Q4	I actively participated in English class when visual content creation assignments were given.	4.05	0.80
Q5	When creating visual content, I concentrate more on finishing the task given.	4.15	0.65

Data shows that the items received high mean scores, ranging from 4.05 to 4.33. The highest mean score was for Question 2 ($M = 4.33$, $SD = 0.63$), indicating that students agreed that creating visual content assignments can increase motivation in English language learning. This was followed by Q3 ($M = 4.32$, $SD = 0.70$) and Q1 ($M = 4.25$, $SD = 0.64$), which showed that visual content assignments make learning more engaging and increase student

involvement. Meanwhile, Q4 received the lowest mean score ($M = 4.05$, $SD = 0.80$), although it also falls within the high category.

Teaching Preparation

The second indicator focuses on teaching skills and readiness for the learning process. This indicator examines students' perceptions of how the creation of visual content contributes to the development of their skills, digital competencies, and readiness as pre-service English teachers. Descriptive statistics are presented in Table 4.

Code	Item	Mean	SD
Q1	The visual content creation assignment helps me to practice designing teaching materials for my future classes.	4.20	0.60
Q2	I feel more confident in using visual media to teach English after completing the visual content creation assignments.	4.28	0.70
Q3	Visual content assignments help me to develop the skills needed to teach English digitally.	4.14	0.65
Q4	The tasks of creating visual content are relevant to my role as a pre-service English teacher.	4.04	0.75
Q5	Creating visual content helps me see myself as a future English teacher who uses digital media effectively.	4.25	0.65

In Table 4, the items received high mean scores, ranging from 4.04 to 4.28. The highest mean score was recorded for Q2 ($M = 4.28$, $SD = 0.70$), indicating that students felt more confident in using visual media for English language learning after completing the tasks. This was followed by Q5 ($M = 4.25$, $SD = 0.65$) and Q1 ($M = 4.20$, $SD = 0.60$). The lowest mean score was found in Q4 ($M = 4.04$, $SD = 0.75$), although this score still falls within the high category.

Understanding and Meaning

The third indicator concerns learning comprehension. This indicator examines students' perceptions of how creating visual content can help them understand English learning materials

more clearly and meaningfully by linking concepts to real-life contexts. Descriptive statistics are presented in Table 5.

Table 5. Understanding and Meaning

Code	Item	Mean	SD
Q1	Creating visual content helps me understand English learning materials clearly.	4.11	0.55
Q2	Visual content creation helps me understand English learning materials more deeply by connecting concepts and ideas for teaching purposes.	4.14	0.62
Q3	Through visual content creation, I can relate English learning materials to real-life or familiar contexts to make learning more meaningful and joyful.	4.22	0.56

Table 5 shows that all items received high mean scores, ranging from 4.11 to 4.22. The highest mean score was found in Q3 ($M = 4.22$, $SD = 0.56$), indicating that students believed visual content creation helped them relate learning materials to real-life situations and made learning more meaningful. Q2 ($M = 4.14$, $SD = 0.62$) and Q1 ($M = 4.11$, $SD = 0.55$) also obtained high mean scores, suggesting that visual content assignments supported students' understanding of English learning materials.

The findings of this study reveal that EFL pre-service teachers at Universitas Brawijaya held positive perceptions of visual content creation assignments across three measured dimensions: learning engagement, teaching preparation, and understanding and meaning. The convergence of high scores across dimensions suggests that these assignments are not perceived as isolated academic exercises but as multi-functional learning experiences that simultaneously support motivation, professional readiness, and conceptual understanding. The following discussion interprets these findings in dialogue with relevant theoretical frameworks and empirical studies in EFL education, multimodal learning, and digital teacher competence development.

Learning Engagement

Participants described that visual content creation tasks increased motivation, engagement, and focus in terms of their English language learning. Multimedia learning theory which asserts that learners can process and retain information more effectively, when presented through visual and verbal channels simultaneously (Mayer's, 2021). However, the present result critically pushes the scope of this theory beyond its initial reception focus. Although Mayer's theory was originally conceived to account for the way learners engage with externally designed multimedia materials, the present data indicate that the act of producing visual content, learners as content creators for making a similar level of cognitive engagement and motivational investment. This production side application of multimedia learning theory

represents a significant theoretical extension that previous studies have failed to effectively explore with the population of pre-service EFL teachers.

This finding aligns well with recent empirical contributions to EFL visual learning. Cárcamo and Pino (2025) in their study with university level EFL learners found that infographic based activities promoted multimodal literacy and maintained student engagement over the whole process of learning. The present study in replicating this positive correlation between visual tasks design and that of learners' engagement extended to the pre-service teacher population. This distinction is theoretically imperative, as unlike general EFL students, pre-service teachers can harbour heightened levels of engagement because in regard to visual creation tasks, as a context of pre-professional education, they might be cognitively oriented towards its applicability to their further professional role in the classroom. In other words, professional identity and future-orientation could be additional motivational resources which enhance the effect of engagement among general learners (Cárcamo and Pino, 2025).

A careful reading of the data indicated an interesting pattern regarding this dimension, that the item that assesses the level of active participation in class obtained the lowest mean score, although it's still located in the high category. This relative gulf between scores requires substantial thoughts. One might suppose that visual content creation is considered only as a personal cognitive and creative endeavour, that is a doing out of class or alone as opposed to socially embedded, in class participatory activity. That this multimodal meaning-making reaches its maximum potential when it involves intersubjective negotiation and collaborative construction of meaning, not just personal production. If assigning visual tasks is majorly out of personal homework activities, their potentiality towards promoting in class participation could be constrained (Serafini's, 2022). Course producers need to take into account such things as structured peer review, gallery walk or collaborative design type as components included in visual content assignments, as far as these enable the social and participatory aspects of engagement.

Teaching Preparation

Pre-service teachers described that the visual content creation assignment helped build their confidence in utilising visual media as a resource in teaching, their competence in designing teaching materials and their readiness to conduct teaching digitally, which is located in high category. These perceptions agree well to the Technological Pedagogical Content Knowledge (TPACK) structures (Mishra & Koehler, 2006) which postulate that excellent teaching in digitally mediated environments require the simultaneous development of technological knowledge, pedagogical knowledge and content knowledge not as discrete competencies but an overlapping entity. The visual content creation tasks explored in this work appear to serve as real sites where exactly this synthesis was provided: participants need to simultaneously utilize their English language content knowledge, administer pedagogical judgment about how to convey that content to meaningfully learner, and use digital tools to realise their instructional designs.

This theory finding is supported by Tondeur et al. (2021), whose mixed method project with pre-service teachers from diverse institutions indicated that task based involving digital material design is among the most effective methods in building TPACK. The present finding as we were affirmed this evidence on EFL specific context and showed the effect at the level of participants' own perceptions rather than an evaluation through outside inspection of the

competence. This is a non-trivial addition of the literature, as self-perceived and self-efficacy are themselves predictors of subsequent technology integration behavior in professional teaching contexts (Falloon, 2020). Implying digital competences development in the subject specific teacher education task rather than keeping as an isolated element in a specific ICT modules have more perdurable integration of technology to trainees' professional identity. The visual content creation tasks in this research seem to imply this embedded pathway, where digital competences' development happen as a natural fruit of English language pedagogy, not as an isolated act on technical competences (Instefjord and Munthe, 2017).

The item on obtaining more confidence in utilising visual media in teaching obtained the greatest mean score in this dimension. This finding warrants closer, particular consideration, since the sense of self-efficacy in teaching, which is one's confidence in one's ability to perform a specified task of instruction, is well established as a predictor of technology integration in classroom practice (Falloon, 2020). Pre-service teachers that emerge from initial teacher education with higher levels of self-efficacy on visual and digital teaching pedagogy are likely to use such approaches in their future classrooms, even in resource-constrained classrooms. This indicates that visual content creation assignments might have longitudinal professional outcomes which far exceed their immediate impact on performance.

On the other hand however, the item on that the participants perceived as the importance in carrying out tasks to the role of pre-service teacher have lowest mean scores in this dimension, again, still located high. This relative gulf implies that despite the certainty that the majority of participants have the perspective of the importance of assignments, still there are sub sets of participants that could not fully consider the link. Pertinent explanation on this is that the pedagogical rationale of connecting visual content creation to professional competences of teaching were not adequately explained during the instruction. Research on the one hand consistently proves that the pre-service teacher benefits in transparent mapping of the course activities to the professional competency framework (Tondeur et.al., 2021). Course producers also are encouraged to add an explicit discussion to visual content creation tasks in regards to how that aligns with established digital teaching standards such as European DigCompEdu framework (Redecker, 23, 2022) which conceptualise in the context of Indonesia EFL.

Understanding and Meaning

On the other hand however, the item on that the participants perceived as the importance in carrying out tasks to the role of pre-service teacher have lowest mean scores in this dimension, again, still located in high. This relative gulf implies that despite the certainty that the majority of participants have the perspective of the importance of assignments, still there are sub sets of participants that could not fully consider the link. Pertinent explanation on this is that the pedagogical rationale of connecting visual content creation to professional competences of teaching were not adequately explained during the instruction. Research on the one hand consistently proves that the pre-service teacher benefits in transparent mapping of the course activities to professional competency framework (Tondeur et.al., 2021). Course producers also are encouraged to add an explicit discussion to visual content creation tasks in regards to how that aligns with established digital teaching standards such as European DigCompEdu framework (Redecker, 23, 2022) which conceptualise in the context of meaning is actually the precise work for understanding.

Relevantly, the top item on this dimension was a statement about capability to relate English learning materials to real life and familiar context. Such findings have critical implications for EFL pedagogy on the Indonesian context, as digital multimodal composing in second language learning found where learner generated digital artefacts are of most use in bridging the gap between decontextualized language training to authentic communicative meaning, since the act of creating need learners actively choose, and interpret and represent the real world examples (Hafner and Ho, 2020). This finding is corroborated by the present study, where the fact that pre-service teachers make visual content about English language themes force them actively to connect that abstract linguistic or pedagogical concept with the contexts that is personally or culturally meaningful to them. This process of contextualization is entailed in the design process itself, and is perhaps the reason that this item received the highest level within dimension.

The item stating deeper understanding by linking concepts have slightly lower mean than real-life relevance class categories, but fell in high level. This phenomenon could be a reflection of the difference of cognitive nature in the particular tasks given. Among the options of two modes, in multimodal composition, that are replication, where learners are asked to reproduce existing information in visual format, and transformation, where learners are asked to synthesize, interpret, or reconfigure knowledge critically into a new multimodal argument (Serafini, 2022). (The tasks assigned to the participants in this study might lay weighted toward replication, such as converting a text into a poster rather than synthesizing several perspectives into an original argument.) Thereby, the level of synaptic connection of deep conceptual understanding was naturally more constricted. Such interpretations are speculative in lack of task analysis, however these forward a productive course of future studies, that is examining the relationship between tasks design complexity and the depth of concept understanding in visual content creation.

Altogether, the pattern of result for this dimension where the strongest was real-life contextualization, slightly lower on deep conceptual synthesis resonated with finding of Cárcamo and Pino (2025), who found infographic based EFL activity was specific effective in connect language learning to personally significant context, but further analytical engagement is needed more scaffolded tasks. The current study expands their findings to production context. Pre-service teachers make visual content rather than having reaction in pre-made infographic, and ascertaining that the benefit of contextualization due visual task is still effective even if the participants act as content creator rather than consumer of the content.

CONCLUSION

This study investigated EFL pre-service teachers' perceptions of visual content creation assignments in English language learning. The findings indicated that participants generally had positive perceptions of these assignments across the three examined dimensions: learning engagement, teaching preparation, and understanding and meaning. Students perceived visual content creation assignments as motivating and engaging learning activities that supported their understanding of English learning materials and enabled them to connect learning content with meaningful contexts.

The findings further suggested that visual content creation assignments contributed to the development of competencies relevant to future teaching practice. Through these

assignments, students reported increased confidence in using visual media, improved digital competencies, and greater readiness to design instructional materials for technology-enhanced learning environments. Therefore, visual content creation assignments can be considered a valuable component of EFL teacher education because they support both learning experiences and professional preparation.

Based on these findings, teacher education programs may consider integrating more visual content creation activities into EFL courses to support the development of digital and pedagogical competencies. Future research may involve participants from different institutions or employ mixed-method approaches to gain deeper insights into how visual content creation contributes to pre-service teachers' professional development and classroom readiness.

REFERENCES

- Cárcamo, B., & Carmona, C. (2025). Improving EFL students' multimodal literacy through infographics. *ELT Journal*, 79(2), 205–215. <https://doi.org/10.1093/elt/ccae049>
- Cárcamo, B., & Pino, B. (2025). Developing EFL students' multimodal literacy with the use of infographics. *Asian-Pacific Journal of Second and Foreign Language Education*, 10(1), Article 16. <https://doi.org/10.1186/s40862-025-00322-3>
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage.
- Bobkina, J., Baluyan, S., & Dominguez Romero, E. (2025). Tech-enhanced vocabulary acquisition: Exploring the use of student-created video learning materials in the tertiary-level EFL (English as a Foreign Language) flipped classroom. *Education Sciences*, 15(4), 450.
- Davis, M. (2017). *Teaching design: A guide to curriculum and pedagogy for college design faculty and teachers who use design in their classrooms*. Simon & Schuster.
- Dockendorff, M., & Solar, H. (2018). ICT integration in mathematics initial teacher training and its impact on visualization: The case of GeoGebra. *International Journal of Mathematical Education in Science and Technology*, 49(1), 66–84.
- Eilam, B. (2015). *Promoting preservice teachers' meta-representational (visual) competencies: The need for a new pedagogy*.
- Falloon, G. (2020). From digital literacy to digital competence: The teacher digital competency (TDC) framework. *Educational Technology Research and Development*, 68(5), 2449–2472. <https://doi.org/10.1007/s11423-020-09767-4>
- Field, A. (2018). *Discovering statistics using IBM SPSS Statistics* (5th ed.). Sage.
- Hafner, C. A. (2021). Multimodal composing in English language teaching: Teacher knowledge and pedagogy. *RELC Journal*, 54(1), 5–21. <https://doi.org/10.1177/0033688220981757>
- Hafner, C. A., & Ho, W. Y. J. (2020). Digital multimodal composing and second language learning. *Language Learning & Technology*, 24(2), 1–13.
- Instefjord, E. J., & Munthe, E. (2017). Educating digitally competent teachers: A study of integration of professional digital competence in teacher education. *Teaching and Teacher Education*, 67, 37–45. <https://doi.org/10.1016/j.tate.2017.05.016>
- Kamalvand, A., & Khany, R. (2024). Development and validation of an English teachers' visual literacy scale for smartphone photography grounded in social semiotic theory. *Language Testing in Asia*, 14, 38. <https://doi.org/10.1186/s40468-024-00307-y>
- Kress, G. (2021). *Multimodality: A social semiotic approach to contemporary communication* (2nd ed.). Routledge.
- Mayer, R. E. (2021). *Multimedia learning* (3rd ed.). Cambridge University Press.

- Mills, K. A. (2015). *Literacy theories for the digital age: Social, critical, multimodal, spatial, material and sensory lenses*. Multilingual Matters.
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017–1054. <https://doi.org/10.1111/j.1467-9620.2006.00684.x>
- Redecker, C. (2022). *European framework for the digital competence of educators: DigCompEdu*. Publications Office of the European Union.
- Reyna, J., Hanham, J., & Meier, P. (2018). The internet explosion, digital media principles and implications to communicate effectively in the digital space. *E-Learning and Digital Media*, 15(1), 36–52.
- Sari, M. I., Utari, S. D., & Arfiandhani, P. (2023). Creating English learning media using Canva: EFL students' perspective. *Teaching English as a Foreign Language Journal*, 2(2). <https://doi.org/10.12928/tefl.v2i2.467>
- Tondeur, J., Scherer, R., Siddiq, F., & Baran, E. (2021). Enhancing pre-service teachers' technological pedagogical content knowledge (TPACK): A mixed-method study. *Computers & Education*, 170, 104224. <https://doi.org/10.1016/j.compedu.2021.104224>
- Tran, T. T., & Nguyen, T. B. (2025). AI-infused visual pedagogy: Enhancing EFL instruction with tailored image generation and academic insights. In *AI applications for English language learning* (pp. 179–194). IGI Global Scientific Publishing.
- Vu, N. N., Hung, B. P., Van, N. T. T., & Lien, N. T. H. (2021). Theoretical and instructional aspects of using multimedia resources in language education: A cognitive view. In *Multimedia Technologies in the Internet of Things Environment* (Vol. 2, pp. 165–194).
- Yeh, H.-C., & Fu, J. S. (2026). Multimodal video projects as a catalyst for language proficiency, problem-solving, and creativity. *Interactive Learning Environments*, 34(4), 2079–2091.