

Digital storytelling projects for developing Indonesian EFL pre-service teachers' metasemiotic awareness and professional competence

Nur Arifah Drajati^{1*}, Lynde Tan², Agustina Tyarakanita³, and Surya Agung Wijaya⁴

^{1,3,4}*Department of English Education, Faculty of Teacher Training and Education, Universitas Sebelas Maret, Surakarta, Indonesia*

²*Department of Primary Education, Primary Literacy Curriculum and Pedagogy, Western Sydney University, Sydney, Australia*

ABSTRACT

Despite the widely-cited potential of digital storytelling (DST), its use in EFL education remains under-explored in Indonesia. Thus, EFL pre-service teachers (PSTs) in Indonesia are not sufficiently prepared to create digital and multimodal teaching materials using pedagogical approaches like DST since EFL education still prioritizes language and has not yet acknowledged other meaning-making modes for communication. In order to fill in the gap, we invited 20 pre-service teachers (aged 22 to 24) in Central Java to be involved in our study. Employing a case study with intervention and using classroom observations, artifacts, and reflections to collect the data, this study aimed to increase pre-service teachers' metasemiotic awareness and professional competence by involving these PSTs in examining the linguistic and visual modes whilst creating digital stories for EFL teaching. Furthermore, we discussed the approach to facilitate the processes to achieve this dual aim. The findings highlighted both the importance of teaching EFL from a multimodal approach and the pedagogical implications for Indonesian EFL pre-service teacher education.

Keywords: Digital storytelling; English as a foreign language; metasemiotic awareness; participatory case study; professional competence

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INTRODUCTION

The digital age has massively shifted the learning mode and heightened the importance of equipping pre-service teachers (PSTs) with using multimedia technologies to design teaching materials (Çebi et al., 2022; Park & Son, 2022; Tan et al., 2019). Despite the urgent need, teachers in Indonesia have not received adequate support in developing this teaching competency (Tyarakanita et al., 2021). In this technological era, it is essential to train PSTs to use digital technologies creatively and effectively and know how to evaluate the affordances of technologies and their educational uses. We argue

that it is also a priority to train PSTs to select and design appropriate learning materials using digital technologies. This priority has not been given adequate attention in the articulation of teachers' *professional competence* based on the Law of the Republic of Indonesia Number 14 of 2005. Professional competence in the context of teaching is used to build competence within a profession and includes several dimensions of competence (such as professional knowledge, situated skills, and performance) (Baumgartner, 2022).

It is not wise to solely focus on the linguistic mode when developing teachers' professional

* Corresponding Author

Email: nurarifah_drajati@staff.uns.ac.id

competence in the digital age. We contend that designing multimodal teaching material, such as a digital story, is an integral aspect of a teacher's professional competence. The process of creating a digital story requires a PST to demonstrate mastery of the teaching materials (e.g., the topic featured in the digital story), knowledge (e.g., metasemiotic knowledge of meaning-making potentials), technology, art, and culture. Although designing digital stories may be overwhelming for PSTs, it will equip them to acquire a new skill and benefit their future occupation (Çıralı Sarıca & Usluel, 2022). For instance, creating a digital story is beneficial for preparing PSTs to learn how to construct meaning and create hybrid text to deliver the message for designing learning materials, as it encourages creativity and critical thinking (Jones et al., 2022; Kukul, 2023), as well as engagement, motivation, and collaboration (Schmoelz, 2018). Despite these educational uses and benefits, DST is yet to be explored in PST education in Indonesia. This gap points clearly to the need to expand the notion of professional competence in Indonesian teacher education.

Multimodal Meaning-Making and Multimodal Texts

The functional approach to language emphasizes language as one of many resources for meaning-making (Eggins, 1994). This perspective has been built on the work of Michael Halliday (1994); he argued that a text is a meaning-making unit that can be analyzed in terms of the metafunctions it serves (Halliday, 1985) – the ideational, interpersonal, and textual meanings. These components of metafunction can be summarised as follows: (1) how language represents the world and our experience (ideational) (2) establish relationships with others (interpersonal), and (3) create cohesive and coherent text (textual) (Halliday, 1994). On the ideational level, it is necessary to consider how the multimodal texts used in the digital story construe the reality of the process, participants, and circumstances of the events. On the interpersonal meaning level, it is about how the digital story

encourages a particular social relationship between writer and reader and represents the writer's attitudes. Finally, the textual meaning is about how the story is organized and how the messages that will be conveyed are presented in the story.

Other systemic functional linguists like Kress and van Leeuwen (1996) extend Halliday's metafunctional language theory to visual images to develop visual grammar. The metafunction on language theory was renamed in visual images as representational (pattern of experience), interactive (the interaction between the producers of image and viewer), and compositional (arrangement of visual elements) meanings. Representational meaning is that 'any semiotic mode must be able to represent aspects of the world as it is experienced by humans' (Kress & van Leeuwen, 2006, p.42). Interactive meaning is about the constructed meaning of the makers and viewers of the image that is realized through contact, social distance, attitudes, and modality. 'Any mode must represent a particular social relation between the producer, the viewer, and the object represented' (Kress & van Leeuwen, 2006, p.42). The compositional meaning is elements that connect the representational and interactive meaning into a purposeful whole in terms of interconnected systems. Kress and van Leeuwen emphasize that 'semiotic mode can form text, a complex of signs which cohere both internally with each other and externally with the context in and for which they were produced' (2006, p.43).

Defined as the process by which people use semiotic resources to make meaning in social settings, multimodal meaning-making focuses on the processes and outcomes of semiotic production. In addition, the use of various range of representational mode has the potential of multimodal meaning-making as each mode are bounded by autonomous communicational resources in culture (Kress & van Leeuwen, 2021). However, many teachers experience insufficient knowledge of multimodal text creation. Thus, there is a need to provide opportunities for teachers to develop their multimodal meaning-making knowledge (Dahlström, 2022).

Table 1
When text and images make meaning

Halliday's (1994) metafunctional theory	Kress and van Leeuwen (1996) visual grammar	Multimodal meaning
ideational	representational	how to do with language and visuals representing human experience.
interpersonal	interactional	how to maintain particular social relationships, roles, or identities through language and visuals.
textual	compositional	how to do with communication with language and visual resources for organizing texts and various elements within the image.

In the digital age, multimodality is characteristic of many texts; a multimodal text uses linguistic, visual, auditory, gestural, and/or spatial modes with each mode having its own system to express meanings (Tan et al., 2019; Tan & Zammit, 2018). For example, printed picture books, films, websites, comic graphic novels, and digital games are common multimodal texts. There are studies that have reported the use of multimodal EFL textbooks that have been approved by the Indonesian Ministry of Education and Culture (e.g., Widodo, 2018; Puspitasari et al., 2021). However, in these studies, it has been reported that the visual mode has been used solely for aesthetic purposes, whilst the key content is primarily communicated using the linguistic mode. Additionally, multimodal EFL textbooks in Indonesia tend to concentrate on basic language skills like reading and writing and are used to represent social-cultural stereotypes (Setyono & Widodo, 2019; Tyarakanita et al., 2021).

Tan et al. (2019) found that Indonesian teachers had insufficient skills in teaching multimodal text. They required a more direct and integrated approach to promote multimodal literacies to increase metasemiotic awareness for teaching purposes. Developing EFL PSTs' reading and writing skills would be insufficient to develop them as proficient communicators (Jukes et al., 2010). Sindoni and Moschini (2022) argue for the importance of mentoring PSTs in multimodal communication alongside digital skills and other knowledge to secure future success in their teaching career.

Composing Digital Storytelling for Language Teaching

Digital storytelling and digital stories are popular among children, parents, and teachers for shared reading activities and as materials to help gain knowledge and values (Hébert et al., 2020; Smeda et al., 2014). For more than 20 years, DST has influenced learners and educators to enact and design short stories with images, voices, text, pictures, and colors with countless themes (Robin & McNeil, 2016). DST can be in the form of a short video or web-based (Choi, 2018) presentation, virtual reality (e.g., Liang et al., 2017), and augmented reality (e.g., Yilmaz & Goktas, 2017). Multimodal forms of activities on digital storytelling and digital stories help learners and educators provide opportunities to achieve the purpose of building knowledge to educate, assess, reflect, and communicate in many countries (Burgess & Rowsel, 2020; Mills & Doyle, 2019; Morabito & Abrams, 2015; Smith et al., 2020). Digital storytelling and digital stories can also be used to support teachers in teaching various subjects and facilitate their digital literacy (Kim & Li, 2021).

Prior studies on DST have reported benefits for teachers in learning English language skills and

21st-century skills (Quah & Ng, 2022; Wu & Chen, 2020), creativity and critical thinking (Yang & Wu, 2012), engagement, motivation, and collaboration (Schmoelz, 2018). In a study investigating the impacts and influence of media in teaching and learning English in Singapore, Towndrow and Pereira (2018) found that creating digital stories was useful for building the teacher's semiotic awareness. Specifically, the teacher could tailor the learning materials between unique voices and their interconnections across various modes. However, it should be highlighted that the expression of meaning presented by the teacher in their DST can be innate from their perspectives of culture and language. The meaning is shaped culturally and historically rather than belonging to specific semiotic modes (Kress & van Leeuwen, 2006).

Creating digital stories allows PSTs to integrate a variety of semiotic modes with the convergence of multimedia. DST offers the potential for active learning and enhancing Indonesian EFL PSTs' multimodal communication and metasemiotic awareness. The DST creation process contributes to the teachers' metasemiotic awareness and digital, narrative, and creative competence (Del-Moral-Pérez et al., 2019) associated with teachers' professional competence. Because the creation of DST comprises the process of narration creation from the images, photographs, illustrations, etc., accompanied by a voice-over and background, it requires different language and creative skills as well as technological skills. Such potential remains under-investigated in the current literacy research and EFL education associated with developing Indonesian PSTs' professional competence. This research supports the PSTs in creating a collaborative DST project to see their multimodal perspective of meaning-making design and awareness of integrating various semiotic resources on text for future practice.

Therefore, the research question posed in this study was, 'How does creating DST EFL promote professional competence beyond linguistic competence?'. In this paper, we discuss the approach used to facilitate the processes to achieve the dual aim of increasing Indonesian EFL PSTs' metasemiotic awareness whilst developing their professional competence in using DST to design materials for EFL teaching. By enabling PSTs to understand the meaning-making potential of semiotic resources, they were given opportunities to draw on their background knowledge to develop appropriate teaching materials critically and intentionally. The processes used to facilitate our approach to expand the PSTs' professional competence underscore the importance of teaching EFL from a multimodal approach. Such an approach bears pedagogical implications for Indonesian EFL PSTs education, which we shall discuss at the end of this paper.

METHOD

Research Context

This study was conducted in one university in Indonesia with 25 PSTs (aged 22-24) who did not have any experience in designing DST and teaching with DST. They attended a Systemic Functional Linguistics (SFL) class where the aims of this class were to build PSTs’ multimodal awareness framework by understanding language structure, language teaching, and critical analysis from various

modes (see Table 2). As participants in this study, they were required to have TOEFL scores of 500 for language proficiency (university policy), experience in microteaching and teaching practicum, and experience in designing software skills (e.g., CorelDraw, Adobe Illustrator, etc.). PSTs were formed into three large teams (8- 9 people) and three divisions in each group (e.g., the story, the exercise, and the illustration and ICT divisions).

Table 2

Preservice teachers’ group information

Group	Project	Description
Group A	Batik, the Eternal Clothes	The DST is about the history of batik (eternal clothes) used by the royal family in Java. The group also described the detail of what batik is. They also implicitly suggest that the readers wear a batik mask to prevent the spread of COVID-19.
Group B	Tumpeng	The DST is about introducing traditional cuisines called Tumpeng. They also discussed the terminology and nutrition of each ingredient. They also suggest that readers eat healthy food to maintain their immune systems and avoid spreading COVID-19.
Group C	The Story of Roro Jonggrang	The DST is about the history of the Prambanan temple as the most wonderful place in Indonesia. They also implicitly inform the readers to maintain social distancing during COVID-19.

This study used a case study (Yin, 2018) with an intervention that aimed to enable researchers to modify or propose a new idea based on participants’ specific needs and characteristics to facilitate their engagement and involvement and develop new skills during the study (Barlow et al., 2009; Gast, 2010). However, Barlow et al. (2009) point out that case studies do not allow generalization of the study.

In the study, the PSTs undertook a course on Systemic Functional Linguistics and Visual Grammar. The second, third, and fourth authors designed the conceptual framework as a pilot DST program to increase metasemiotic awareness and professional competence, and it was implemented by the first author as the lecturer. Robin and

McNeil’s (2019) scaffolding 12-step process for DST was chosen to conceptualize, design, and implement to build metasemiotic awareness where they started their ideas by choosing a topic, conducting the research topic, writing a draft, receiving feedback, revising the script, designing the image, respecting copyright, and creating a storyboard. Then, we tailored and used Robin and McNeil’s (2019) scaffolding 12-step process integrating with a conceptual model of three metafunctions as an intervention that we categorized the activities into three layers (Figures 1-3). However, the implementation of the layers was not in linear order, but PSTs can go back and forth in the process of each layer.

Figure 1

Building metasemiotic awareness

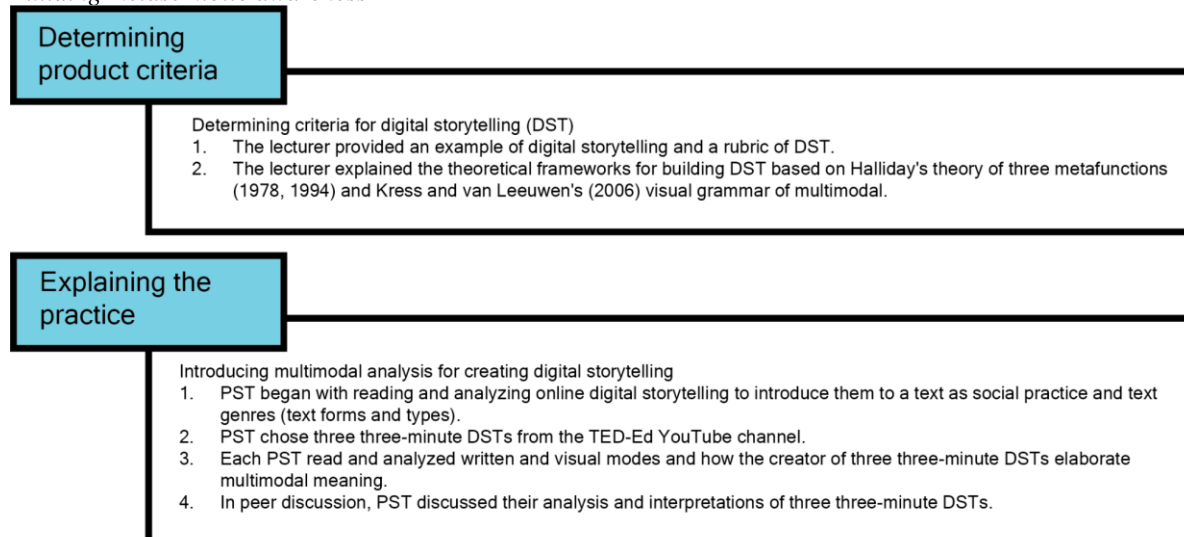


Figure 2
Creating digital storytelling

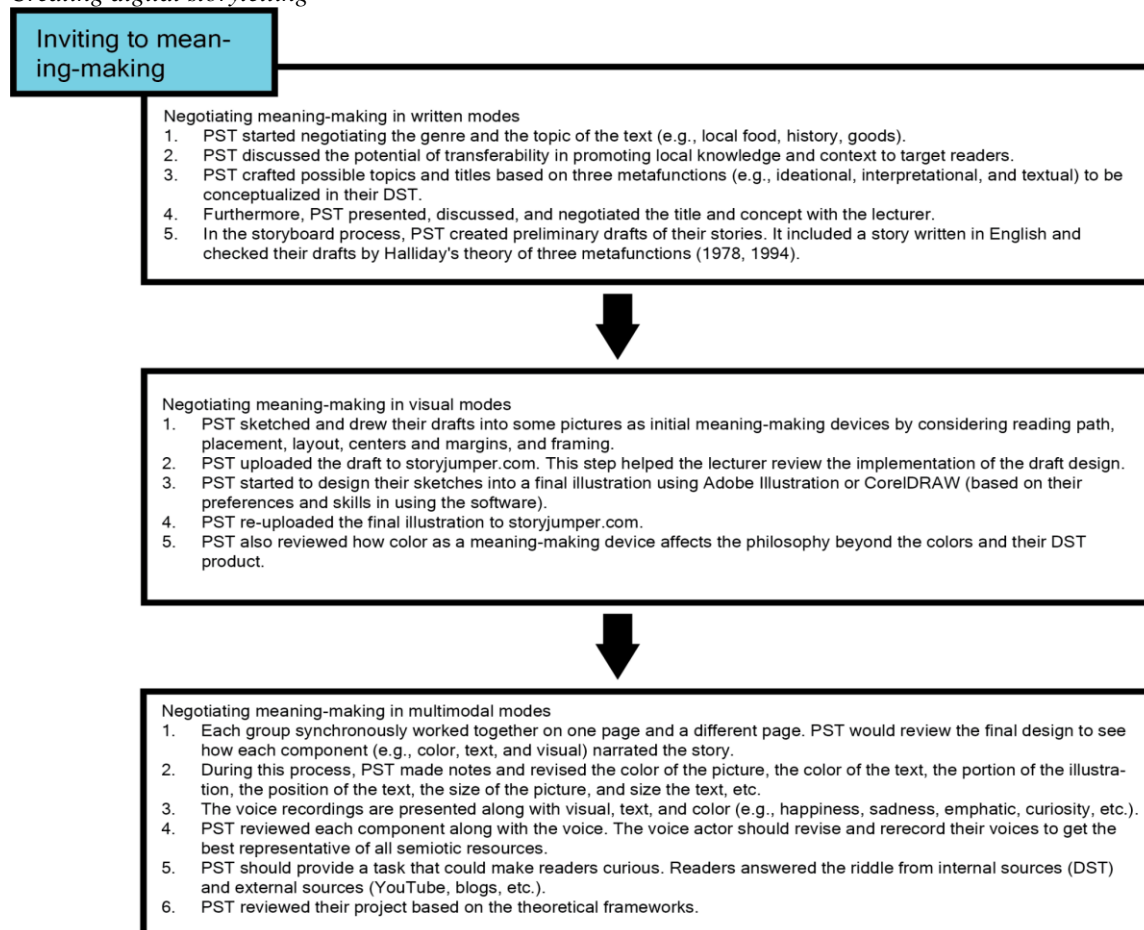
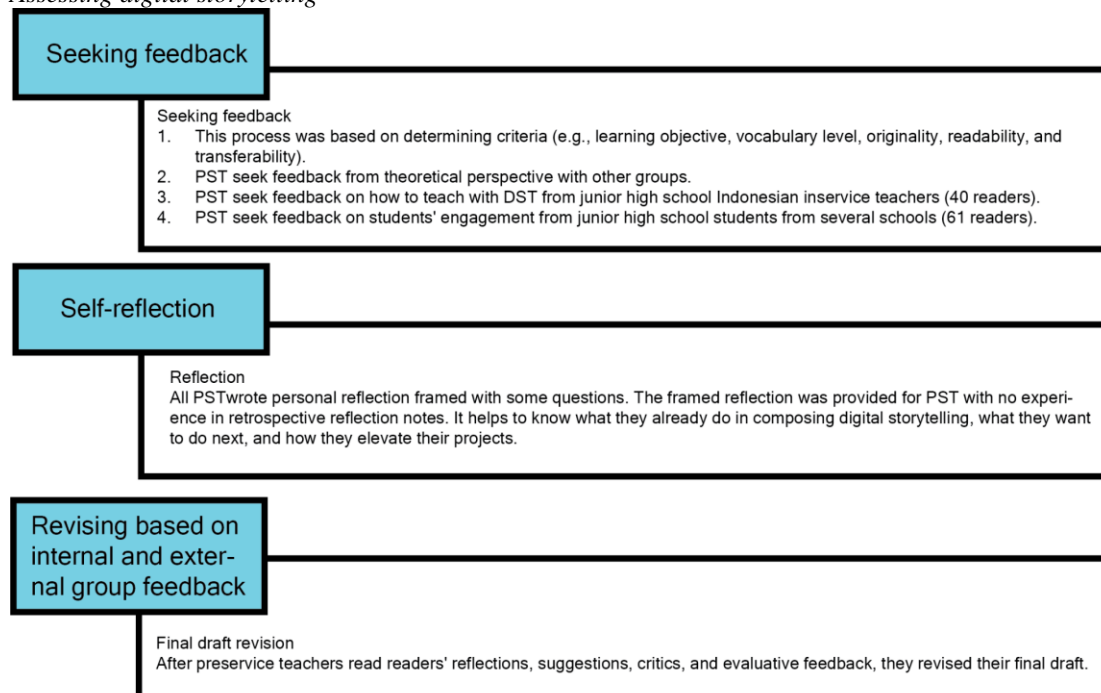


Figure 3
Assessing digital storytelling



The first layer was “determining product criteria and explaining the practice”. Initially, the students did not have any background knowledge of metafunctional language theory, visual grammar, multimodal meaning-making, and how to design and create DST. The participants needed to be guided to understand the whole project. The lecturer and PSTs discussed the output and the rubric. Then, the lecturer encouraged PSTs to build and shape PSTs’ metasemiotic awareness by giving theoretical foundations and asking them to engage in analyzing activities (See Figure 1)

In the first layer, semiotic awareness was measured by PSTs’ analysis of DST. Then, they had a discussion of their analysis with their class. PSTs seek feedback from each other regarding their analysis result. They were encouraged to discuss what they recognized and missed from their analysis.

In the second layer, we enhanced the PSTs’ engagement toward metasemiotic awareness by asking them to create collaborative DST. We divided the designing activities into three focus aspects focusing on written, visual, and multimodal modes. First, written-mode activities were deconstructed and constructed based on Halliday’s three metafunctions. Second, visual-mode activities focused on PSTs interpreting written modes into visual modes by considering visual grammar. Third, PSTs had to evaluate how each mode communicates and makes meaning.

On the third layer, PSTs conducted self-reflection and sought feedback from other readers, and revised their work. The purpose was that they could find the strengths and weaknesses of their DST works.

Data analysis

We conducted Braun and Clarke’s (2006) thematic analysis by reading carefully, noting, and highlighting each piece of data source (e.g., classroom observation data, PSTs’ tasks, the three DST books, and reflection). Thus, we compared the data to find the similarities and differences. The coded data were grouped based on the various emergent themes. These themes were employed to portray how Halliday’s theory of three metafunctions (1994) and Kress and van Leeuwen’s (1996) visual grammar into DST can be promoted for professional competences. By understanding professional competences and each relationship to metasemiotic awareness, we can gain a comprehensive understanding of how creating DST promotes professional development beyond linguistic competence. There were 1) PSTs’ awareness of metasemiotic, 2) PSTs’ criteria on metasemiotic awareness, 3) seeking feedback on building metasemiotic awareness, and 4) reflection on their professional competence and metasemiotic awareness.

FINDINGS AND DISCUSSION

In this part, the study’s findings are presented in three separate headings that discuss the approach used to facilitate the processes to achieve the dual aim of increasing Indonesian EFL PSTs’ metasemiotic awareness whilst developing their professional competence.

PSTs’ awareness of metasemiotic

Student-centered and teacher-centered course designs are complementarily implemented in the SFL class. However, as the PSTs were new to DST, they perceived most of the direct instruction from the lecturer at the initial meeting. Teachers transmit knowledge about Halliday’s (1994) Systemic Functional Linguistics and Kress and van Leeuwen’s (2006) three layers of multimodal meaning-making principles by providing examples of a digital story representing the theories.

Initial classroom observation showed PSTs’ low metasemiotic awareness (Dahlström, 2022; Tan et al., 2019), so the lecturer provided an overview of the verbal and visual representation in the example of a DST to engage the PSTs in understanding the product criteria. The lecturer also initiated dialogue with PSTs by encouraging brainstorming and questioning how meaning interacts with a passage and accompanying visual objectives. It helped them realize how the constructed multimodal communicative act could foster the PSTs’ positive affect and attitude toward learning English and cultures (Wünsch-Nagy, 2020; Teo & Zhu, 2018). Further, preservice teachers also queried to research other DSTs on the internet to broaden their insight (Robin & McNeil, 2019).

To achieve a successful DST project, PSTs must challenge critically and effectively the content and multimodal aspects, considering the readers’ perspectives (Yang & Wu, 2012) and various verbal and non-verbal strategies (Mowafy, 2022). Some PSTs indicated the initial building of their metasemiotic awareness when they critically analyzed the impact of DST analysis on their understanding of multimodal resources. The following is a sample of one PST who thinks exploring digital stories is challenging and beneficial for the digital story production process.

When analyzing the 3-minute digital stories, I realized that it is crucial to consider the components of text, picture, and sound, considering the target readers’ perspectives. Moreover, developing or making materials for preservice teachers is more complex than it looks. We cannot just adapt, do the editing process, and then it is done. We must figure out the visual and verbal text components we will present. Creating a story is complicated and requires a long time to evaluate and revise to achieve the best version of the learning material. (Group C member)

Moreover, engaging PSTs in analyzing other DST projects is beneficial for preparing a digital story creation. Goodman (1996) stated that reading focuses on what is written in the text and how readers sense it. Reading other DSTs builds up one's background knowledge about what kind of project s/he will make. The forms of DST created by the teachers in this study were in digital book format. So, the initial process of analyzing a digital story

was in the form of video to make the preservice teachers critically understood various semiotic resources. Moreover, pre-service teachers must also know language and tools to analyze language to understand the subject matter demand, support literacy development, and critically approach their text (Svensson et al., 2009). The following (Figure 4) is an example of a digital story analysis from group C.

Figure 4
Group C member's analysis task



Title of the first video: HOW SOAP KILLS THE CORONAVIRUS

Link: <https://youtu.be/-LKVUarhtvE>

The reason for choosing the Video: Coronavirus is a big issue right now, and this video gives people education about how to stop the spread of coronavirus

Contextual Parameter:

- **Field** : This video shares health and science knowledge, so the term "virus," "lipid," and "nucleus" are used in this video. It tells the audience to keep healthy and stop the spread of coronavirus by washing hands.
- **Tenor** : This video involves two participants: the speaker/narrator as the expert and the audience as a novice seeking information.
- **Mode** : This video is categorized as a formal spoken monologue since it often uses rhetorical questions. Visual elements support it.

NO	SCENE	DATA ANALYSIS																
		LINGUISTIC (VERBAL)	NON-LINGUISTIC (VISUAL)															
1.	 <p>Figure 1.1</p>  <p>Figure 1.2</p>	<p>1) The Ideational Level The first scene sentence is in the active voice and declarative form.</p> <table border="1"> <tr> <td>the best way to prevent the spread of coronavirus</td> <td>is</td> <td>to wash your hands</td> </tr> <tr> <td>Identified</td> <td>Relational process</td> <td>Identifier</td> </tr> </table> <p>Here, "is" as a relational process indicates that if people wash their hands, they can prevent the spread of coronavirus.</p> <p>2) The Interpersonal Level</p> <table border="1"> <tr> <td>the best way to prevent the spread of coronavirus</td> <td>is</td> <td>to wash your hands</td> </tr> <tr> <td>Subject</td> <td>Finite</td> <td>Complement</td> </tr> <tr> <td>Mood</td> <td></td> <td>Residue</td> </tr> </table> <p>Here we can see that the speaker has a higher</p>	the best way to prevent the spread of coronavirus	is	to wash your hands	Identified	Relational process	Identifier	the best way to prevent the spread of coronavirus	is	to wash your hands	Subject	Finite	Complement	Mood		Residue	<p>1) The Representational Level Three screenshots of the first scene are taken. One participant in the scene is a guy who acts as a news anchor with a picture behind him showing somebody washing his hand along with the written text. There is no sound from the news anchor since a narrator delivers the whole information in the video. In figure 1.1, the news anchor seems like delivering news about the coronavirus with a headline beside him. Then the headline is zoomed-in figure 1.2 to highlight the words "Stopping the spread" with someone washing his/her hands' background. The background represents the way how to stop the spread of the virus. Figure 1.3 shows a coronavirus illustration and some basic precautions to elaborate on figure 1.2 clearly. The scene shows meaningful learning, as before the speaker explains further about how to stop the coronavirus, the speaker recalls the general knowledge of washing hands through the picture.</p>
the best way to prevent the spread of coronavirus	is	to wash your hands																
Identified	Relational process	Identifier																
the best way to prevent the spread of coronavirus	is	to wash your hands																
Subject	Finite	Complement																
Mood		Residue																

PSTs' criteria on metasemiotic awareness

Preservice teachers determine the target readers of the story and the stance of the digital story. Here, the preservice teachers preferred to use a describing text tone. When creating a digital story, it is important to know how they choose a way to speak to the reader (Kress et al., 2001). The following is the sample statement of one preservice teacher.

In the story we created, we use descriptive text. The title is Tumpeng. The purpose of this text is to describe the philosophy of Tumpeng. For the first time, my team and I tried to find an interesting and attractive topic for the reader. So, we decided to choose Tumpeng as a topic for our project. At the beginning of our story, we provide information on the birthday party in the general context. Then, we explain how birthday parties in the Indonesian context can use Tumpeng to change the tart cake. It will give the preservice teachers a gap of culture

between Indonesian and Western cultures. (Group B member)



Moreover, when negotiating the topic of a digital story, all groups determined several local contexts (e.g., local food, history, or goods) as the topic of their project. For example, group B chose the topic of Tumpeng, a local Indonesian food. The following is an example of a PST's statement about the local context that his group chose.

We chose the topic of local food called "Tumpeng". I expected that people could learn more about Tumpeng. Many Indonesian people need to learn the history of Tumpeng. In addition, by reading this digital story, they also could learn about the positive impact of the nutrition contained in Tumpeng. (Group B member)

Tumpeng was an everyday concrete knowledge connected to history (traditional food from Indonesia) and Biology (nutrient content). Those messages were combined with areas of expertise to make new meanings (Kress et al., 2001). Moreover, PSTs also mind how to facilitate and constrain active meaning-making in the digital

story in their storyboard. In the pre-element selection, when creating stories, the writers had to deal with the spatial order of social interaction or human mastery over nature. The following (Figure 5) is an example of storyboard negotiations from group B and a statement from one of the members.

Figure 5
Group B storyboard

No	Pictures	Texts	Audio Texts
1		Tumpeng /tumpêng/ may sound unfamiliar to you, but you may know about a birthday party well. Most of the rest of the world may prefer to use a cake to celebrate their birthday parties. At the party, you may invite your family, friend, and clique. Then, you will cut out the cake and give it to some people. Why should it be a cake? In western countries, the staple foods are corn, root, and wheat milled into a flour.	Student O : Tumpeng may sound unfamiliar for some people, but you know a birthday party well. Student O : It is identical with a cake, right? Student O : We will meet family, friend, and clique Student O : You will cut out the cake and distribute Student O : Why should it be a cake? Student O : In western countries, the staple foods are corn, root, and wheat milled into a flour.
2		However, in eastern countries, especially Indonesia, we love rice. Moreover, we celebrate our gifts by presenting Tumpeng. We present Tumpeng in every single celebration such as housewarming, Independence Day, and also a birthday party. So, what is Tumpeng?	Student O : But, in eastern countries, especially Indonesia, we love rice. Student O : So, we celebrate with Tumpeng Student O : for a housewarming, Independence Day, Indonesia's thanksgiving, religious, moment/celebration, and also a birthday party.

In our story, the foreigners celebrate a birthday party with cake to bridge the cultural gap between Tumpeng and the target viewers. Indonesians celebrate a birthday party with Tumpeng as a representative of using Tumpeng in real life, which is common in every culture. Therefore, it will engage the viewers. Then, Tumpeng is the highlight that is portrayed as a representative of “one for all and all for one”, even though the components consist of different things. However, they could combine into one and appear in many Indonesian celebrations from Sumatra to Papua. (Group B member)

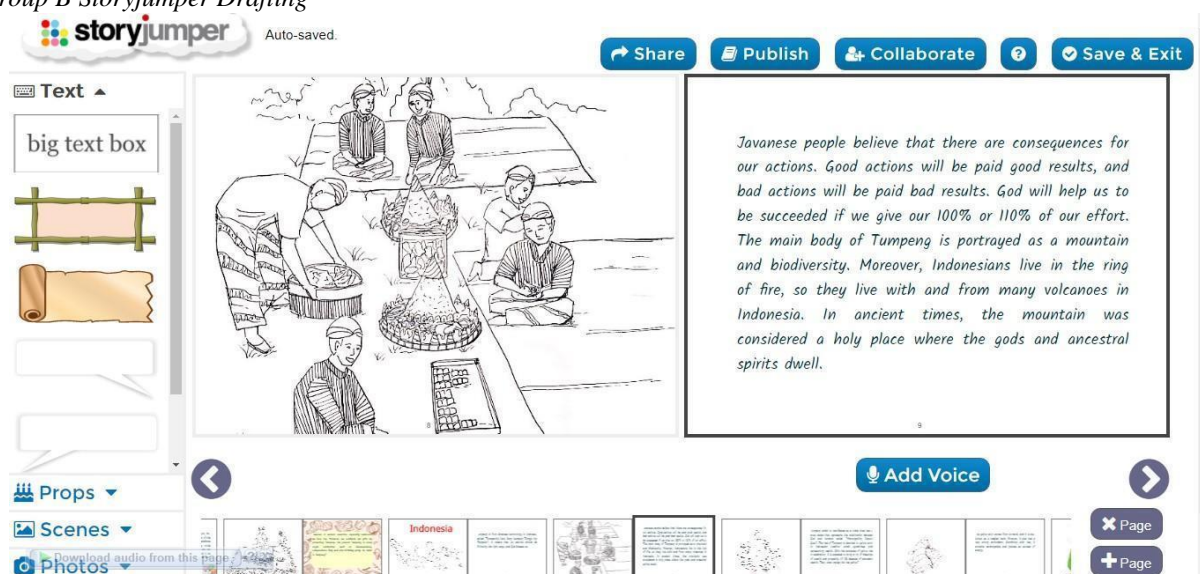
In creating a storyboard, the visual structure can be either narrative, presenting action or events, the process of change and transitory spatial arrangements, conceptual, or representing a participant in a more generalized and timeless essence (Kress & van Leeuwen, 2021). When designing the sign of social action, group B presented the visual representation by relating events of birthdays to the topic of Tumpeng. The pictures in Figure 5 show the transactional process, in which the people as the actors see the goal of the cake or Tumpeng in front of them. Moreover (see Figure 5), pre-service teachers also mind the verbal text that will be presented besides considering the visual text. To facilitate digital storytelling learning

for DST readers, it is essential to use both visual and verbal text simultaneously. However, Group B also needed clarification regarding interweaving audio and text. During the drafting storyboard text of DST, their audio did not verbalize the written text.

In the story jumper platform, PSTs synchronously worked together on one page and a different page. They started to negotiate for each element of verbal and non-verbal modes (Mowafy, 2022) to work together in the real book. The following (Figure 6) is a sample of the Tumpeng group’s work in story jumper.

Figure 6 showed how the PSTs wanted to represent the relation between the viewer and the visual by integrating the aspects of contact, social distance, attitude, and modality. When the connection between the viewer and represented participants in the visual (6 boys) was presented, the readers of the digital story were positioned as the looker and engaged in the story. There is a fundamental difference between pictures from proposed participants looking directly into the viewer’s eyes: first creates a visual form of direct address (acknowledges viewers explicitly), and second, the visual was used to make the viewer do something (Kress & van Leeuwen, 2006).

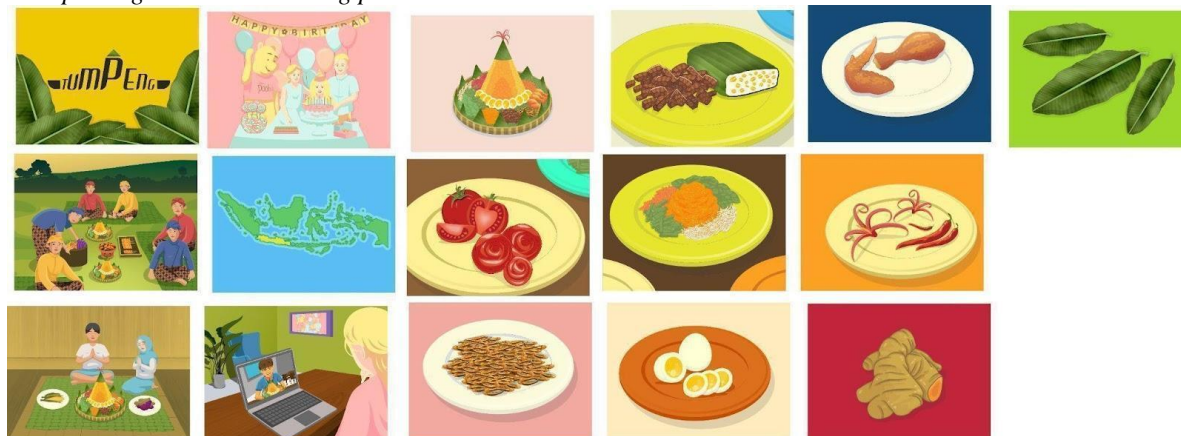
Figure 6
Group B Storyjumper Drafting



All the preservice teachers preferred using various colors to be represented in negotiating the color. The more color is taken away, abstracted from the color of representation, the modality of the representation is getting lower (Kress & van Leeuwen, 2006). The following (see Figure 7) showed that PSTs preferred to use unmodulated

colors. Most children who were the target readers of their digital story enjoyed the highly saturated color. Although PSTs used highly saturated colors, they also considered how the visual was presented in real life. Therefore, using colors made the readers experience sensuality and realize what was real and true.

Figure 7
Group B negotiates the coloring process



In this phase, PSTs negotiated how they presented the illustration (Figure 8). Most of the DST presented the visual image information in the center position. They put the visual appearance in the center to highlight the key information. With the medium close shot, with a horizontal angle, it can be concluded that the readers are invited to a neutral relationship with the represented visual representation (Kress & van Leeuwen, 2006). The following is one of the statements from one of the group B members.

My team designed the component of words, colors, framing elements, characters, and movements that have each purpose. During the course and project activity, I learned how to create text representing meaning-making, such as by creating a bigger or smaller visual image. I also mind the purpose of each color in my design. I also learn how to make the visual image the nucleus of information by positioning it in the middle. (Group B member)

Figure 8

Group B negotiates illustration



Moreover, pre-service teachers act as voice actors and record dialogue or monologue (text) created when negotiating the storyboard. Group B changed the audio text in line with the written text after they discussed and reflected on their work. Therefore, text can be used for recorded or transcribed spoken and written entities (Kress, 2003). Furthermore, in dealing with voice recording, PSTs should be able to present the tone (e.g., happiness, sadness, empathy, curiosity, etc.) along with the visual or verbal text. Each PST should work together to review and discuss which part needed improvement or was already good.

Thus, PST was concerned with the following criteria for designing DST, such as 1) textual aspect representing genres of text or community discourse (e.g., local food, history, or goods did not translate to target culture from text but different modes combined), 2) every symbol, visual aspect, and colour meaning-making (e.g., flat design and colourful design used to modernize and close to target readers), 3) reading path (e.g., big pictures to build initial background knowledge) and 4) music background, and voice building context (e.g., encouraged happiness to engage readers to the story).

Seeking feedback on building metasemiotic awareness

Each group started to seek feedback from the inner circle of the storytelling projects, where they had arguments based on representational, interactional, and compositional meaning and modes of communication from linguistic perspectives. By collaborating with other preservice teachers, they developed critical and social skills while creating DST and building awareness among various modes.

Feedback from internal (self-reflection to make explicit their internal sources) and external (lecturer, classmates, in-service teachers, and students) helped each group finalize their products. This phase guided PSTs to be further engaged in revising their DST projects, as they needed to process the internal and external feedback and revise their DST. Group

C received feedback as follows from the textual level, in which the readers commented about providing an additional prologue at the beginning of the story to build up the context of the readers.

The comment we received from readers is that they think our DST should present the prologue at the beginning of each page. I appreciate the feedback from the readers, and we [group C] tried to discuss this aspect and edit our DST. Now, in our project, the readers can see the prologue about Indonesia. (Group C member)

The revising phase encouraged the team to run on the interaction process between members. This process helped them develop their thinking skills (Tanrikulu, 2022). Moreover, internalizing various feedback—inner circle feedback (indicating theoretical-driven feedback) and outer feedback (indicating practical feedback)—the revision process employed PSTs to shape their critical thinking and problem-solving. Compared to the traditional language teaching method, it cannot support the literacy needs of PSTs who must cope with a wide array of competencies. Therefore, experiencing these activities helped them extract and select the information, drawback to conceptual design, and negotiate and revise DST books (e.g., revisiting to modify communication among audio, visual, and written text to readers). However, to focus on representing visual and textual modes, they mostly forgot to improve the quality of learning objectives (e.g., promoting implicit learning of grammar from text and task) (Robin & Mcneil, 2016) because these books would be implemented at school levels for teaching English for EFL learners.

To explicit these lack areas, the PSTs were required to seek feedback from the outer circle of this project with inclusion criteria (context consideration: junior high school in Indonesia, including urban and rural areas, conducted distance learning; policy consideration: the English language was mandatory taught by the teacher from junior high school; accessibility and practicality: PSTs'

ownership of mobile devices; convenient sampling: PSTs' prior schools; negation access and ethics: PSTs were required to ask permission from school members, teachers, parents, and PSTs by texting through WhatsApp).

Teachers and students (as the readers) gave positive feedback to the text as social practices (e.g., visual, written, and audio texts), mentioning its good structure, graphic design, and audio text. However,

teachers reported helpful explicit English language learning objectives by commenting, "What is the learning objectives of this story?". Furthermore, EFL junior high school teachers reviewed "Batik, the Eternal Clothes" (Feedback Reader-Teacher 20) on the ideational level. The teacher suggests revising the textual level at which the organization of the story could be more synchronized.

Figure 9

Group A revising the ideational level



There are attractive pictures and background music. The preservice teachers narrated the dialogue. To further improve, I suggest balancing sound effects/background music and the narration because sometimes I cannot listen when the music is too loud. I can distinguish different types of batik and their symbolic meaning. I can also know how batik is produced. The story is set during the COVID-19 pandemic when the protagonist must stay home for public health reasons. It tells me the importance of caring for the society we live in by doing my part in fighting against the virus, even if it means wearing a mask in my front yard. (Feedback Reader-Teacher 20)

Compared to traditional learning, engaging PSTs in the DST project supported the potential for building learning conditions that led to complete social participation (New London Group, 1996). Identifying problems and problem-solving were encouraged during the feedback-seeking from internal and external circles to shape PSTs' stories creation (Anderson & Macleroy, 2017), which also resulting them to the process of critical thinking, creativity, and autonomous learning. Moreover, internalizing feedback also helped PSTs to see the value of cultural knowledge and moral values from Indonesian norms and perspectives (Anderson et al., 2018; Churchill, 2020). By seeking feedback from out-of-class environments, the online research skills of PSTs can be enhanced by conducting interviews and analyzing the data for their stories (Churchill, 2020). Therefore, accommodating two voices from

the inner and outer circles of the project allowed PSTs to engage with the strengths and weaknesses of their design, the purpose of their design, and the real action (teaching and learning) of the design.

Reflection on their professional competence and metasemiotic awareness

The self-reflection process allowed the PSTs to see the potential of their DST projects. As they realized they had real audiences, they became more enthusiastic and confident about evaluating and improving their project. Moreover, they also built a more profound sense of determining the text genre by considering the Indonesian curriculum, PSTs' vocabulary level, and learning objectives. The following is the sample of one of the group A member statements.

The descriptive text was chosen for the story because when talking about batik, it deals with defining, classifying, or generalizing the phenomena of batik in Indonesia. This story describes each part or a small part of batik (such as the naming terminology) until the whole part (types of batik)... Creating a story is complicated and needs a long time to evaluate and revise until it is the best material version. Appropriate learning goals and teaching approaches adapted toward the materials are also something we need to consider more in developing or making the materials...there are many challenges... Specifically, when determining the text's storyline and readability, we need to triangulate the readability to the learners first,

whether it is too difficult or not, in which this process needs time. (Group A member)

Engaging in digital storytelling projects shaped PSTs' knowledge, values, social practices, and behavior. It stimulated them to know how language represents teaching and learning experiences, how to capture language as interactive aspects of meaning-making particular social relationships, and how multimodal text can be a cultural tool that locally and globally connects readers with text as social practices of specific genres. Furthermore, with visual grammar, PSTs employed careful consideration of visual literacy skills. Although their books were targeted to be used for local students, preservice teachers considered local readers with various cultural backgrounds and foreign readers. They considered that their design could speak to different boundaries.

There are three actors such as Foreigner, Tumpeng, and Indonesian. In our story, the foreigners celebrate a birthday party with cake to bridge the cultural gap between Tumpeng and the target viewers. Indonesians celebrate a birthday party with Tumpeng as a representative of using Tumpeng in real life, which is common in every culture. Therefore, it will engage the viewers. Then, Tumpeng, as the main actor, is portrayed as representative of "one for all and all for one", even though the components consist of different goods. However, they could combine into one and appear in many Indonesian celebrations from Sumatra until Papua...My design has a purpose, even simple words, colors, positioning of elements, characters, and movements. I learn how to give the text to mean making by designing bigger or smaller. I also should think about the purpose of each color in my design. I also learned how to make the actors as the nucleus of information by positioning them in the middle, and I also should think about if they are on the left and right... To minimise cheating among preservice teachers, we make the question more personalized for preservice teachers to answer the question for the essay. (Group B member)

By re-evaluating and returning to their experience, knowledge, and beliefs, PSTs could measure their understanding toward implementing Halliday's theory of three metafunctions (1994) and Kress and van Leeuwen's (1996) visual grammar into DST. DST is potentially used for reflection in-process, on-process, or reflection tools. The reflection process using DST allows PSTs to recognize teachers' identity, personal identity, and well-being (Austen et al., 2020). This study added a reflection on the process, allowing students to revisit their work, and building metasemiotic awareness and professional competence. Their professional competence can be shaped by encouraging knowledge, skill, and confidence in designing DST (Sunderland et al., 2021). PSTs showed more confidence in L2 competence and performance by

negotiating vocabulary levels in language teaching (Liu et al., 2021; Tanrikulu, 2022) and the value of their identity development and representation (Kim & Li, 2020). Through these DST projects, PSTs know the relationship between language, text as social practice, and context (Halliday, 1978, 1994; Mickan & Wallace, 2020) to design material practice. Employing PSTs to create DST was a rewarding process that could be used for future teaching (Meletiado, 2022).

CONCLUSION

A previous study (Tan et al., 2019) mentioned that Indonesian teachers still need an integrated approach to promote multimodal literacy. However, this study demonstrated ways that align with certain disciplinary practices to enhance PSTs' metasemiotic awareness. Engaging in the DST project increased PSTs' metasemiotic awareness of meaning-making resources beyond the written language. It developed their competence in creating language materials for teaching EFL in digital contexts. It was shown from the data that there has been a growing awareness of expressing aspects of the material, learning goals, and teaching approaches from the beginning to the end of the DST project. This study's final product was the digital stories created for EFL teaching. It did not entail observing the actual use of these stories for classroom teaching. Future research would consider more longitudinal studies to observe the impact of designing and using multimodal texts in actual EFL classrooms on enhancing graduate teachers' professional competence.

CONFLICT OF INTERESTS

The authors declare that they have no conflict of interest.

DECLARATION OF INTEREST STATEMENT

The authors declare no conflict of interest concerning this article's research, authorship, and publication.

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REFERENCES

- Anderson, J., & Macleroy, V. (2017). *Multilingual digital storytelling*. Routledge.
- Anderson, J., Chung, Y. C., & Macleroy, V. (2018). *Creative and critical approaches to language learning and digital technology: findings from a multilingual digital storytelling project*.

- Language and Education*, 32(3), 195–211.
<https://doi.org/10.1080/09500782.2018.1430151>
- Austen, L., Pickering, N., & Judge, M. (2021). Student reflections on the pedagogy of transitions into higher education, through digital storytelling. *Journal of Further and Higher Education*, 45(3), 337–348.
<https://doi.org/10.1080/0309877X.2020.1762171>
- Barlow, D. H., Nock, M. K., & Hersen, M. (2009). *Single case experimental designs: Strategies for studying behavior change (3rd ed.)*. Pearson Publishing.
- Baumgartner, M. (2022). Professional competence(s) of physical education teachers: terms, traditions, modelling and perspectives. *German Journal of Exercise and Sport Research*, 52(4), 550–557.
<https://doi.org/10.1007/s12662-022-00840-z>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
<https://doi.org/10.1191/1478088706qp063oa>
- Burgess, J., & Rowsell, J. (2020). Transcultural-affective flows and multimodal engagements: Reimagining pedagogy and assessment with adult language learners. *Language and Education*, 34(2), 173–191.
<https://doi.org/10.1080/09500782.2020.1720226>
- Çebi, A., Bahçekapılı Özdemir, T., Reisoğlu, İ., & Çolak, C. (2022). From digital competences to technology integration: Re-formation of preservice teachers' knowledge and understanding. *International Journal of Educational Research*, 113.
<https://doi.org/10.1016/j.ijer.2022.101965>
- Choi, G. Y. (2018). Learning through digital storytelling: Exploring entertainment techniques in lecture video. *Educational Media International*, 55(1), 49–63.
<https://doi.org/10.1080/09523987.2018.1439710>
- Churchill, N. (2020). Development of students' digital literacy skills through digital storytelling with mobile devices. *Educational Media International*, 57(3), 271–284.
<https://doi.org/10.1080/09523987.2020.1833680>
- Çıralı Sarıca, H., & Usluel, Y. K. (2022). Pre-service teachers' future professional self-understanding: a reception study through teachers' digital stories. *Journal of Education for Teaching*, 48(2), 159–177.
<https://doi.org/10.1080/02607476.2021.1967088>
- Dahlström, H. (2022). Students as digital multimodal text designers: A study of resources, affordances, and experiences. *British Journal of Educational Technology*, 53(2), 391–407.
<https://doi.org/10.1111/bjet.13171>
- Del-Moral-Pérez, M. E., Villalustre-Martínez, L., & Neira-Piñeiro, M. del R. (2019). Teachers' perception about the contribution of collaborative creation of digital storytelling to the communicative and digital competence in primary education schoolchildren. *Computer Assisted Language Learning*, 32(4), 342–365.
<https://doi.org/10.1080/09588221.2018.1517094>
- Eggs, S. (1994). *An introduction to systemic-functional linguistics*. Frances Pinter.
- Gast, D. L. (2010). *Single subject research methodology in behavioral sciences*. Routledge.
- Goodman, K. (1996). *On reading: A common-sense look at the nature of language and the science of reading*. Scholastic.
- Halliday, M. A. K. (1978). *Language as social Semiotic: The social interpretation of language and meaning*. Edward Arnold.
- Halliday, M. A. K. (1994). *An introduction to Functional Grammar (Second Edition)*. Arnold Edward
- Halliday, T. C. (1985). Knowledge mandates: collective influence by scientific, normative and syncretic professions. *British Journal of Sociology*, 36(3), 421–447.
<https://doi.org/10.2307/590459>
- Hébert, C., Thumlert, K., & Jenson, J. (2022). #Digital parents: Intergenerational learning through a digital literacy workshop. *Journal of Research on Technology in Education*, 54(1), 34–91.
<https://doi.org/10.1080/15391523.2020.1809034>
- Jones, L., Smith, S. L., & Durham, C. (2022). Teachers as digital composers: Designing digital jumpstarts to scaffold for emerging bilingual learners. *Computers and Education*, 189, 104592.
<https://doi.org/10.1016/j.compedu.2022.104592>
- Jukes, I., McCain, T., & Crockett, L. (2010). *Understanding the Digital Generation: Teaching and Learning in the New Digital Landscape*. Corwin.
- Kim, D., & Li, M. (2021). Digital storytelling: facilitating learning and identity development. *Journal of Computers in Education*, 8(1), 33–61. <https://doi.org/10.1007/s40692-020-00170-9>
- Kress Gunther, & van Leeuwen, T. (2006). *Reading images: The grammar of visual design*. Routledge.
- Kress, G. (2003). *Literacy in the new media age*. Routledge.

- Kress, G. R. (2010). *Multimodality: A social semiotic approach to contemporary communication*. Routledge.
- Kress, G., & Van Leeuwen, T. (1996). *Reading images: The grammar of visual design*. Routledge.
- Kress, G., & van Leeuwen, T. (2021). *Reading images: The grammar of visual design*. Routledge.
- Kress, G., Jewit, C., Ogborn, J., & Tsatsarelis, C. (2001). *Multimodal teaching and learning: The rhetorics of the science classroom*. Continuum.
- Kukul, V. (2023). Should I use digital storytelling in my future classroom? Why or why not? Investigating pre-service math teachers' acceptance of digital storytelling. *E-Learning and Digital Media*.
<https://doi.org/10.1177/20427530231156173>
- Law Number 14 of 2005 concerning Teachers and Lecturers. (2005). *Undang-undang nomor 14 tahun 2005 tentang guru dan dosen* [Law no. 14/2005 on teachers and lecturers]. Government of the Republic of Indonesia.
- Liang, H., Chang, J., Deng, S., Chen, C., Tong, R., & Zhang, J. J. (2017). Exploitation of multiplayer interaction and development of virtual puppetry storytelling using gesture control and stereoscopic devices. *Computer Animation and Virtual Worlds*, 28(5).
<https://doi.org/https://doi.org/10.1002/cav.1727>
- Liu, Y., Mishan, F., & Chambers, A. (2021). Investigating EFL teachers' perceptions of task-based language teaching in higher education in China. *Language Learning Journal*, 49(2), 131–146.
<https://doi.org/10.1080/09571736.2018.1465110>
- Meletiadou, E. (2022). Using educational digital storytelling to enhance multilingual students' writing skills in higher education. *IAFOR Journal of Education*, 10(2), 111-130.
- Mickan, P., & Wallace, I. (2020). *The routledge handbook of language education curriculum design*. Routledge.
- Mills, K. A., & Doyle, K. (2019). Visual arts: A multimodal language for Indigenous education. *Language and Education*, 33(6), 521–543.
<https://doi.org/10.1080/09500782.2019.1635618>
- Morabito, N. P., & Abrams, S. S. (2015). Digital storytelling: A tool to develop preservice teachers' cross-literate reflections. *Literacy Research, Practice and Evaluation*, 6, 59–77.
<https://doi.org/10.1108/S2048-04582015000006003>
- Mowafy, M. (2022). Unheard voices as “counter narratives”: Digital storytelling as a way of empowering Muslim women. *Indonesian Journal of Applied Linguistics*, 12(2), 385-398.
<https://doi.org/10.17509/ijal.v12i2.37698>
- New London Group. (1996). A pedagogy of multiliteracies: Designing social futures. *Harvard Educational Review*, 66(1), 60–92.
<http://dx.doi.org/10.17763/haer.66.1.17370n67v22j160u>
- Park, M., & Son, J. B. (2022). Pre-service EFL teachers' readiness in computer-assisted language learning and teaching. *Asia Pacific Journal of Education*, 42(2), 320–334.
<https://doi.org/10.1080/02188791.2020.1815649>
- Puspitasari, D., Widodo, H. P., Widyaningrum, L., Allamnakhrah, A., & Lestariyana, R. P. D. (2021). How do primary school English textbooks teach moral values? A critical discourse analysis. *Studies in Educational Evaluation*, 70, 101044.
<https://doi.org/10.1016/j.stueduc.2021.101044>
- Quah, C. Y., & Ng, K. H. (2022). A systematic literature review on digital storytelling authoring tool in education: January 2010 to January 2020. *International Journal of Human-Computer Interaction*, 38(9), 851–867.
<https://doi.org/10.1080/10447318.2021.1972608>
- Regulation of the Ministry of Indonesia National Education Number 14 of 2005
- Robin, B. R., & Mcneil, S. G. (2016). What educators should know about teaching digital storytelling. *Digital Education Review*, 22, 37–51.
- Robin, B. R., & McNeil, S. G. (2019). Digital storytelling. *The International Encyclopedia of Media Literacy*, 1–8.
<https://doi.org/10.1002/9781118978238.ieml0056>
- Schmoelz, A. (2018). Enabling co-creativity through digital storytelling in education. *Thinking Skills and Creativity*, 28, 1–13.
<https://doi.org/10.1016/j.tsc.2018.02.002>
- Setyono, B., & Widodo, H. P. (2019). The representation of multicultural values in the Indonesian Ministry of Education and culture-endorsed EFL textbook: A critical discourse analysis. *Intercultural Education*, 30(4), 383–397.
<https://doi.org/10.1080/14675986.2019.1548102>
- Sindoni, E. M. G., & Moschini, I. (2022). *Multimodal literacies across digital learning Contexts*. Routledge.
- Smeda, N., Dakich, E., & Sharda, N. (2014). The effectiveness of digital storytelling in the classrooms: a comprehensive study. *Smart Learning Environments*, 1(1).
<https://doi.org/10.1186/s40561-014-0006-3>

- Smith, B. E., Pacheco, M. B., & Khorosheva, M. (2020). Emergent bilingual students and digital multimodal composition: A systematic review of research in secondary classrooms. *Reading Research Quarterly, 56*(1), 33-52. <https://doi.org/10.1002/rrq.298>
- Sunderland, N., Robinson, K., & Burgess, A. (2021). Overcoming future professionals' fear of digital storytelling. *Australian Social Work, 74*(1), 13-28. <https://doi.org/10.1080/0312407X.2020.1762098>
- Svensson, L., Anderberg, E., Alvegård, C., & Johansson, T. (2009). The use of language in understanding subject matter. *Instructional Science, 37*(3), 205–225. <https://doi.org/10.1007/s11251-007-9046-1>
- Tan, L., & Zammit, K. (2018). *Teaching writing and representing in the primary school years* (2nd ed.). Pearson Australia.
- Tan, L., Chai, C. S., Deng, F., Zheng, C. P., & Drajiati, N. A. (2019). Examining preservice teachers' knowledge of teaching multimodal literacies: a validation of a TPACK survey. *Educational Media International, 56*(4), 285–299. <https://doi.org/10.1080/09523987.2019.1681110>
- Tanrikulu, F. (2022). Students' perceptions about the effects of collaborative digital storytelling on writing skills. *Computer Assisted Language Learning, 35*(5–6), 1090–1105. <https://doi.org/10.1080/09588221.2020.1774611>
- Teo, P., & Zhu, J. (2018). A Multimodal Analysis of Affect and Attitude Education in China's English Textbooks. *Multimodal Communication, 7*(1). <https://doi.org/10.1515/mc-2017-0014>
- Towndrow, P. A., & Pereira, A. J. (2018). Reconsidering literacy in the 21st century: Exploring the role of digital stories in teaching English to speakers of other languages. *RELC Journal, 49*(2), 179-194. <https://doi.org/10.1177/0033688218754943>
- Tyarakanita, A., Drajiati, N. A., Rochsantiningsih, D., & Nurkamto, J. (2021). The representation of gender stereotypes in Indonesian English language textbooks. *Sexuality & Culture, 25*(3), 1140-1157. <https://doi.org/10.1007/s12119-021-09813-0>
- Widodo, H. P. (2018). A critical micro-semiotic analysis of values depicted in the Indonesian ministry of national education-endorsed secondary school English textbook. In H. P. Widodo, L. V. Canh, M. R. G. Perfecto, & A. Buripakdi (Eds), *Situating Moral and Cultural Values in ELT Materials: The Southeast Asian Context* (131–152). Springer. <https://doi.org/10.1007/978-3-319-63677-1>
- Wu, J., & Chen, D. V. (2020). A Systematic review of educational digital storytelling. *Computers & Education, 147*(April 2020). <https://doi.org/10.1016/j.compedu.2019.103786>
- Wünsch-Nagy, N. (2020). Multimodal literacy development in a higher education English Studies classroom. *Journal of Visual Literacy, 39*(3-4), 167-184. <https://doi.org/10.1080/1051144X.2020.1826218>
- Yang, Y. T. C., & Wu, W. C. I. (2012). Digital storytelling for enhancing student academic achievement, critical thinking.; Learning motivation: A year-long experimental study. *Computers and Education 59*(2), 339–352. <https://doi.org/10.1016/j.compedu.2011.12.012>
- Yilmaz, R. M., & Goktas, Y. (2017). Using augmented reality technology in storytelling activities: examining elementary students' narrative skill and creativity. *Virtual Reality, 21*(2), 75–89. <https://doi.org/10.1007/s10055-016-0300-1>
- Yin, R. K. (2018). *Case study research and applications (Sixth Edition)*. Sage Publication.