Reflections of Pre-Service Teachers on Digital Material Design After Practising Digitally-Enhanced Instructional Events

Güler Göçen Kabaran, PhD., Muğla Sıtkı Koçman University, gulergocen@mu.edu.tr
ⓘD 0000-0002-2631-8768

Bilge Aslan Altan, PhD., Muğla Sıtkı Koçman University, bilgeaslan@mu.edu.tr
ⓘD 0000-0002-3309-933X

Abstract

Digital capacities of teachers are profoundly valued in present teaching activities because advanced technology demands to adapt and follow digital trends in education. In order to answer this call, initial teacher education (ITE) programs offer courses to promote multifaceted digital capacities of preservice teachers and enable them to design digitally-enhanced teaching materials and activities. This study supports the idea of improving digital learning outcomes of offered courses, Instructional Technologies in this case, with well-suited instructional events which are enriched with digital knowledge and practice in digital material design. Doing so, this case study aims to report 118 preservice teachers' reflections on digital material design after they experiencing a 14-weeks period syllabus which combines digital tools/sources/environments and necessary pedagogy referring to Gagne's Instructional Events. The study collected necessary data through self-evaluation forms consisting 5 open-ended questions. The results document that majority of the preservice teachers could successfully experience digital material design process according to an instructional flow, and they identify themselves as improved enough to practice teaching with digital materials and resources.

INTRODUCTION

The digital transition in teaching and learning activities may not be a new trend, but an ongoing issue on which teacher educators, in particular, continuously debate because various digital resources and networks comprise the major part of today's teaching practices (Gudmundsdottir & Hatlevik, 2018). Thus, teachers' digital capacities and practices have been frequently stressed (Garcia-Martin & Garcia-Sanchez, 2017; Instefjord & Munthe, 2017) to improve digitally-enhanced teaching activities. Initial teacher education programs (ITE), in this sense, can be accounted to have primary responsibility to infuse fundamental digital understanding and readiness into preservice teachers' professional digital skills. However, ITE programs are mostly criticized (Foulger et al, 2020; Gudmundsdottir, & Hatlevik, 2018; Tondeur et al., 2017; Liu, 2013; Hew & Brush, 2007; Kay, 2006; Koehler and Mishra, 2005) to have limited contexts in which preservice teachers' digital skills can be professionally empowered.

Leaning on basic criticisms, preservice teachers' technology acquisition and early digital experiences are primarily linked to their professional training, therefore to faculty staff in ITE. Firstly, teacher educators are encouraged to be active users of digital resources and networks in their own practices (Ungar & Baruch, 2016). Borthwick and Hansen (2017) also underline the importance of processes in which teacher educators introduce variety of digital tools through individual practice. Furthermore, ignorance or exclusion of digital resources by academic staff in applied courses may result in poor levels of digital capacities of preservice teachers (Ertmer, et al., 2012; Ottestad et al., 2014). Secondly, digital skills in teaching should be consistent with pedagogy so that professional development can be assisted through which newly qualified teachers can be decisive to establish effective teaching and learning environment (Gudmundsdottir, Loftagarden, & Ottestad, 2014; Lund et al, 2014). Lund and Erikson (2016), here, draw attention to the "double challenge" for preservice teachers, which emerges from the dual-expectation of being competent in using digital technologies as well as fostering productive, appropriate, and effective designs with these technologies in teaching. To achieve, preservice teachers should be reinforced to transform these competencies into innovative teaching practices, which represents the notion of transformative agency explained as (Virkkunen, 2006) a capacity to "break away from the presented frame of action and take the initiation to transform it". Lastly, preservice teachers can overcome unexpected challenges (such as COVID-19 pandemic etc.) through their professional digital capacities to continue teaching in related contexts. Concerned studies on the topic (Bozkurt & Sharma, 2020; Murphy, 2020) reflected that issues as discrepancy between theory and practice, lack of experiences and practices have resulted in difficulties faced by teachers in hard time. Accordingly, it is fair to say that digital skills and mastery of teachers in instructional technologies are very crucial at present and in future teaching conditions (Carrillo & Flores, 2020; König, Jager-Biela & Glutsch, 2020).

In order to respond the criticisms and present a roadmap for teacher educators, the iterative findings (Borthwick & Hansen, 2017; Falloon, 2020; Guerriero, 2017; König et al., 2017; Russel & Finger, 2007) emphasize the importance of well-suited digitally enhanced instructional practices in offered courses in ITE that are addressed to empower digital capacities in teaching. In such courses, syllabuses should be properly organized for preservice teachers to realize why digital resources are important components of teaching (Falloon, 2020) and how they can "smartly" design their teaching materials and activities with these resources by combining context and pedagogy. Against this background, we intended to practice a syllabus which combines Gagne's instructional events with digital tools and practices to better upskill preservice teachers' knowledge and capacity in digital material design in Instructional Technologies (IT) course which is an offered must course in ITE program in Turkey. Doing so, this study wishes to examine the reflections of preservice teachers on digital material design after delivering a course content that is digitally-enhanced. In line with our main intention, we wish to offer available digital tools and resources to be adopted in multiple instructional situations for future

teaching practices as well. To better describe the reflections, we asked preservice teachers to practice designing authentic digital materials referring to an instructional event with a context. In conclusion, we examined the preservice teachers' reflections on digital material design through their self-generated digital materials addressing following research questions:

1. What are the reasons of preservice teachers behind selecting and preparing the presented digital materials?
2. What are the assumed benefits of the presented digital materials in teaching and learning according to preservice teachers?
3. What are the challenges which preservice teachers might experience in preparing the presented digital materials?
4. What are the strengths and weaknesses of the presented digital materials according to preservice teachers?
5. What are the implications of preservice teachers about the delivered content of the applied syllabus in terms of digital material design?

FEATURED LITERATURE TO IMPROVE DIGITAL CAPACITIES IN ITE: BRIEF OVERVIEW

Attempts in defining digital capacities and proposes to improve necessary digital skills for teachers similarly point out fundamental concepts and components. Mostly known models such as TPCK (Mishra & Koehler, 2006), European DigiComEdu framework (Vuorikari et al., 2016) are very influential in realizing underpinning rationale and features of basic contexts in which preservice teachers are encouraged to have digital skills of teaching. These models accentuate the multifaceted digital capacities of teachers/preservice teachers in delivering digitally-enhanced teaching-learning activities by stressing effective combination of digital tools/resources, contexts, and pedagogies. Along with these models, there are suggestions (Almerich et al., 2016; Johannesen et al., 2014; Ottestad et al., 2014; Janssen et al., 2013) that outline key aspects of technological and pedagogical competencies in general. Additionally, there are taxonomy-based descriptions for digital competencies of teachers (Oliver, 2019; Krumsvik, 2008). Eventually, these research findings feature generic digital competence, digital teaching competence and professional digital competence, some of which directly refer to actively use of digital tools, proficiency in digitally-enhanced teaching designs, and mastery in productive and innovative context-related digital teaching designs respectively.

Apart from teacher-based digital capacities, suggestions for teacher educators were also available. Foulger and her associates (2017) presented Teacher Educator Technology Competencies (TETCs) to organize better content and instructions in teacher education. The framework highlights designing content-specific technologies incorporation with pedagogy; supporting preservice teachers' development in knowledge, skills and technology use; applying varied strategies and technology tools for different instructional situations, and many other.

Relying on the literature, we were inspired by the learning by design approach that was argued by Koehler and Mishra (2005) while organizing and delivering the course content. According to them, traditional way of introducing digital tools and resources to teachers are no longer very much effective to empower technology skills in teaching. Instead, it is claimed to be much better to provide teachers with deeper understanding of technology use which is interrelated with context and pedagogy. Benefiting from the main insights of learning by design approach, we followed a course content that honours both this approach and literally agreed components to assist preservice teachers to advance in digital capacities of material design. Before delivering the IT course, following were prioritized: (1) knowledge of digital tools, (2) mastery in use of digital tools, (3) consistency with context and pedagogy, (4) personal and professional confidence to produce innovative digital designs.

ROADMAP FOR DELIVERING THE COURSE: GAGNE'S MODEL

As previously stated, digital capacities do not solely capture digital knowledge. It requires to know how to organize and teach with digital technologies in certain contexts with necessary pedagogy. In such a plan, as a first step, preservice teachers are intended to be familiar with appropriate digital tools and resources before initiating a digital material design procedure. Because there are vast variety of digital tools/resources that are applicable to use by teachers in different instructional purposes, it may be ill-suited to make a list of randomly selected digital tools/resources. In order to suggest a justified roadmap for both teacher educators and preservice teachers, we attempted to concentrate on digital tools/resources that can be useful in particular instructional stages with different contexts. Therefore, preservice teachers of different subject areas can design digital materials addressing specific instructional situations. Consequently, Gagne's (1988) instructional model was inspired in categorizing digital tools and resources while delivering the course content.

Gagne's instructional model is widely accepted and refers to the actions that take place in a teaching period (Ilie, 2014; Khadjooi, Rostami, & Ishaq, 2011). In designing teaching activities, Gagne proposed nine instructional events under three main sections, namely as: preparation to learning (gaining attention, informing the learner of the objective, stimulating the recall of prerequisite learning), instruction and practice (presenting the stimulus material, providing learning guidance, eliciting the performance), and assessment and transfer (providing feedback about performance correctness, assessing the performance, enhancing retention and transfer). These events can be considered as the procedures in a learning process as well (Driscoll, 2000). Gagne's teaching model provides a solid theoretical framework for designing instructional activities and improving the quality of teaching, and offers an action-oriented approach. In ITE programs, teacher educators mainly emphasize these procedures while enhancing teaching skills as well as supervising necessary pedagogies with different subject areas. To take the necessary action, therefore, as in this study, Gagne's model can be applied to select and use digital tools while matching the instructional stages in a course design and practice.

METHOD

RESEARCH DESIGN AND CONTEXT

The research, which is built upon case study of qualitative study, aims to examine and present the reflections of preservice teachers on digital material design after experiencing a digitally-enhanced course content, Instructional Technologies, in an ITE program. Case study is described as "an in-depth exploration of a bounded system (e.g., an activity, event, process, or individuals) based on extensive data collection" (Creswell, 2015). In this study, it is wished to capture an in-depth examination of preservice teachers' opinions on digital material design capacities so that case study was referred. The named course is offered in one term of an academic year, which continues for 14-weeks period.

Before conducting the course, the literature-based backgrounds, official reports documenting national and international digital standards and competencies, and research findings concerning digital improvements in material design were examined thoroughly to create a feasible and sustainable content. The intended actions in the course were organized according to Gagne's model of instructional events. Therefore, preservice teachers were attempted to be equipped with mastery in using digital tools for digital materials design in different stages of instruction. To combine, rich sources for digital tools/environments were scanned. Among the scanned digital tools, the ones that are consistent with intended instructions were listed and adopted for the course. Besides, free-to-use digital tools were given priority to fully benefit in practice.

The final version of the course content covered theoretical frameworks of digitally-enhanced instructions and materials to provide an understanding for preservice teachers to use digital materials

in teaching; digital tools/resources to design digital materials to prepare students for learning; digital tools/resources to design digital materials for instruction and practice a context; and digital tools/resources to design digital materials to assess student performances and transfer learning (Table 1).

Table 1. *Delivered Course Content*

Period	Duration (2 hrs. for each week)	Content	Reference to Gagne's Model	Practiced Digital Tools
3 Weeks	6 hrs.	Theoretical framework of digitally-enhanced instructional designs and materials	-	Course based digital materials of instructors
2 Weeks	4 hrs.	Posters, Word clouds Game-based tools, Infographics, Mind maps, Concept maps	**Preparation to Learning**	Wordart, Wheeldecide, Canva, Mind42, Creately
6 Weeks	12 hrs.	Presentation, Documentation, Collaborative learning, Interactive materials, Digital stories	**Instruction and Practice**	Prezi, Google Docs, QR Code Generator, HP Reveal, Quiver, Thinglink, Canva, Powtoon, Storyjumper
3 Weeks	6 hrs.	Digital games, Interactive response systems, Virtual classrooms	**Assessment and Transfer**	Learningapps, Cram, Google, Forms, Kahoot, Socrative, Edmodo, Classdojo

The course was practiced by researchers as instructors of the course. The digital tools and resources were not prescribed, rather they were practiced with hands-on activities and tasks. After finalizing the course period, preservice teachers were asked to originate their digital materials (two materials for each preservice teacher) for a specific instructional stage and submit them with a lesson plan. In their lesson plans, preservice teachers justified their subject-specific contexts and rationales of their authentic digital materials.

PARTICIPANTS

The research was conducted in Instructional Technologies must course with 118 (female=70, male=48) registered sophomore year preservice teachers. This course is one and only must course addressing technology-based teaching skills that participants have to take in their training. 52 participants study in English language teaching while 66 of them study in Turkish language teaching. Yet, they are addressed to have basic digital capacities and mastery in using digital tools and resources for digital material design.

Participant preservice teachers were exposed to course content, then they practiced the selected digital tools with the researchers' guidance. They were also provided with visualized manuals, explaining from where these tools can be accessed and how they can be practiced.

The course content was shared with participants at the beginning of the term, and they were informed about research intentions. Participants were volunteer to participate in the research and their names were not shared in any part of the research procedure.

DATA COLLECTION

The course was conducted in the fall semester of 2020-2021 academic year, and at the end of the term, preservice teachers were asked to produce their digital materials with introduced digital

tools and resources. Following, preservice teachers were given self-evaluation forms for their presented works. These forms were originated by the researchers to examine the reflections of preservice teachers on digital material design in line with the research questions. The forms were developed by referring to necessary literature, the literature review helped to create draft questions. Contributing expert opinions and following revisions finalized the self-evaluation forms with five open-ended questions. The whole research-based procedures were operated voluntarily and anonymously.

DATA ANALYSIS

The analysis of qualitative data was inductive, starting with describing the digital materials and digital tools/resources. Then, the process incorporated with content analysis to treat data of stated responses in the forms. The researchers examined responses individually, question-by-question, and using open-coding. Iterative statements were listed and compared. After the analysis was completed, the individual conclusions were united. Researchers had consensus on results, then the findings were reported with direct references of participants.

The coding procedure was firstly conducted by the researchers, one of whom was also the instructor of the named course. After the first round, the reliability percentage between researchers was determined as .85, which is accepted as reliable. Not to act biased, the external researcher was invited to perform another coding procedure to ensure reliability. The final reliability percentage was found as .87. Additionally, the codes and unified themes were supported by direct references from participants' responses to increase and ensure the credibility and consistency.

RESULTS

DESCRIPTIONS OF SELECTED DIGITAL TOOLS

As the first phase of data analysis, participants' designs were described according to the digital tools they opted (see: Table 2). The mastered digital tools for digital materials were given below.

Table 2. *Participants' Practiced Digital Tools*

Reference to Gagne's Model	Practiced Digital Tool(s)	*f*
Preparation to Learning	WordArt	16
	Mind42	16
	Creately	16
	Canva	11
Instruction and Practice	Prezi	84
	Canva	7
	Powtoon	7
	LearningApps	34
	Cram	5
Assesment and Transfer	QR Codes	1
	Google form	18
	Kahoot	44
	Socrative	11
	Cram	9

Table 2 pictures that preservice teachers preferred to design digital materials with Prezi (*f*=84) for instruction and practice at most. In the same category, the secondly practiced digital tool is LearningApps (*f*=34). These digital tools were possibly practiced for content delivery and eliciting performance, referring to Gagne's model. On the other hand, preservice teachers seemed to work with Kahoot application (*f*=44) with the purpose of assessment and transfer. As equally practiced,

preservice teachers produced digital materials with WordArt (*f*=16), Mind42 (*f*=16), and Creately (*f*=16) likely to organize visually attractive materials in preparation to learning section.

REASONS FOR SELECTION

Preservice teachers' stated their reasons for selecting and preparing their digital materials with individual, instructional and technical concerns. These concerns varied with different sub categories as shared below (Figure 1).

The presented themes reflect that preservice teachers' individual preferences for digital tools are explained as: the selected tools are fun; they fit for the subject-specific context, and preservice teachers are intrigued by these tools. More specifically, one of the participants explained his/her individual priority stating as: *"I preferred Prezi and Socrative since I thought that I could have more fun. Compared to other digital tools and resources, these applications attracted me more."* Another participant, for instance, explained the personal reason for selected digital tools and materials by stating: *"I prepared a presentation by using Prezi since I saw it before, but unfortunately I did not know how to use it. I was very interested in using Prezi. I also designed a digital story because it fits my subject area, and I can frequently use it in my future career."*

Figure 1. *Themes of Reasons in Selection of Digital Tools*
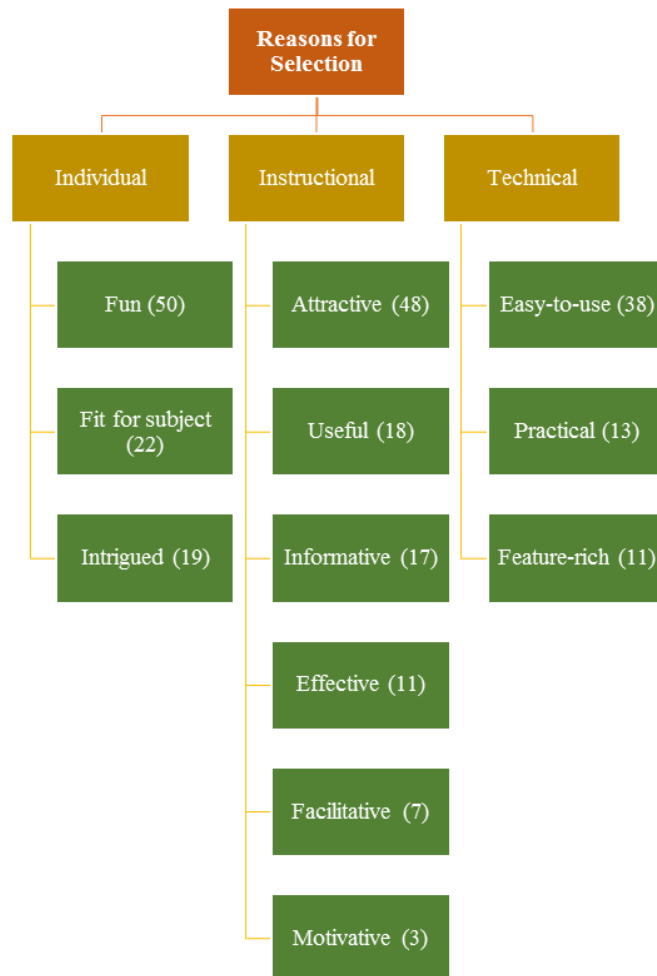
Instructional reasons, however, are more apparent compared to individual ones. Preservice teachers explain their reasons of selection with instructional intentions more. In these intentions, the sub themes reflect pedagogical concerns as attraction, usefulness, information, efficiency, facilitation, and motivation. In the given statements, one of the preservice teachers stresses as: *"I believe that my design with Prezi will attract students and draw their attention to topic. My other digital material*

designed with Cram will facilitate students' learning since it presents information through games, also students will have fun in their performance, therefore, the learning will be more permanent." The reference shows pedagogical concerns that preservice teachers have in digital material design with the focus of attraction and facilitation. Another example illustrated in the sense of motivation and usefulness is as: *"I prepared a word cloud, mind map, booklet, and digital story. I preferred to design these materials because they are very motivating and fun for students. During teaching, these materials are very useful and help students to concentrate on the topic."*

As the final emphasized reason, technical factors seem to affect preservice teachers' selection in digital tools. The factors include easiness-to-use, practicality, and rich features of the digital tools. Easy-to use and feature-rich themes were clearly seen in specific responses as *"I applied Canva and Kahoot in my material designs. The reason why I chose these applications is because they are very easy to use. Canva, in particular, has very rich features, and one can prepare many materials with different options."* In another similar explanation for technical reasons, a reference was stated as: *"My digital materials were with Prezi and Learning Apps. These applications are actually very comfortable to use, and also have rich features."* To sum up, preservice teachers prepared their digital materials with different tools concerning their individual preferences, pedagogical intentions, and technical adequacy.

ASSUMED BENEFITS OF DIGITAL MATERIALS

The explored data of preservice teachers' assumptions on benefits of prepared digital materials were outlined with learning-based, student-based, and instruction-based themes. The findings present three different themes with related sub themes on assumed benefits. On the assumption of learning-based benefits, preservice teachers explain that designed digital materials enable students to learn with fun, and help teachers to promote retention, facilitate learning, and have better didactic quality. The learning-based benefits were exemplified by one of the preservice teachers as: *"I prepared my materials with LearningApps and Prezi. These materials are very effective, I think. Students can have fun while learning. They also enable teachers to easily facilitate learning. Therefore, students can keep knowledge much longer and transfer it to future learning."* Additionally, there is another reference to illustrate positive effects on learning as: *"I designed my materials with Prezi and Google Forms. These tools seem to be very efficient in retention and transferring knowledge. Thanks to such tools, teaching becomes much easier and more effective."*

Figure 2. *Themes of Assumed Benefits of Digital Materials*
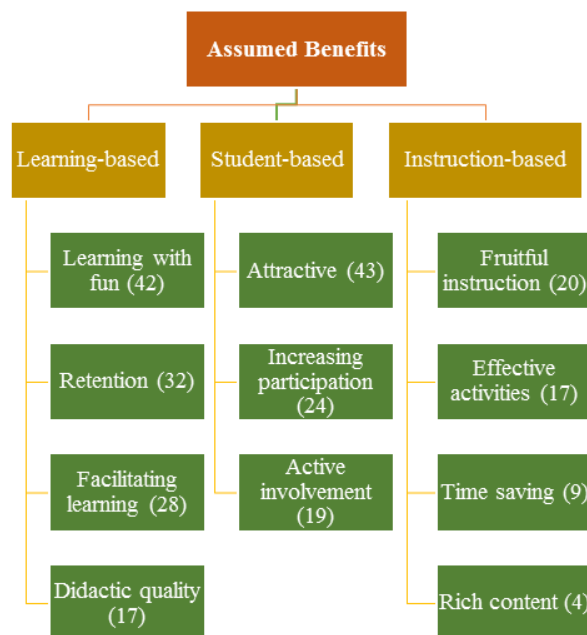
The second main theme, student-based benefits, gives a point of view underlining that digital materials attract student' attention, increase participation, and improve students' active involvement in learning activities. In attracting students, digital materials were referred as: *"I prepared many digital materials using Prezi, Cram, Pawtoon, Socrative, and Google Froms in favor of the course. These materials are audio-visual stimuli, and I can say that they attract students' attention and encourage them to involve in learning. Such materials are very useful for teachers and students."* Preservice teachers continued to present student-based benefits stating as *"Our generation and coming one included technology in every part of their lives. Therefore, it is more than necessary to benefit from technology in teaching-learning activities. My digital games attract students aurally and visually. Eventually, different learning styles are addressed. Through such materials, students can be engaged in learning."* and as *"Digital materials address to different intelligences so that many students can involve in learning activities much more and better. The materials are also easy to follow and attract students."*

The final theme on instruction-based benefits prospered with fruitful instruction, effective activities, less time and effort, and rich content sub themes. Preservice teachers assumed that digital materials replace simple and plain instructions with more fruitful, effective, and enriched instructions. These assumptions were mirrored in preservice teachers' responses as*: "When varied digital materials are put into practice, the instruction becomes more efficient. The monotonous deductions are replaced with fruitful learning activities, and students have more attention and motivation in course, and wait for the next session impatiently."* The responses follow as: *"Everybody is curious about technology in today's world. Even children can use tablets, smart phones, and etc. In such a world, we as teachers need to prepare digital materials to organize effective learning activities in our instructions.", "My designed digital materials help me to save time. Otherwise, to prepare similar materials, I have to spend much more time. I think digital materials are time saving for instructions.",* and *"I have digital materials designed with Prezi and LearningApps. The most important aspect of my materials is to present rich content. Though we have intense program, digital materials and content provide teachers with different alternatives. Having a variety of options is very useful to prepare rich content."*

Briefly, preservice teachers have become more aware of digital materials within different purposes. The presented assumptions match with the instructional events suggested by Gagne. Though presented with different rationales, preservice teachers seem to have a sense that digital materials can be used in preparation to learning (attracting students, etc.), instruction and practice (didactic quality, fruitful instruction, etc.), and assessment and transfer (facilitating learning, retention, etc.).

CHALLENGES IN PREPARING DIGITAL MATERIALS

It is very likely to have some challenges in digital world. Preservice teachers also touched on basic challenges in preparing digital materials with individual and technical lacks. However, the majority responded that they had no difficulty in using digital tools and designing digital materials.

**Figure 3**. *Themes of Challenges in Preparing Digital Materials*
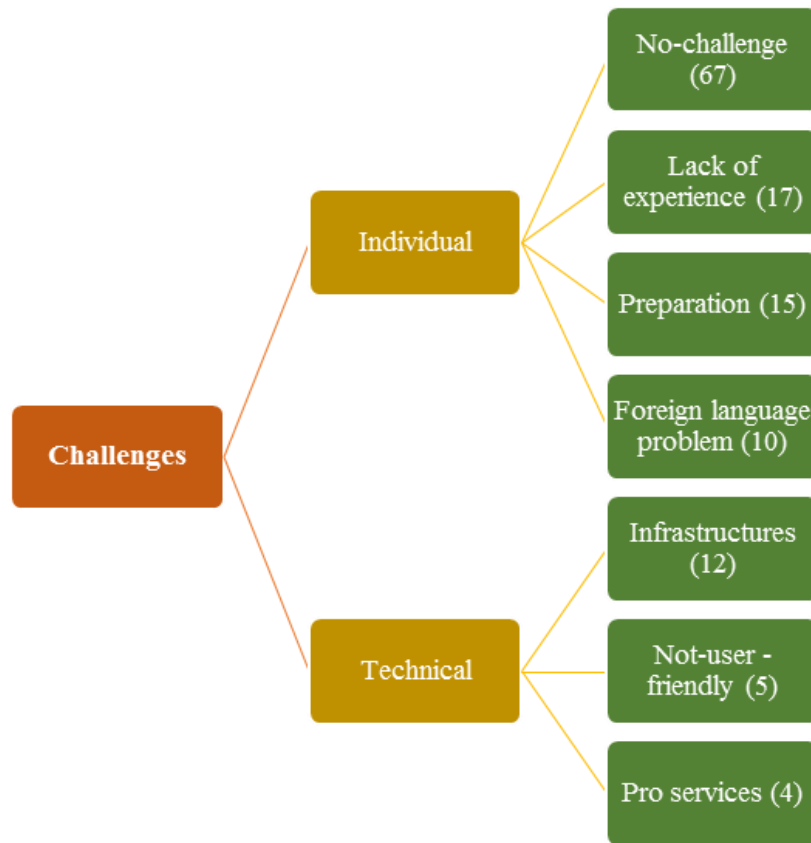
As presented above, preservice teachers mentioned basic challenges in preparing digital materials due to individual and technical reasons. However, it is pleasing that the number of challenged preservice teachers is not so high. Others, facing individual problems, mentioned being inexperienced, struggling in preparation period, and not understanding the foreign language truly. Given examples for these backgrounds of individual challenges can be illustrated with the direct references as: *"While I was designing my digital materials, it was very hard to use the tools since I did not have any prior experience. However, I started to feel more comfortable when I got more into the work."*, *"I prepared an e-book. The main challenge was to prepare the backgrounds and get ready to organize content. It was fun, though.",* and *"In designing the materials, I struggled to understand the language actually. It was all in English, so I could not understand the whole options and settings. I had to use translation in some cases."*

In technical challenges, preservice teachers captured infrastructures and features (not-user-friendly and pro services). In this respect, they exemplified the technical challenges as: *"I prepared my presentation on Prezi, but suddenly the web site gave an error. It closed without saving and I had to re-prepare it."*, *"Prezi is very difficult to use. Organizing templates and in-and-out shapes are very difficult."*, and *"I used Canva. I had difficulty in finding cartoon characters related to my content. Some are in PNG format, but some are not. Some features need pro account, which means I need to pay money."*

STRENGTHS AND WEAKNESSES OF DIGITAL MATERIALS

Preservice teachers detailed their materials in terms of their strengths and weaknesses. While listing strengths of digital materials, they indicated assets as efficiency, rich options, attraction, easiness, practicality, and being fun. On the other hand, they presented weaknesses of digital tools they selected for their digital materials namely as pro services, complexity, limitations, language options, and non-downloadable materials.

Figure 4. *Themes of Strengths and Weaknesses of Experienced Digital Tools and Digital Materials*
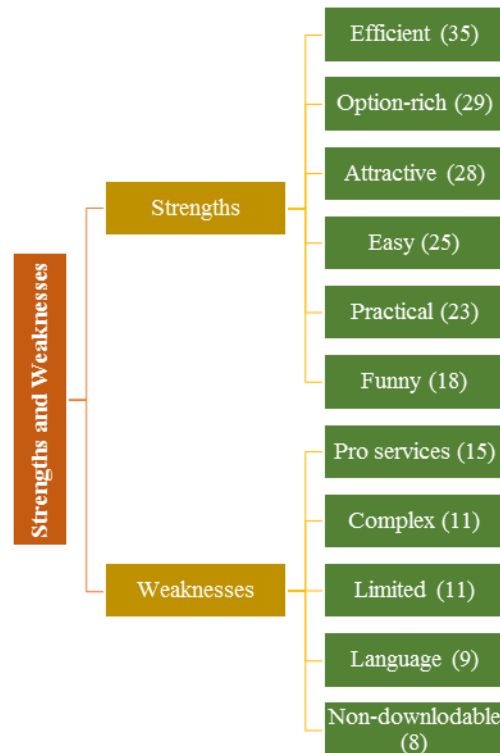
Attempting to understand better, the strengths of digital tools and materials were exemplified with different sub themes. The direct references emphasizing strong parts of digital tools were given as: *"I think WordArt helps us to prepare visually improved materials. It is very important to organize colors and sizes of the words, to choose different templates. Creately, on the other hand, is a very nicely designed digital tool providing concept maps. It is very creative. It has also rich options. Additionally, I found LearningApps very fruitful. It is very effective to attract students and teach with fun. It is very practical as well. It has also rich options. These tools are also effective and practical for different subject."*, *"Both Kahoot and Prezi help to increase motivation and attraction. Kahoot is effective in repeating the covered topic, and Prezi has attractive visuality."*, *"Prezi is very strong because it is funnier and more lively compared to other presentation tools. It has rich options. Additionally, Kahoot makes question-answer sessions much funnier and makes students like to involve in learning"*, and *"I used Canva and Pawtoon. Canva is very easy to use and practical, I can say. Everyone, actually, can design with this tool. Pawtoon, also, is very rich with styling, music, pictures, videos etc. It provides rich options."*

On the contrary, preservice teachers found certain features of digital tools poorly developed regarding their personal experiences. These poor features were exemplified as: *"The most annoying part of the digital tools, Kahoot and Prezi, is pro services. Though the tools have rich options, you have to pay money to use them in favour of your work."*, *"Prezi is a very effective presentation tool. We can include as much content as we wish. However, it is very complex to use. The interface should be improved and made easier to use."*, *"Cram is very fun to apply, but it has only two types of gaming. More alternative will increase the motivation and fun."*, and *"Prezi and Cram are effective tools, yet the language was very challenging. People with poor English proficiency can have difficulties, so there should be more language options."*

Overall, preservice teachers seem to be satisfied with pedagogical emphasis of digital tools in terms of technology-provided strengths. The weaknesses mostly match with tool-based features, and reflect technical structures.

FURTHER IMPLICATIONS OF PRESERVICE TEACHERS

Preservice teachers were asked to evaluate the whole course procedure and practiced activities in terms of digitally-enhanced instructional designs and materials; knowledge and mastery of applicable digital tools in material design; knowledge and mastery of selecting and organizing digital tools according to pedagogy; knowledge and mastery of how digital tools can be adopted in a certain flow of a lesson; and designing authentic digital materials. Pleasantly, the responses gathered on two categories: improved and almost improved.

After the 14-weeks period with digitally-enhanced course content which refers to Gagne's Model, it is delighting to mainly succeed in empowering preservice teachers in digital material design. The majority of the preservice teachers (% 77.96) qualifies themselves with improved digital capacity in digital material design, stating as: *"Throughout the term, I dedicated myself to learn what was practiced in the course. I believe that I have enough knowledge and capacity in material design. I mean, I can say that I am improved enough to prepare digital materials in my future instructions."* and *"As I previously mention, I did not know what these tools and agents were. If I can teach one day, I can honestly say that I can use these tools easily. The practiced tools in the syllabus helped me to experience different types of digital environments. So, I feel improved enough to use them."*

Additionally, there are preservice teachers (%22.04) who have doubts about their capacity. However, there is no one feeling unimproved in digital material design. The almost improved preservice teachers add that they will be feel more secure in using digital tools and designing materials after they have more practice. The references clearly exemplify it as: *"I cannot say that I am one hundred percent improved. However, I can be better user of digital tools if I practice the experienced tools. I think this syllabus and the course are absolutely necessary for a teacher-to-be. This course enlightened me intellectually and skilfully."* and *"I used to believe that digital materials were PowerPoint slides. Therefore, it was an excellent experience for me. Now, I know how to present content, how to make the course more fun. However, I need some time to practice to be better."*

DISCUSSION, CONCLUSION AND IMPLICATIONS

This study concerns theory and practice to present digitally-enhanced course content that follows Gagne's Model of Instructional Events and examine the reflections of preservice teachers who were exposed to this content. According to results, it is fair to comment that preservice teachers somehow progressed in designing consistent digital materials with Gagne's instructional events although they favoured digital materials in instruction and practice of the model at most. Opting to design digital materials for instruction and practice can also be the indicator of preservice teachers' tendencies to concentrate on content-delivery. These tendencies are particularly illustrated by the mostly preferred digital tool: Prezi. Prezi is a widely used digital tool featured with rich and effective visual components as well as cloud storing. It is also fancied because it encourages teachers to present an interactive and personalized content which combines creative thinking and modern technology at the same time (Špernjak, 2014). Besides, it enables teachers to include variety of visual components (Kiss, 2016), and aesthetically attractive templates (Lam, 2014). Therefore, preservice teachers could deliver their content appealingly. The other mostly selected digital tool in preservice teachers' digital materials is Kahoot!. Preservice teachers designed their digital materials with Kahoot! with the aim of assessing and transferring the knowledge. This tool has quizzes, surveys, and jumbles so that it assists teachers in drawing attention to topic, assessing with fun, and engaging students in learning (Bozkurt Türk, 2019). It is also free-to-use and available to apply in any time of the instruction (Barnes, 2017). Contrarily, relatively fewer preservice teachers opted to design digital materials that are appropriate for preparation to learning. It might indicate the reflection of national education policy which cares content delivery and assessment more. It is fair for preservice teachers, both as students and future actors of this national policy, to intensify their digital materials on instruction and assessment.

Preservice teachers' selection criteria for their digital materials basically directed three main motives as: individual, instructional, and technical. Individually, preservice teachers tended to apply digital tools and resources which are fun, more consistent with their subject area, and attractive. The insisted responses on having fun while using digital tools can be assumed as an indicator that preservice teachers wish to have good time while designing their digitally-enhanced teaching materials. Indeed, it is fairly important for teachers to be comfortable and to enjoy themselves while progressing in digital designs, because the more positive attitudes teachers have towards digital designs, the more they cherish applying digital tools and resources in their teaching (Van Acker et al, 2013). Also, they can gain more self-efficacy in sustaining to conduct activities in digital environments. As Borthwick and Hansen (2017) echoed in their study, introducing variety of digital tools and practicing them while instructing could result in high level of self-confidence to design materials.

Instructional motives, according to preservice teachers, are essential to draw attention, facilitate learning, and strengthen motivation of students. Catching the attention of students through digital materials, particularly, is stated as the prior motive on account of engaging students in instructional activities. Materials as the complementary parts of teaching activities are surely influential, yet deciding on which materials to be used in these activities is evenly important (Billings-Gagliardi & Mazor, 2007). It is not, all the time, convenient to apply any digital material in instructional activities though there are evidences suggesting that today's students are more willing to be in digital world (Fodor & Jaeckel, 2018; Seemiller & Grace, 2017). Rather, it is better to design deliberate digital materials through which students can be reinforced in learning (Gudmundsdottir, Loftagarden, & Ottestad, 2014; Lund et al, 2014). As the final motive, preservice teachers opted digital tools and resources that are technically easy to use and rich with features. Designing any material takes time, and the time spent in designing digital materials may increase depending on technical competency. Devoting their time and effort to such processes can be disincentive, for that reason, teachers can favor ready-to-use materials due to technical incompetency (Göçen Kabaran, 2020; Soydan, 2018). While introducing digital tools and resources for teaching activities, (preservice) teachers should be given enough time to practice their own designs, when necessary, so that they can confidently progress in digital capacities.

Assumed benefits and strengths of digital materials stress that preservice teachers pay attention to different dynamics related to learning. According to their statements, preservice teachers highly regard learning with fun, facilitating learning, empowering retention etc. while designing their materials. Actually, it is a known fact that gamification, motivating students with their own interests (Yağcı, 2017), keeping students' attention on activities for a certain period of time (Yang et al, 2014) are assisting components of meaningful learning. Besides, Şahin (2009) adds that students of the generation are much more motivated to learn when enjoy the teaching activities. This study, also, reports that preservice teachers of the present and future generation are fond of designing their teaching activities with attractive, funny, and motivating digital materials. When student-based dynamics are put into practice, digital materials and resources are spotted as more attractive materials in facilitating learning as well, which is also marked in research findings (Karademir-Coşkun & Alper, 2019). It can be because digital materials are enriched with audio-visual effects, and are powerful sources to captivate different intelligences, in consequence, students can quickly link what they learn with their real life experiences (Zwart et al, 2017). Correspondingly, instructional activities are also cultivated with digital materials and their persuasive assets as productive learning contexts, consuming less time, rich content and many other. In relation with productive learning contexts, Moyer (2001) reminds that instructional materials are designed with the aim of fulfilling learning objectives, presenting more concrete data to help students make sense of the topic. Digital materials have the power to instruct smoothly and achieve the intended learning outcomes when they are designed appropriately for the topic, learning outcomes, and students.

As in all practices, preservice teachers had challenges and observed weaknesses while designing their digital materials. Although majority of the preservice teachers did not sweat in practices, some of them had to struggle with designing owing to lack of experience. It is not specific for this study, instead, a shared problem uttered in different studies (Bozkurt & Sharma, 2020; Ghavifekr et al, 2002; Murphy, 2020). Advancing in technology occurs rapidly whereas adapting its consequences does not. Teachers both in pre-service and in-service need time and training to be competent enough to adapt necessary skills to properly and effectively apply technology in teaching, otherwise, there might be fundamental problems in enhancing digital learning environments as part of lack of knowledge, competency, and experience. In this sense, the study implies that preservice teachers' digital knowledge and capacities could be substantially promoted through the syllabus. Depending on preservice teachers' digital productions, the syllabus can be reported as a transformative agent of Virkkunen (2006) because preservice teachers could innovatively originate digital materials resulting from their transformed digital capacities. Therefore, preservice teachers of this study are envisaged to be more improved in their continued profession with more experience. In addition to lack of experience, some preservice teachers were also challenged because of technical problems such as difficulty of use and pro services. In digital material design process, preservice teachers had occasional problems of internet speed, server defaults, and system registration. These problems are mostly associated with insufficiencies of users, and teachers, as users, can easily discontinue to proceed in designing digital materials (Çelik, 2020, Göçen Kabaran, 2020). Still such problems can be eliminated if instructors comply with concrete solutions while practicing.

To sum up, preservice teachers were posed to variety of digital tools and resources which can be appropriately used for different phases of teaching. After the 14-weeks progress, research findings signify the high-awareness of preservice teachers on digitally-enhanced teaching materials and activities in given responses. Majority of the preservice teachers could successfully experience digital material design process following a lesson plan and necessary pedagogy, and they identify themselves as improved enough to practice teaching with digital materials and resources. It is accepted as a sign that preservice teachers are strengthened in digital capacities in digital material design of teaching profession, which is the explicit finding of the study.

Referring to participants' answers and shared experiences in the study, preservice teachers value digital materials in teaching activities in many ways. Most importantly, they evaluated themselves as improved in designing digital materials at the end of the course period, which implies that the flow and the content of the course substantially assisted in improving preservice teachers' digital material design capacities. Within the study, we wished to offer variety of digital tools and resources applicable in digital material design, necessary knowledge to guide how to use these tools and resources, needed pedagogical insights for digitally-enhanced teaching materials and activities, and opportunity to practice the whole expertise with combining Gagne's instructional events. In this study, we also intend to discuss how ITE programs and teacher educators can assist preservice teachers to improve in digital capacities through their courses and training. We strongly hope to establish a discussion point and present evidences for promoting digital capacities with more practices in ITE programs so that to collaborate with literature of digitally competent teachers in international contexts. The study is limited to digital material design, which represents a partial skill of professional digital competencies. The framework of the study is also limited in terms of referenced digital tools and models, instructors' abilities, participants, and contexts. Future research can extend these limits via new tools, methods, participants, trends, and contexts.

The following recommendations were developed within the scope of the research.

• The study offers an example, which will increase the pre-professional digital competencies of teacher candidates, and can be applied in ITE programs.

• Based on this research, an instructional design can be developed that will increase the digital material design capacity of preservice teachers.

• Future research can extend limits of this research via new tools, methods, participants, trends, and contexts.

AUTHOR CONTRIBUTION

Author 1: conceptualization, designing the syllabus, preparing manuals and materials, writing, methodology, writing, reviewing-editing.

Author 2: conceptualization, designing the syllabus, preparing materials, writing, methodology, writing, reviewing-editing.

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