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# Developing Teacher Identities Through ePortfolios: A Multimodal Approach

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Through a multimodal approach, we describe a qualitative case study that sought a deep understanding of how undergraduate teacher candidates constructed and communicated emerging teacher identities through ePortfolios in two undergraduate teacher preparation semester-long classes. Through the visual analysis of the candidates' ePortfolios and a thematic analysis of semi-structured interviews with eight focal participants, two important themes emerged. First, the candidates' developing teacher identities were illustrated through various modes of semiotic representations. These signs and symbols, or modes of semiotic representations, encompass multiple formats, such as quotations and stories, as well as multimodal forms, including self-portrait photography, teaching artifacts, images with special meanings, and strategic use of colors. Second, the findings demonstrate the candidates' design thinking through multimodal expressions. Implications are drawn to address opportunities and challenges for ePortfolio implementations, cultivating teacher candidates' active agency and their creative, multimodal expressions of developing identities through ePortfolios.

> I gave a little bit of a background of myself . . . why I went into teaching and how I cherish the times with my students, and I'm passionate about my education, future teaching. . . . I think that this ePortfolio really brought out the different aspects of why I want to teach and how I got into that. So, I think those messages are throughout my whole portfolio. . . . You kinda have to read through it to understand. (Teresa, Undergraduate Teacher Candidate, Elementary Education Major)

What happens when preservice teachers are provided with a digital space to creatively express themselves and how they are developing as professionals? The above statement by an undergraduate teacher candidate in their third year of an elementary (K–8) teacher preparation program foregrounds this study on preservice teachers' agency to communicate their emerging teacher identities through a multimodal approach in the ePortfolio assignment. In teacher preparation programs, electronic portfolios (ePortfolios) are utilized as an essential instrument to serve a variety of purposes: to collect data on teacher candidates' knowledge, skills, and dispositions for program evaluation and accreditation (Strudler & Wetzel, 2011), to document learning processes and professional growth (Gülbahar & Tinmaz, 2006), to demonstrate and promote reflection, self-assessment, and self-regulated learning (Chun-Burbank et al., 2023), and to increase employability (Cordie et al., 2019).

Despite the prevailing and multifaceted usage of ePortfolios in teacher education, tensions arise between two contrasting epistemological stances: (a) an objective philosophy that views ePortfolios as an assessment instrument to meet institutional requirements or accreditation purposes and (b) a subjective philosophy with a constructive nature that centers on the learners as they reflect and choose artifacts to document their professional trajectory (Strudler & Wetzel, 2011). Such contrasting viewpoints were illustrated in Hallman's (2007) interview study as conflicts developed in the process of composing ePortfolios when two prospective teachers engaged in an intensive negotiation of presenting themselves as professionals who mastered teaching practices (i.e., an objective philosophy) versus who were reflective and in constant inquiry for improvement (i.e., a subjective philosophy). The tensions illustrated in the above examples underscore the complex and dynamic nature of how teacher candidates portray themselves (i.e., self-identities) through representations found in ePortfolios.

In this qualitative case study (Yin, 2009), we sought to understand how ePortfolios were used to mediate undergraduate teacher candidates' emerging teacher identities and agency through a multimodal approach. Featuring the connection between identity development and the multimodal design of ePortfolios, this study is significant in three aspects. First, serving as a bridge between the aforementioned contrasting epistemological viewpoints, the ePortfolio project through a multimodal approach created a digital, mediated space, in which teacher candidates explored and experimented with different modes of semiotic representations (e.g., verbal and visual) to not only demonstrate their knowledge of the course content, but also to examine and reflect on their beliefs, visions, and to develop their "teacher persona" (Kincheloe, 2003, p. 47). Second, the emphasis on teacher candidates' agency and emerging identities through a multimodal approach attends to the call for a paradigm shift in teacher preparation from a skill-based, technicist stance, or factory model, that often views undergraduate teacher candidates as "a unit of production of an assembly line" (Kincheloe, 2004, p. 60) to incorporate a humanistic stance that centers on

these teacher candidates as a whole person (Darling-Hammond, 2009; Korthagen, 2016; Li, 2016). Third, this study can be applied in other disciplines. For example, students in fine arts, music, business, and engineering can showcase their emerging expertise and explore their emerging identities through multimodal design of an ePortfolio that not only reflects the discipline's distinctive nature but also highlights their individual characteristics as a professional in the field.

## Teacher Identities Through ePortfolios

Research on teacher identity and ePortfolios in teacher education often focuses on students' perception and their reflective process. For example, in a post-degree teacher preparation program in Canada, Fu et al. (2022) investigated how 12 teacher candidates' perceptions about assessment were transformed because of their experiences with ePortfolios, such as peer assessment via ePortfolio reviews and choices in constructing ePortfolios. Fu et al. (2022) also noted that ePortfolios enable the candidates to make connections between their personal and professional aspects of life as it was emphasized by one teacher candidate in their research: "[the ePortfolio] does allow for you to show yourself as a whole person instead of just specific assignments" (p. 11). Although this brought forward the dynamic feature of teacher identities through ePortfolios, the results were solely drawn from the candidates' perceptions while their ePortfolios were not examined to reflect such features.

In another research study that featured a teacher education program at the University of Konstanz, Germany, ePortfolios were utilized to promote the notion of life-long learning, for which student teachers documented both formal and informal learning through reflective writing tasks during student internships (Ziegelbauer & D'Errico, 2021). In these reflective writing tasks, the teacher candidates formed a "digital career identity" through their ePortfolios (Ziegelbauer & D'Errico, 2021, p. 223). The authors argued for the connection between the teacher candidates' "digital career identity" through the ePortfolios with their efficacy to promote themselves in the teaching job market. However, the connection was rarely explained, and more importantly the teacher candidates' ePortfolios were displayed but not examined. While these two studies emphasized teacher candidates' perceptions and identity constructions, they failed to unpack the ePortfolios, especially about how those identities were constructed and represented throughout the ePortfolios. More importantly, they overlooked the multimodal and digital nature of representation in the digital space of ePortfolios.

## ePortfolios and the *E*

In teacher education research, many studies on the digital aspect of ePortfolios analyze teacher candidates' perceptions about technology. For example, Roberts et al. (2016) discussed preservice teachers' resistance to the technology program, PebblePad, an ePortfolio platform in the research, due to their unfamiliarity with the program and preference for paper documentation. Similarly, Oakley et al. (2014) examined preservice teachers' experiences with Wikispaces, an information and communications technology (ICT) employed as an ePortfolio reflection platform. The findings of Oakley et al. (2014) revealed a contradictory phenomenon. That is, although the candidates rated themselves with high confidence in using ICTs, many simply uploaded their reflections as Word or PDF files, instead of utilizing Wikispaces' multimedia features, such as hyperlinks. While both Roberts et al. and Oakley et al. raised issues about teachers' knowledge of ePortfolio technology, Koehler et al. (2017) discussed the nature and quality of teachers' technological knowledge of ePortfolios. In the research of Koehler et al., they reviewed 589 ePortfolios and identified Technological Pedagogical and Content Knowledge (TPACK) as a suitable framework for understanding teachers' technological knowledge. Among these ePortfolios, teacher candidates employed various artifact technology, such as Web and social media, which corresponded to different levels of TPACK measures. While all these studies addressed the digital aspect of ePortfolios, they failed to examine the multimodal design thinking within the digital space via the ePortfolio technology.

The studies mentioned above failed to deeply examine the digital aspect of ePortfolios, especially regarding teachers' creativity and design thinking with multiple forms of media (Brown et al., 2015) and the connections across various forms of knowledge (Rowley & Munday, 2018). To address the above gaps, especially the lack of research on examining ePortfolios' multimodal design and its connection to how candidates represent their identity development, in this study, we emphasize the notion of the *e* (McDermott-Dalton, 2021) and employ a multimodal approach to understand how preservice teacher candidates expressed their emerging teacher identities through the multimodal design of their ePortfolios. Specifically, this study is guided by the following research questions:

1. How did undergraduate teacher candidates demonstrate emerging teacher identities through multimodal expressions of their ePortfolios?
2. How did undergraduate teacher candidates engage in multimodal design thinking to create their ePortfolios?

## Theoretical Framework

### Teacher Identities

This study is theoretically framed by two perspectives: teacher identity development and the use of multimodal design. The notion of teacher identities is complex and often explained under vastly different definitions. When reviewing different definitions about teacher identities, several commonalities can be identified. First, teacher identities are often formed through a continuously shifting and dynamic process, which responds to the questions "who am I at this moment" and "who do I want to become" (Beijaard et al., 2004, p. 122; Mockler, 2011; Smetana & Kushki, 2023). Second, a common feature is that teacher identities are often mediated and contextualized by a constellation of both internal and external factors (Goodson & Cole, 1994; Mockler, 2011). In other words, teacher identities often include "sub-identities" that align with "teachers' different context and relationships" (Beijaard et al., 2004, p. 122). A third important commonality is that teacher identities involve active agency in the process of identity-construction (Beijaard et al., 2004). Coldron and Smith (1999) explained that teachers draw on various traditions and practices in their identity construction: "People find a kind of agency in positioning themselves within this plurality of related resources in response to needs that arise from an assessment of the circumstances in which they find themselves" (p. 714). Fourth, teacher identities are represented and shaped through narratives of various communication modes (e.g., verbal and visual), which include teachers' internal, reflexive self-dialogue and are instantiated externally as stories told by teachers (Anspal et al., 2012; Mockler, 2011; Torres & McKinley, 2023). In this study, we consider the above four features and investigate how these fluid attributes of teacher identities are represented in teacher candidates' digital, multimodal expressions through their ePortfolios.

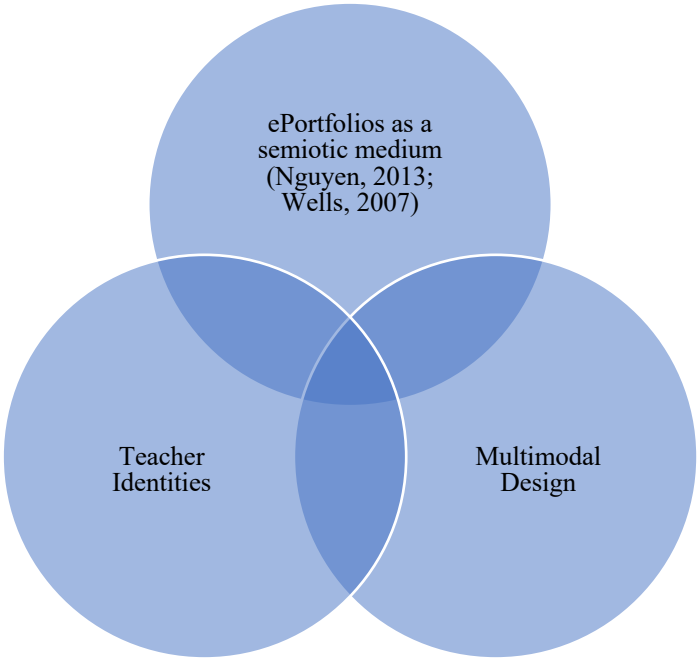
### Designing ePortfolios Through a Multimodal Approach

The other component in the theoretical framework, multimodality, is closely associated with ePortfolio design. Multimodality indicates that meanings are formed and communicated through multiple representations (i.e., modes) beyond the use of traditional or textual language. Examples of modes include "image, gaze, gesture, movement, music, speech, and sound-effect" (Jewitt & Kress, 2003, p. 1), and color (Kress & Van Leeuwen, 2002). An important facet about modes is that no mode can carry a whole and complete message on its own (Jewitt & Kress, 2003). In many human interactions, meanings are often communicated via more than one mode. However, verbal texts in writing are traditionally given higher status in meaning-making, especially for academic performance. For example, in a traditional paper-based portfolio, written texts, such as academic essay writing, are often given more focus than other modes of meaning-making. Yet, written texts deliver partial messages, just like other modes of communication. In this study, we argue that, through a multimodal approach, incorporating different modes together can enrich meanings and convey significant messages about preservice teachers' emerging professional identities. In other words, through multimodal expressions in the digital space of ePortfolios, "word and image, verbal texts, 'visual culture' and 'print culture' are all dialogic relationships rather than binary opposites" (Hocks, 2003, p. 631) to one another.

Among all aspects of multimodal expressions, design thinking is considered an important aspect, which refers to "an analytic and creative process that engages a person in opportunities to experiment, create, and prototype models, gather feedback, and redesign" (Razzouk & Shute, 2012, p. 330). Design thinking in multimodality points to "the use of different modes – image, writing, colour, layout – to present, to realize, at times to (re-)contextualize social positions and relations, as well as knowledge in specific arrangements for a specific audience" (Kress, 2010, p. 139). Research on design thinking is mostly conducted in the fields of arts, engineering, science, and business management, yet it has a great potential in educational applications for its emphasis on creative and problem-solving skills (Carlgren et al., 2016; Razzouk & Shute, 2012).

The interaction between the above two theoretical perspectives, ePortfolios' multimodal design and teacher identity development, plays a significant role in this study. As illustrated in Figure 1, the ePortfolios serve as an essential instrument in the interconnected relationships between teacher identity development and multimodal design. As a semiotic medium (Nguyen, 2013; G. Wells, 2007) that carries multiple modes of meaning-making, the ePortfolios make identity development visible by providing a digital space for preservice teacher candidates to exercise their agency and multimodal design thinking, and more importantly to creatively express their emerging teacher identities, which are socially constructed through ongoing, situated activities that change across time and place (Beijaard et al., 2004) and influenced by a variety of experiences (Noonan, 2019). This layered approach affords teacher candidates with opportunities for richer representation of concepts, to infuse emotional nuance, and build contextual relationships across ideas more so than any single mode could achieve alone.

Figure 1
*Theoretical Framework*




## Methods

### Research Context and Participants

This qualitative case study is situated in two undergraduate teacher preparation semester-long classes, from two consecutive semesters, fall and spring, in a Midwest university. The purpose of the course focused on developing preservice teachers' knowledge about disciplinary literacy, along with a required practicum working with K–8 learners in an after-school tutoring program. As a course assignment intended to document learning, the ePortfolio focused on multimodal artifacts that represent their developing reflective practitioner identities. As well, the assignment documented their growing knowledge and skills both in the class and in the clinical setting. In doing so, teacher candidates were asked to use design thinking and multimodal design to represent their developing teacher identities, knowledge, and skills in the digital space of their ePortfolio. For this assignment, the teacher candidates were required to build their ePortfolio on Google Sites, one of the Google Workspace Apps and Web 2.0 technologies (Schneckenberg et al., 2011). Google Sites provided affordances for creative design and multimodal compositions. A studio approach (Carpenter et al., 2012; Stivers et al., 2019) was adopted to support the teacher candidates during class time and three visual-design consultants from the Fine Arts Department were recruited to facilitate the candidates' multimodal design thinking. In the fall semester class, the visual-design consultants conducted two mini lessons to teach the candidates about visual design: one lesson about professional photos and the other about use of color. In the spring semester class, a third mini lesson was added to teach the candidates about visual structure and layout.

In the fall semester, core components required in the teacher candidates' ePortfolio were: (1) a homepage with About Me information and an overview of their ePortfolio; (2) a literacy glossary that documented candidates' knowledge of important reading comprehension, literacy strategies, and related terms; (3) one literacy tool from candidates' class presentations during the class activity, Content Literacy Tools & Materials Workshop; (4) one sample lesson plan, from their practicum experience; and (5) a final reflection, for which the candidates discussed their overall experiences with the ePortfolio and about the class in general. In the spring semester, in addition to the above requirements, the candidates were required to include two sample lesson plans, instead of one, and add an additional core component, inquiry project, because it was a newly added assignment for that class. Many candidates went beyond the above requirements and included other components, particularly teaching philosophy and related multimodal artifacts that demonstrated candidates' professional identities.

Figure 2
*ePortfolio Workflow: In-Class Work Sessions*

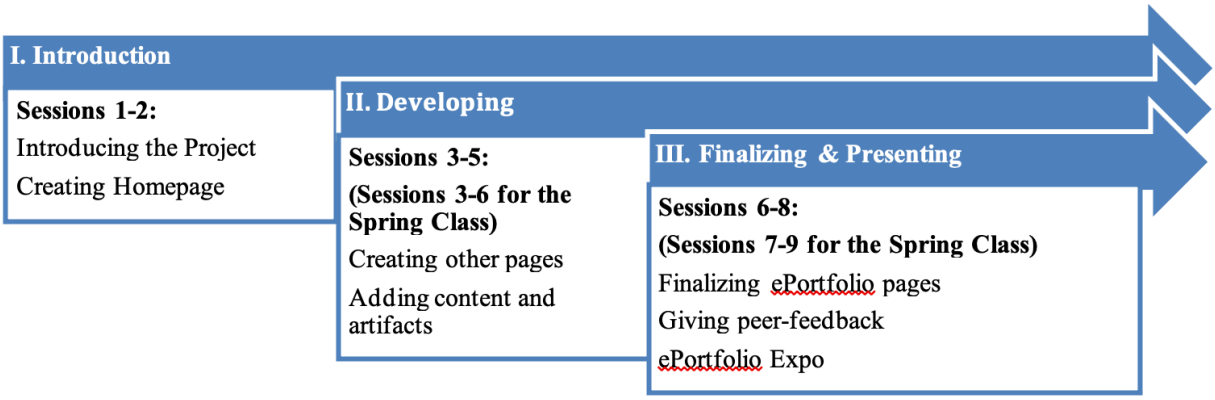



Table 1
*Eight Focal Participants*

| Class | Name (pseudonym) | Majors and minors |
|---|---|---|
| Fall semester class | Aurora | Elementary Education & Language Arts/Math |
| | Ember | Elementary Education & Language Arts/Math |
| | Emerald | Early Elementary |
| | Louisa | Early Elementary & Language Arts |
| | Olana | Special Education & Language Arts |
| | Sandra | Elementary Education |
| | Teresa | Elementary Education & English/Science |
| Spring semester class | Lindsay | Special Education |

Candidates' ePortfolios in the fall semester class were developed over eight weeks of in-class work sessions while those in the spring semester class were developed over nine weeks of in-class work sessions. These in-class work sessions were divided into three recursive and overlapping stages, as illustrated in Figure 2. The ePortfolio project began with an exploration of website samples and creating a homepage on Google Sites. Then, the candidates created the other pages and added content and multimodal artifacts on these pages. At the third stage, they provided peer reviews for each other's work. At the final in-class work session, an ePortfolio Expo was held for the candidates to showcase their presentations.

The research participants were 21 undergraduate, preservice teachers who enrolled in the above two classes: 14 from the fall semester and seven from the spring semester. Eight of them participated in the individual, semi-structured interviews at the end of the class: seven from the fall semester and one from the spring semester. Primary voices were elicited from these eight focal participants, as listed in Table 1. Most of them were in their junior or senior year: four of them majored in Elementary Education, two in Early Elementary Education, and two in Special Education. Each participant was given a pseudonym.

**Data Sources and Analysis**

To ensure trustworthiness, data were collected from multiple sources. Primary data included the eight focal teacher candidates' ePortfolios and semi-structured interviews. The interviews provided insight into their design-thinking process and how meanings were multimodally composed in the ePortfolios. Secondary data included the other ePortfolios created by 13 candidates who consented but were unable to participate in the interviews, participant observations the author Kuo conducted, and the visual-design consultants' work logs that documented their consulting work with the teacher candidates.

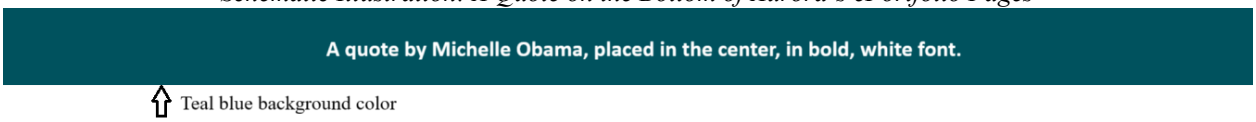
The data analysis contains the following components. First, we analyzed teacher candidates' ePortfolios with a focus on thematic elements (Riessman, 2008) and visual design (Kress & Van Leeuwen, 2021). The analysis of the ePortfolios involved the following

Table 2
*Guiding Questions at the Initial Stage*

| Content and (academic) writing) | Visual design |
|---|---|
| What is the student trying to convey? | What is the student trying to convey? |
| What immediately comes to my mind? | What immediately comes to my mind? |
| What features are used? | What (visual) features are used? |
| What impressed me? | What impressed me? |

*Note*. Adapted from Albers (2007, p. 154).

Figure 3
*Schematic Illustration: A Quote on the Bottom of Aurora's ePortfolio Pages*




discursive stages. In the initial stage, the homepage of teacher candidates' ePortfolios was examined based on the question: "What impression and messages do the student convey on the homepage, in terms of the content and visual design?" This initial analysis on the homepage and the other pages was guided by the detailed questions adapted from Albers (2007, p. 154), with a focus on the content and visual design elements as illustrated in Table 2. After the initial stage of analysis, emerging themes and features were identified and agreed upon, such as quality of writing, teaching beliefs and philosophy, and symbolic representations (e.g., images and use of color). In the second stage, teacher candidates' ePortfolio content and visual design were further examined focusing on the emerging themes identified in the initial stage. For example, candidates' strategic use of images and color to express individual characteristics was further analyzed after it was identified in the initial stage and is discussed further in the sections below.

The semi-structured interviews were recorded and transcribed. A thematic analysis (Braun & Clarke, 2021) was conducted on the interview transcripts and other data sets to identify emerging patterns (Glesne, 2011), which were utilized to triangulate the findings from the analysis of candidates' ePortfolio. At this stage, the visual and thematic analyses were integrated in a thematic table, which included four hierarchical columns: categories/themes (e.g., semiotic representations, personal vs. professional), codes (e.g., quotations of famous people, teaching philosophy, professional headshots, teaching pictures and artifacts, use of color to express professional self), sources (e.g., Aurora's ePortfolio and interview), and excerpts (from the semi-structured interviews, images or written texts from the ePortfolio). Furthermore, reflexive practices employed to strengthen the rigor included our reflective conversations in the initial analysis of candidates' ePortfolio and reflexive review of the thematic table that Kuo conducted (Morison, 2025).

## Findings and Discussion

Two themes emerged from the above analysis and respond to the research questions of this study. The first theme is the variety of semiotic representations that showcase candidates' emerging teacher identities. Drawing from the analysis of the ePortfolio webpages, we present examples that feature semiotic representations of their developing professional and personal identities. We also discuss the use of semiotic representations with narrative data derived from candidates' semi-structured interviews. The first theme of semiotic representation sets the stage for the discussion of theme two, which highlights multimodal design thinking and helps to answer our second research question. The teacher candidates' engagement in multimodal design thinking is unveiled in two ways. First, the teacher candidates' design thinking is made visible by their choice and deliberate communication of their learning processes, knowledge, and skills. Second, the candidates' design thinking is made visible through their orchestration of multiple modes for effectively communicating their past learning, current learning, and a sense of future as they envision future employment as an education professional. To ensure participants' confidentiality and acknowledging ownership of their multimodal works, we apply thick description (Geertz, 2017) and display schematic illustrations to foreground the multimodal features of candidates' ePortfolios in lieu of the whole ePortfolio (Kuo & Sprečić, 2025).

## Semiotic Representations of Emerging Teacher Identities

Semiotic representations consist of multiple sign systems from linguistic to non-linguistic forms, such as image, sound, diagrams, and language, used for the purpose of conveying meaning (Cowan & Albers, 2006). Our analysis of the candidates' ePortfolios revealed various sign systems and semiotic representations that demonstrate their emerging teacher identities. In this section, we start our discussion with the sign system of language such as quotations and narratives. Then, we move on to discuss other sign systems used to convey their experiences, such as visual components, self-portrait photography, images of teaching artifacts, other images, and the use of color.

### *Semiotics of Language*

First, many teacher candidates used language in the form of quotes from famous people to express their teaching beliefs and philosophy. For example, at the bottom as part of the background on every page in Aurora's ePortfolio (Figure 3), she displayed a quote by Michelle Obama: "Success isn't about how much money you make, it's about the difference you make in people's lives."

In the interview, Aurora explained her thinking about this choice, "it's a presentation of what I believe. And, it is also something I can change, or if I like something better, a better quote later, I can replace it. But, it was something very representative of what I believe." Aurora further explained that the quote represents who she is and how she cares about student learning and their lives. Related to this message, Aurora wrote a statement on the page titled Biography and Teaching Philosophy that stated:

> From a very young age I knew that helping people was something that gave me great satisfaction. . . . My decision to pursue a career in teaching is due, in part, to my intrinsic desire to make a positive impact on the life of a child.

To substantiate the same message, she then shared a story about how one of her teachers made a positive impact in her life when she was an emergent bilingual learner in an eighth-grade classroom:

> Learning in a new environment where language was a barrier was not easy, but I had great teachers along the way that helped me overcome my own fears and who served as my support system. . . . Reflecting on my own struggles, was that I realized how influential a teacher can be. Mr. C (pseudonym) helped me build a bridge that has allowed me to come this far. He challenged me more than anyone had done it before and showed me I can in fact achieve more than I think. As a teacher today, I aspire to model his values and professionalism in the classroom. . . . Through my experience in Mr. C's classroom, I also learned the importance of going the "extra mile" in building meaningful relationships with my students.

Aurora was the first one among all the teacher candidates to include quotations in the ePortfolio. After peer reviews in class, several other candidates incorporated quotations to express their beliefs. Similarly, some candidates added narratives to establish more nuance and depth related to their chosen quotes. For example, on the About Me page, Olana added a quote, "Tell me and I forget, teach me and I may remember, involve me and I learn" by Benjamin Franklin. Underneath the quote, Olana wrote a vignette that reflects the emphasis of "involve and learn" in her quote. As a Special Education major, Olana described how she became interested in teaching secondary students with emotional impairments because of the influence of her family members who were also special educators. Olana reiterated the idea of "involve and learn" on her Overall Reflection page when she wrote about her practicum experiences, "I truly enjoyed this practicum because this opportunity was so hands-on; learning the material in class and then having the chance to apply what we learned to a real-life situation made the learning deeper."

Similarly, Emerald posted a quote in her ePortfolio: "Every child is one caring adult away from being a successful story" by Josh Shipp. Emerald wrote about her emphasis on becoming a caring educator on her homepage:

> I aspire to be like the teachers that I had the pleasure of having; encouraging, positive, caring, and always going above and beyond. Every child deserves to have a good, caring role model that will support them to succeed. I strive to be that person for my students.

In the interview, Emerald stated, "I added in little quotes that represent me, which puts in my personal flair."

Another example is found in Teresa's ePortfolio, in which she added a quote on the Overall Reflection page: "A teacher affects eternity. He can never tell where his influence stops" by Henry B. Adams. This quote conveys a sense of resilience and corresponds to her story of studying hard to become a classroom teacher. In the interview, Teresa elaborated:

> I think that's a message to all teachers, that throughout the tough times . . . our students are going to take what we teach them, and go on and

> influence other people. I think that's a really important message to all teachers and to myself, that there's going to be hard days, but keep pushing on. I think it's the result that's definitely worth it.

In the above examples, each candidate purposefully selected a quote to engage the viewers' imagination, with room for viewers' interpretation about the candidate's teaching beliefs. Yet, as discussed regarding the partiality of modes, a single quote only conveys meanings partially (Jewitt & Kress, 2003). The narratives or stories that the candidates added complement their chosen quotes, so both elements work together to provide a more holistic message that accentuates their teaching philosophies and guides viewers' attention to the kind of teachers they want to become in the future. The interplay of quotes and narratives provides a rich linguistic representation of teacher identities; however, these alone cannot fully capture the complexity of meaning-making. These linguistic choices, along with the visuals below, invite viewers into a different kind of interpretive engagement, where meaning is shaped not only by what is said but also by what is seen.

***Semiotics of Image and Color***

Candidates presented their teacher identities through the semiotics of images and color throughout the ePortfolio, including self-portrait photography, teaching artifacts, images with special meanings, and use of color. First, many of the teacher candidates utilized self-portrait photography to highlight their developing identities. Aurora, Louisa, Sandra, and several other candidates posted a professional headshot on their homepages, in which they were in business casual outfits while looking straight at the viewer. According to Kress and Van Leeuwen (2021), when a represented participant of an image gazes at the viewer, it creates a social interaction that "demands something from the viewer" (p. 116). In these teacher candidates' professional headshots, many smiled to express a sense of friendliness, "in which cases the viewer is asked to enter into a relation of social affinity with them" (Kress & Van Leeuwen, 2021, p. 117). In other words, these headshots deliver a message of invitation to engage the audience of the ePortfolio.

On the other hand, some teacher candidates included photos, in which they did not look directly at the viewer. For example, on the About Me page, one teacher candidate posted a photo of her sitting next to her practicum student and gazing at the student with a smile. This photo conveys a more complex message about her identity as a teacher to care about the student and demonstrates the notion of active teaching. The photo corresponds to her written narrative, placed beside her photo, "I love to work with children and enjoy collaborating with others," along with a story of how she "discovered [her] love for teaching at a young age."

In another example, on the Biography page, a teacher candidate posted a photo of her standing next to her student in front of a white board. In this photo, both the candidate and the student looked at the white board with their backs to the viewer. This candidate's right hand was drawing a line underneath the phrase "long vowel" on the white board, with her left hand resting on her waist. The candidate's posture in the photo conveys a message of self-confidence in teaching, which corresponds to her written narrative next to the photo:

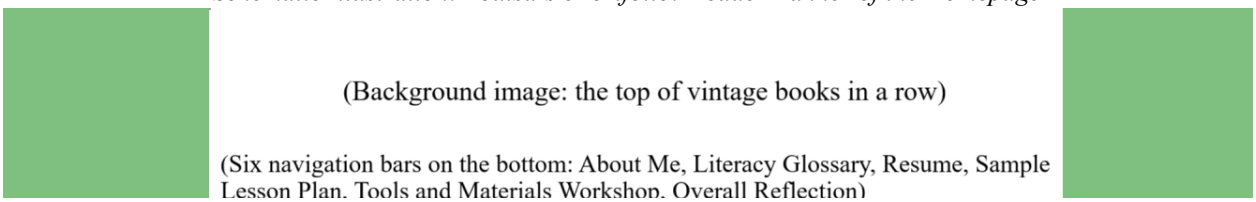
> I strive to be a teacher that encourages youth to be themselves and embrace their unique qualities just like me! I have found a love in teaching, and I hope to be an educator that impacts the next generation of youth in a positive way.

For this type of image, in which the represented participants do not look directly at the viewer, Kress and Van Leeuwen (2021) explained that this kind of image "offers the represented participants to the viewer as items of information, objects of contemplation" (p. 118). In the above two examples, which portray these two teacher candidates' teaching in action, their photos offer the viewer a message of their positive attitudes toward teaching, yet with nuanced differences. The first demonstrates a pleasant student-centered message, and the second demonstrates a sense of self-confidence. Furthermore, like the interaction between a quotation and a narrative discussed above, these two examples work together to convey a holistic message about these two candidates' emerging teacher identities.

Furthermore, some teacher candidates posted images of teaching artifacts, particularly on the page featuring sample lessons taught in the practicum. For instance, on the Sample Lesson Plan page that contains a lesson plan in written text, Aurora included an image of a puppet show, which she and Sandra created for their lesson on "retelling stories" in the practicum. In the interview, Aurora explained her intention of adding an image:

> I wanted to have some colors; I didn't want it to be all just text. . . . It makes it easier for them [viewers] to understand what I'm talking about. . . . I think I told them we used the puppet shows. . . . I put a picture here, so they know what I'm talking about when I said puppet shows . . . so it makes it more visual for them, and they see what students were seeing.

Figure 4
*Schematic Illustration: Louisa's ePortfolio: Header Banner of the Homepage*




In Aurora's statement, she emphasized the two purposes of her use of this image. One is to set emotional tone and contrast (i.e., "I wanted to have some colors; I didn't want it to be all just text"). The other purpose is for the image to carry additional meaning that complements the written content in her lesson plan sample to create a cohesive message, "when I said puppet shows . . . so it makes it more visual for them, and they see what students were seeing."

In addition to images of teaching artifacts, some teacher candidates intentionally chose images to communicate coherence across messages and to strengthen the meaning. For example, Louisa used an image of books as a header banner of the homepage (Figure 4) to represent her literacy educator's identity, and as a navigational cue in the form of a border. In the interview, Louisa explained the rationale behind her image choice:

> I really like books. It's something that I'm very passionate about. So, I kept trying to find different book pictures or library pictures or something, but I liked this one because these books are kind of like vintage and I like old books and stuff like that so that's why I picked it.

On the homepage, Louisa also included a section with a visual heading titled "Fun facts!" In this section, she represented the following:

> Favorite movie: Finding Nemo
> Favorite book: A Monster Calls by Patrick Ness
> Favorite activity: hiking and exploring nature
> Favorite animals: tortoise and sloths

In the interview, Louisa explained that this "fun facts" section on the homepage represents the personal aspect of her identity, in addition to her professional self:

> I felt like, any ePortfolio is like a representation of myself but on the computer, and so I didn't want it to be just my professional background, just my education. Um, because if an employer zooms in to look at this, I feel like, they want to see all the professional aspects, but they also want to see, like whom they are gonna potentially hiring, and so I wanted to include, like stuff about myself. So they can kinda get more ideas about who I am. . . . If you include yourself like fun facts, people kinda get the impression that I'm a friendly person. Um, and, also I'm kinda layback, because I think the color skim [exhilarating green] is more like layback, and it's not like bright.

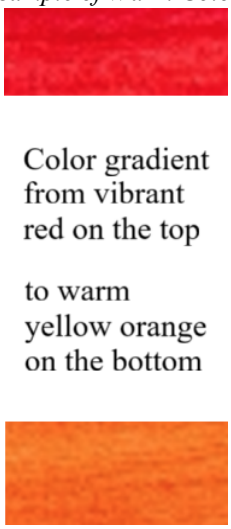
Another example of using images to create cohesive meaning and cultural associations that illustrate personal and professional identity is found in Lindsay's ePortfolio. On the Biography page, Lindsay displayed two photos side by side in the middle of the page. On the left-hand side, under the heading "OUTSIDE OF SCHOOL" was a photo of her going cross-country skiing, followed by a written description of activities she enjoys outside school. On the right-hand side, under the heading "WITHIN THE CLASSROOM" was a photo of her doing a presentation in class. Beneath the photo, she wrote about her pre-internship experiences in different classrooms at local elementary schools. In the background of this page, Lindsay placed a large image portraying still water that mirrors the sky in a lakeview, which sets the emotional tone of the whole page in a tranquil and calming dark ink blue.

Lindsay explained the inclusion of both her personal and professional aspects in the interview:

> I really wanted to specifically include stuff about myself, and personal and professional. And so like in my bio, I have like the two sections, and I really wanted to make that clear. . . . I wanted to be professional but personable. And so that's why I've put this color in because I think it's more personal and like the background and everything just to give people an idea of who I am.

During the interview, Lindsay also mentioned that she is a photographer in addition to being a college student. Lindsay took the lakeview picture and intentionally selected all the images for her ePortfolio as she noted: "So I think that [lakeview photo] conveys my personality of, being a photographer and, um,

Figure 5
*Schematic Illustration: A Sample of Warm Color Choices of an ePortfolio*




enjoying. I love nature, so I think it kind of brings that in a little bit, too." In this example of Lindsay's Biography page, like the above examples, each semiotic resource partially captures a side of her identity. To fully understand her developing teacher identity, the viewers need to take into consideration all the semiotics of image and color. The photos portray her out-of-school and in-class activities, along with linguistic descriptions, and particularly the lakeview image.

Moreover, Lindsay's comment, "that's why I've put this color in because I think it's more personal," brings our attention to the next visual mode used in the teacher candidates' ePortfolios: strategic and purposeful use of color. Color, like other visual modes, is its own mode with its own grammar to communicate meanings, such as companies using color in their advertisements to establish their "corporate identity" (Kress & Van Leeuwen, 2002, p. 365, 2021). In addition to the above example of Lindsay's use of dark ink blue in her ePortfolio, Aurora used teal blue (Figure 3) as the background color to set a more formal tone of her ePortfolio pages. In the interview, Aurora discussed how she changed the color from orange to teal blue after the mini lesson about using color:

> I actually ended up changing my colors after they had that session about color. It used to be like pinkish orangey, like my [ePortfolio] background. And I wasn't really happy. I ended up changing it to this [teal blue] and I really like it.

Another example of color usage is from Louisa's ePortfolio. As illustrated in Figure 4, she used exhilarating green as the background color of her ePortfolio because it was her favorite color, which she chose to express calmness and to match the header banner image (Figure 4), as she explained in the interview:

> They [the visual consultants] kind of talked about green being calming and stuff like that, so that's another reason that I picked it, and I wasn't trying to pick anything that was too bright. Originally, I had yellow as my background, and I changed it to purple and pink. I had a lot of different colors. . . . I ended up with green and I like it because, I also wanted, like the [vintage book] picture in the banner to match, to kind of go with the background, cause the banners on every page. So, I wanted those two to connect. And I kind of found the banner [with the vintage book picture] first, and then picked the background color to go with that.

Kress and Van Leeuwen (2002) explained that people use color to "present themselves and the values they stand for . . . in the context of specific social situations, to say 'I am calm', or 'I am energetic'" (p. 349). In Lindsay's, Aurora's, and Louisa's ePortfolios, they all used cold colors (i.e., dark ink blue, teal blue, and exhilarating green respectively), to express a sense of quietness and calmness, a choice commonly made by many other teacher candidates in the classes. On the other hand, a few teacher candidates chose warm colors to express passion and creativity. For example, a teacher candidate set the tone of her ePortfolio background with a linear color gradient in watercolor texture from vibrant red on the top of the page to warm yellow orange on the bottom of the page. Figure 5 presents a sample of this teacher candidate's color choices in her ePortfolio.

On her Reflection page, she wrote that she wanted to make her pages "aesthetically pleasing." On the upper right corner of this Reflection page, she also drew an image of the sun, with bright yellow in the center, then spread outward in orange and red. In addition, she drew an image of flowers in a variety of yellow, orange, pink, and red colors, which brings up a sense of playfulness, and placed it on the bottom of her ePortfolio pages. Her choice of warm colors and visual design highlights her artistic self, as she wrote on her About Me page: "I also enjoy painting, drawing, knitting, and everything that allows me to be creative. These qualities would be an asset to a school that is looking for someone who is creative."

Through all the examples above, it is evident that the candidates' emerging teacher identities are "mediated" (Mockler, 2011, p. 125) through their intentional use of semiotics to represent emotion, tone, salience of importance, and a brand identity. Some candidates adopted famous quotations, accompanied by narratives or personal stories, to feature their teaching beliefs and philosophy. Some utilized various types of visual components, including self-portrait photography with different gazes (e.g., directly at the viewer versus looking away from the viewer), artifacts of teaching materials, images with special meanings, and strategic use of color to represent a sense of self. These visual modes are not simply decorative. They communicate specific hierarchical, symbolic, and functional meanings related to their developing teacher identities, which included a professional self, such as through Louisa's vintage book image, Lindsay's photo of herself making a presentation, Aurora's color choice of teal blue, Louisa's fun facts section of her ePortfolio, Lindsay's photo of her in an outdoor activity, and the other candidate's ePortfolio with warm color choices, sun with bright yellow, orange, and red colors, and the flower image. These semiotic examples accentuate the complex professional and the personal representations of teacher identity development.

More importantly, with an emphasis on multimodal approaches to design thinking, all the above semiotic resources, both linguistic and visual, work together to convey a more holistic and complete message of candidates' developing teacher identities. Different from a traditional stance on portfolios that focus on presenting candidates' knowledge and skills, ePortfolios provide a fluid digital space for preservice teacher candidates to select different modes of semiotic representations that are critical to expressing themselves through thoughtful design.

**Design Thinking Through Multimodal Expressions**

Teacher candidates' semiotic representations of their emerging identities through ePortfolios manifest through an analysis of two prominent features of their design thinking: deliberate choices and design thinking continuity. For the first feature, as the candidates explored the dynamic nature of the digital space, they engaged in design thinking by making deliberate choices to create multimodal meaning for the viewer. In other words, the candidates' design-thinking processes are made "tangible" (Carlgren et al., 2016, p. 47) by various multimodal expressions through the ePortfolio. Take the teacher candidates' color choices: some selected cold colors, such as exhilarating green in Louisa's ePortfolio and teal blue in Aurora's ePortfolio, because these colors represent calmness, while a few other teacher candidates chose warm colors, such as a red-orange linear color gradient portrayed in Figure 5 to highlight a different teacher quality (e.g., creativity).

In addition to color choices, candidates' deliberate choices of multimodal expression are apparent in the intentional design of visual structure and layout of the ePortfolios. For example, in Lindsay's ePortfolio, she intentionally created a two-column structure on the Biography page to include her "Outside of School" and "Within the Classroom" experiences, which emphasize both the personal and the professional aspects of her identities. Such design to promote both the professional and the personal aspect is also articulated on Louisa's About Me page, in which her choice of the vintage book image (Figure 4) highlights her literacy educator's role and a fun facts section features her friendly personality. The intentional design to exhibit both professional and personal identities resonates with the dynamic, multifaceted, and contextual nature of teacher identities as discussed in the preceding section.

Another example of deliberate choices of design thinking is characterized by Aurora's use of images, quotes, colors, and other multimodal variations that represent her teaching philosophy. In addition to the selection of teal blue as the background color, her design thinking is made visible through showing a quote by Michelle Obama and sharing her story as an emergent bilingual learner to express her teaching philosophy, and through displaying the image of the puppet show station from her practicum session to showcase her teaching of a literacy lesson, all of which were purposefully designed to demonstrate her emerging teacher identity. In addition to posting static images, such as the puppet show station photo, Aurora embedded other multimodal resources such as Google Slideshow, retrieved from her class presentation slides, to draw the viewer's attention to her growing knowledge of literacy strategies and tools. In the interview, Aurora described her design thinking process when she created these different multimodal components:

> I just uploaded the slides that we used in class . . . when you go to "insert," you can go right to "Google," and this says "Presentation." . . . There are a lot of Google things that you can upload, like document and Google Map, and things like that. . . . I tried to explore the site to see what things I could do. . . . I wasn't familiar with that. So, it was really hard to know what I could do with that or not, so I spent the whole afternoon, just going through the tab, just playing around with it, playing with the colors and everything. . . . I spent a lot of time doing this (laughing), but . . . now I feel comfortable using it.

The second form of design thinking is revealed through a sense of continuity as illustrated in Aurora's comment: "just going through the tab, just playing around with it, playing with the colors and everything." Design thinking continuity is conceptualized as how designers "[try] things out in an iterative way, and moving between divergent and convergent ways of thinking" (Carlgren et al., 2016, p. 47). Design thinking continuity involves "critical consciousness," which relates to a creator's ability to "feel, to pay attention to nuance, to act and appraise the consequences of one's choices, and revise and then to make other choices" (A. Wells, 2013, p. 625). Design thinking in this regard constitutes a creative, dynamic, interactive, and reflective process of inquiry and problem-solving. In Aurora's case, she explored different functions among Google Apps, "played around" with color choices, and considered different visual structures, such as static images versus slideshow presentations.

In the interview, Aurora also explained how she would expand the scope of her ePortfolio in the future beyond just a class assignment: to make it more personal and add more work experiences. This speaks to a sustainable mindset that becomes iterative in future contexts. Aurora further described a story about her experiences at a job interview for a teacher position. During the job interview, she showed the Biography and Teaching Philosophy page of her ePortfolio to the interviewers at the school. She described:

> Just because they asked me what my philosophy was, I show them [the teaching philosophy page], I think they were impressed. . . . They said, we can see that you have put a lot of time in this. . . . I talked about it [teaching philosophy] and they were reading through it [the teaching philosophy page].

Aurora also explained that she had future employers in mind when she developed her ePortfolio:

> That's why I also added things from TK20 [to this ePortfolio] because I wanted them [future employers] to see I have that in there. I want it to be something I can present to now and future employers. I could always keep updating it.

Aurora's experience at her job interview resonates with Kitchenham's (2008) research that "prospective employers saw the e-portfolios as an impressive demonstration of not only their technological prowess but also the students' teaching qualifications" (p. 147).

Other teacher candidates also demonstrated their design thinking continuity related to their future use of the ePortfolio. For example, Teresa planned to include a link to her resume to make it accessible for her future employers. In Lindsay's case, she discussed how her ePortfolio presented an "online presence" of herself that can facilitate her interaction with others in the professional setting:

> Just having this as a way to create my own website for my classroom and having this to show in interviews and stuff would be super helpful just because I have my examples of my work right there. . . . just give myself an online presence that I wouldn't have otherwise. . . . I want to keep it and present it to different professionals just as a way of showing who I am.

In the above examples, Aurora, Teresa, and Lindsay discussed what future employers might look for in their ePortfolios. Using ePortfolios fortifies preservice teacher candidates' transition to employment (Cordie et al., 2019). Strudler and Wetzel (2011) advocated that the process of creating the ePortfolio prepares teachers to better respond to job-interview questions, as demonstrated in Aurora's case above. Several teacher candidates stated that they would continue to improve their ePortfolio and would consider sending their ePortfolio with their future applications for teaching positions. Furthermore, their comments demonstrate an awareness of multiple audiences in their design thinking continuity. The feature of design thinking continuity also brings forward the authentic, iterative, and sustainable nature of ePortfolios, particularly in the connections to the candidates' professional identities and future lives (Cordie et al., 2019).

## Conclusion and Implications

In this article, we outlined a study that employed an ePortfolio project as a semiotic medium, through which undergraduate teacher candidates engaged in design thinking and utilized multimodal expressions to construct and represent their emerging teacher identities. In the digital space of their ePortfolios, the candidates presented themselves by strategically using semiotic representations that included language components (e.g., quotations with supporting narratives or stories in Aurora's and in Olana's ePortfolio), as well as other multimodal components, including self-portrait photography, teaching artifacts, images with special meanings (e.g., Lindsay's use of the

lakeview picture, as well as "Outside of School" versus "Within the Classroom" photos), and strategic use of color (e.g., Aurora's use of teal blue, Louisa's use of exhilarating green, and Lindsay's use of dark ink blue). Their design thinking is made visible through the multimodal semiotic representations that were intentionally selected to promote professional and personal selves. Finally, their design thinking featured a sense of continuity as they explored and experimented with the digital space and planned to revise and modify their ePortfolios for future iterations. In what follows, we draw implications that address challenges and opportunities because of this study.

To address challenges, especially in ePortfolio implementations (Luera et al., 2016; Peacock et al., 2010), one challenge points to adequate time and support to work on the ePortfolio. In this study, although class time was allocated with the visual consultants' support through a studio approach, some candidates indicated the need for more structured support during the in-class work sessions, as well as for specific guidelines that differentiate in-class and at-home preparation tasks. Some challenges may also be related to "negative attitudes to technology and ePortfolios" (Peacock et al., 2010, p. 837). For example, Ember explained in the interview that she would prefer doing things on paper because it takes so much time to create and to make ePortfolios look professional, although she understood the drives in the digital era. To address this issue and to increase buy-in, Luera et al. (2016) recommended that instructors "identify core values of the ePortfolio as early as possible in the project" (p. 135).

Despite challenges regarding ePortfolio implementations, we identify opportunities that positively support teacher identity development. First, utilizing multimodal expressions in the design process cultivates agency in the candidates, such as Louisa's deliberate use of a vintage book image in her ePortfolio to express her love for books and her identity as a literacy educator. Moreover, the candidates can develop knowledge of digital literacies (Andersen & Pitkänen, 2019; Jones & Hafner, 2021) as they engaged in the design thinking process. For example, in Aurora's case, she actively explored and considered the affordances and constraints of different digital materials (e.g., various Google Apps, static images versus Google Slideshow) through this ePortfolio project.

Furthermore, the above findings and discussion call attention to the fact that ePortfolios are not simply a collection of academic artifacts to demonstrate learners' knowledge. The opportunities to cultivate preservice teacher candidates' agency as they form their professional identities through multimodal ePortfolio design interrogate the traditional view on preservice teacher candidates as "technician, consumer, receiver, transmitter, and implementer of other people's knowledge" (Cochran-Smith & Lytle, 2008, p. 42). In this study, utilizing ePortfolios through a multimodal approach creates an authentic and creative environment, in which the preservice teacher candidates incorporated design thinking and problem-solving skills. When ePortfolios are developed through a multimodal approach informed by design thinking, the tension between objective and subjective philosophies (Strudler & Wetzel, 2011) shifts from an oppositional stance to a dialogical continuum. Additionally, this study can be applied in other disciplines, in which students create ePortfolios to multimodally express their growing knowledge and developing identities that reflect the unique nature of their field.

As the work of teacher educators with preservice teacher candidates is heavily focused on facilitating the transformation from thinking as a learner to a professional educator who facilitates learning (Garza et al., 2016), an ePortfolio project through a multimodal approach fortifies this transformational work. The ePortfolio project empowers preservice teachers with agency as they engage in design thinking, review and reflect on their learning trajectory, and transform their identities from learners to professionals (Whitney et al., 2021). These components are essential in an era when classroom teachers and teacher educators must navigate dynamic changes and address increasingly complex issues.

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