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Exploring the Role of Feedback and its Impact within a Digital Badge System from Multiple Perspectives: A Case Study of Preservice Teachers

For the degree of Doctor of Philosophy

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EXPLORING THE ROLE OF FEEDBACK AND ITS IMPACT WITHIN A DIGITAL BADGE SYSTEM FROM MULTIPLE PERSPECTIVES: A CASE STUDY OF PRESERVICE TEACHERS

A Dissertation

Submitted to the Faculty

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Erin D. Besser

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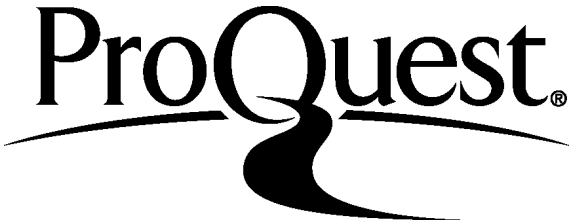

And we know that all things work together for good to those who love God, to those who are called according to His purpose.

–Romans 8:28

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ABSTRACT

Besser, Erin D. Ph.D., Purdue University, May 2016. Exploring the Role of Feedback and its Impact within a Digital Badge System from Multiple Perspectives: A Case Study of Preservice Teachers. Major Professor: Timothy J. Newby.

The purpose of this qualitative case study is to examine the role feedback plays within the instructional process, and how students are using feedback to inform their course work within Digital Badge contexts. Educators are looking toward Digital Badges as a way to increase student engagement (Abramovich et al., 2013; Glover & Latif, 2013), develop mastery with critical concepts (Mehta et al., 2013), and reduce gaps in student knowledge (Bowen & Thomas, 2014; Guskey, 2007). Feedback is emphasized as a critical component (Bloom, 1968, 1976; Guskey, 2007; Kluger & DeNisi, 1996; Slavin & Karweit, 1984). Instructors need to be able to not only display characteristics of a good instructor, but understand the functions (Balzer et al., 1989; Butler & Winne, 1995) and dimensions (Yang & Carless, 2013) of feedback, and then be able to deliver effective feedback (Nicol & Macfarlane-Dick, 2006).

Participants in this study included 78 students and 2 instructors from a large Midwestern public university. Data included instructors' assignment feedback provided to students and students' online surveys consisting of open-ended questions about the nature and value of instructional feedback within a Digital Badge system. Analysis of the

data ensued and then overarching dimensions occurred through the categorization and synthesis of codes.

The findings included six major thematic groups concerning the ways in which instructors provide feedback: Outcome feedback, Motivation and Interaction, Clarification, Opportunities to Further Knowledge, Decreasing Gaps in Knowledge, and Promotes Learning and Cognitive Development. Also included are three major thematic groups illustrating feedback from the students' perspective: Importance and Nature of Feedback, Authority over Knowledge and Learning, and Learning for Mastery. The recommendations based on the study findings presented a set of "Best Practices," including Types of Feedback to Provide, Feedback Management and Organization, and The Value of a Good Facilitating Instructor, aimed at helping educators navigate the potential challenges of implementing Digital Badge systems and Mastery Learning approaches. The main conclusion of the research is that feedback consists of various characteristics focusing on general low-level categories to higher-level categories that allow preservice teachers to develop essential skills for teaching and learning.

CHAPTER 1. INTRODUCTION

With more students pursuing higher education there has been concern as to how to differentiate students' academic experiences, as well as how to recognize informal learning that may be valuable within the workplace. Many are looking toward Digital Badges as a solution to this potentially growing problem (Grant, 2014). Mozilla's Open Badges was one of the first platforms to offer ways for individuals to recognize learning outside of the formal classroom. They define the purpose of Digital Badges as a means to "get recognition for learning that happens anywhere. Then share it on the places that matter" (Mozilla, n.d., n.p.). With origins found within organizations like Boys and Girls Scouting, "Digital Badges are an assessment and credentialing mechanism that is housed and managed online. Badges are designed to make visible and validate learning in both formal and informal settings, and hold the potential to help transform where and how learning is valued" (Foundation, 2014). Digital Badges are a visual representation of learning and skills that focus on a set of specific standards and criteria which the learner must meet in order to be awarded the badge. Awarded badges can then be displayed in a variety of places: personal web pages, social media, resumes, and other various digital settings. Many have touted that badges are "feedback, motivation, catalysts for discussion, and socially sharable" (Ostashewski & Reid, 2015, p. 194), and generate

students with a greater understanding of their fields (Gibson, 2013; Randall, Harrison, & West, 2013).

Interest surrounding Digital Badges has crossed into formal education contexts. Educators are looking toward badges to increase engagement (Abramovich, Schunn, & Higashi, 2013; Glover & Latif, 2013), develop mastery with critical concepts (Mehta, Hull, Young, & Stoller, 2013), and reduce gaps in student knowledge (Bowen & Thomas, 2014; Guskey, 2007). Universities like Brigham Young University are using badges to transform their teacher education program while offering teaching-related participants opportunities to increase their technology skills (Brigham Young University: Instructional Psychology, n.d.). DePaul University is using Digital Badges to support curriculum and common core alignment within secondary education (Foundation, n.d.). Additionally, Purdue University has not only implemented Digital Badges, but has developed an in-house system where instructors can create badges and students can earn and display them (Tally, 2012).

Digital Badge systems have been making a mark within formal higher education settings. Instructional designers are faced with the challenge of how to deliver content and how to provide assessment within badges. Using Mastery Learning (Bloom, 1968, 1971a) approaches along with Digital Badges is giving educators a way to incorporate this new system into traditional learning contexts. Mastery Learning approaches have been a source of interest for researchers for many years. In one early study, Thorndike (1931; described in Mayer, 2008) tested how repetitive practice affected overall learning. He discovered that practice in and of itself does not increase student learning. It is when feedback is paired with practice that learning gains are achieved. Bloom (1968) notes

that in traditional contexts students receive virtually the same instruction, but it is the student's aptitude that varies. In traditional contexts, the time students have to learn is fixed resulting in varied knowledge. Within the Mastery Approach time is fluid and the instruction is fixed. Instructors not only allow learners to work at their own pace, but provide varied levels of scaffolding to aid in the mastery of the content (Reigeluth & Karnopp, 2013).

In building on the idea that practice in and of itself does not increase learning, Trowbridge and Cason (1932; described in Mayer, 2008) found that feedback needs to be detailed and be used as a source of information. In their study, the students that received feedback as information not only learned rapidly, but also deepened their knowledge. Within the literature the key component of student learning within the Mastery Learning approach is feedback.

Feedback is a critical part of Mastery Learning (Bloom, 1968, 1976; Guskey, 2007; Kluger & DeNisi, 1996; Slavin & Karweit, 1984). In order to support student learning, Guskey (2007) emphasizes the importance of not only frequent feedback, but specific feedback. Chickering and Gamson (1987) have identified Seven Principles of Good [instructional] Practice. One of the key categories is 'prompt feedback,' although elements of feedback are woven throughout all seven categories. Chickering and Gamson (1987) position the *Seven Principles* (promotes activity, interaction, cooperation, diversity, responsibility, and expectations) within teaching and learning. These "forces" (p. 3) might be considered precursors to today's 21st century skills: analytical thinking, creativity, collaboration, communication, and problem solving (Skills, 2009). Combining Chickering and Gamson's (1987) Seven Principles and 21st century skills gives educators

an even greater framework in which to cultivate their instruction. Additionally, using technology in conjunction with these principles affords educators opportunities to be more efficient and purposeful in their instructional decisions while still including many of the principles of good practice.

Various authors have identified the nuances of feedback through various frameworks and models. Balzer, Doherty, and O'Connor (1989) and Butler and Winne (1995) classify the functions of feedback within two distinct categories: outcome feedback and cognitive feedback. Yang and Carless (2013) examine the dimensions that impact feedback, focusing on contextual and external factors. Whereas Nicol and Macfarlane-Dick (2006) appeal to the practitioner in directly joining the *Seven Principles of Good Practice* (Chickering & Gamson, 1987) specifically to the characteristics of feedback in their model. The authors draw from the body of literature surrounding self-regulated learning where they position feedback as a tool used to motivate and aid students during learning. Together these authors have provided a good picture of the role feedback plays, how to classify it, and how to identify factors that influence good feedback.

As instructors look to incorporate Mastery Learning approaches within their educational contexts, technology is being used as one way to make this process more efficient. The process of receiving and applying feedback is not only essential in Mastery Learning contexts, but within Digital Badges systems. Detecting students' gap in knowledge, or lack thereof, is required in receiving Digital Badge achievements.

1.1 Problem and Purpose

Digital Badges are becoming a viable option for educators wishing to deepen their students' knowledge and increase student engagement. Ideally, badges give the learner the ability to receive recognition for knowledge and skills learned outside of the formal classroom. As educators capitalize on this technology the purpose must shift to one that works within the limitations of the conventional educational system.

Incorporating Digital Badges and Mastery Learning can be challenging within the confines of traditional education. This instructional approach is providing instructors a set of guidelines to not only help their students' master content, but also give them greater direction in how to help them get there. Digital Badges provide a set of detailed criteria, allow the learner to work at their own pace, provide feedback to enhance their practice, and give students the ability to demonstrate mastery and deep learning. Formative assessment through instructor feedback is crucial to mastering content and displaying achievement.

Imposing a Mastery Learning approach to a Digital Badge system may be a potential solution towards using Digital Badges within higher education. The role feedback plays is vital, and perhaps the system is only as good as the instruction and assessment provided. Instructors need to be able to not only display the characteristics of a good instructor, but also understand the functions (Balzer et al., 1989; Butler & Winne, 1995) and dimensions (Yang & Carless, 2013) of feedback. Furthermore, they must then be able to deliver effective feedback (Nicol & Macfarlane-Dick, 2006) that is prompt, provides detailed information, and engages in interactions to facilitate learning.

Digital Badge systems are gaining popularity as ways to fill gaps. A critical component of Mastery Learning is the role of instructional feedback. Digital Badges and Mastery Learning coincide. While the research surrounding Mastery Learning and feedback is plentiful, very little has yet to be published regarding Digital Badge systems. This study will begin to inform instructors as they begin to implement the blending of these instructional approaches and technologies within their own courses. This study will add additional support to the body of feedback literature, and attempts to identify feedback approaches from the perspective of both the teacher and student. Furthermore, this study will add to the knowledge surrounding Digital Badges, and of how badges might be used in formal education contexts to meet the growing needs of 21st century students.

The purpose of this study is to examine the role feedback plays in the instructional process and how students are using feedback to inform their course work in Digital Badge contexts. Therefore this study will focus on two specific areas of research. First, it will investigate the feedback process from both the perspectives of the student and the instructor. Second, it will examine how students are internalizing feedback and applying it to their subsequent work. Specifically, this study will look at how instructors are providing feedback and how students are applying that feedback to their assignments. Consequently, this research will investigate the following questions:

1. In what ways do instructors provide feedback to assignments in a Digital Badge system?
2. What types of feedback do students find most and least helpful and how do they report applying such feedback?

By answering the above questions and completing this study, the author hopes to provide an in depth look surrounding feedback within a Digital Badge system. Specifically the desired outcome is to provide educators with a set of "best practices" in the ways feedback can and should be used to increase student learning. Additionally, giving valuable insight into the decision making process students go through when working within a Mastery instructional approach, and how feedback might be leveraged by technology to increase student learning.

1.2 Summary

Chapter 1 included a brief overview and definition of Digital Badges and a discussion of the role feedback has within teaching, learning, and specifically Mastery Learning contexts. Additionally, rationale for this research is discussed along with presentation of the problem, purpose, and research questions. Chapter 2 comprises a review of the literature to establish a foundation for the study related to instructional feedback and how Digital Badges might be used within Mastery Learning.

CHAPTER 2. LITERATURE REVIEW

A recent educational trend has been the increasing focus on validating and credentialing learning taking place outside of traditional academic settings. There has been increasing interest in the concept of Digital Badges. While the concept of earning badges is not new, the ways in which this system is being used is capitalizing on our digital and technological world. Organizations like Girls and Boys Scouting offer a reference point to the badge system. Children have opportunities to work through problems, participate in projects, and engage in various learning tasks where they work towards a final achievement and reward for their accomplishments. The reward is in the form of a small physical badge visually depicting elements of the challenge, and is often displayed on their uniform for all to see their accomplishments. Mozilla's Open Badges program was one of the first organizations to apply this system digitally to learning within a variety of contexts. Mozilla (n.d.) notes the purpose of Digital Badges are to, "get recognition for learning that happens anywhere. Then share it on the places that matter" (n.p.). Mozilla provides learners with a platform in which to not only earn badges but to display their accomplishments.

2.1 Digital Badges

"Digital Badges are an assessment and credentialing mechanism that is housed and managed online. Badges are designed to make visible and validate learning in both

formal and informal settings, and hold the potential to help transform where and how learning is valued" (Foundation, 2014, n.p.). Digital Badges are a visual representation of learning and skills (Figure 2.1).

Figure 2.1 Passport Badges: Movie Maker, Distance Education and Online Learning- Basic Badge, and Instructional Design Literacy- Individualized Instruction.

Developers not only create a unique image for learners to display, but a set of specific standards and criteria the learner must meet in order to be awarded the badge. Awarded badges can then be displayed in a variety of places: personal web pages, social media, resumes, and other various digital settings. Figure 2.2 depicts Mozilla's Open Badge program (n.d.) and how the system works to recognize formal and informal learning experiences.

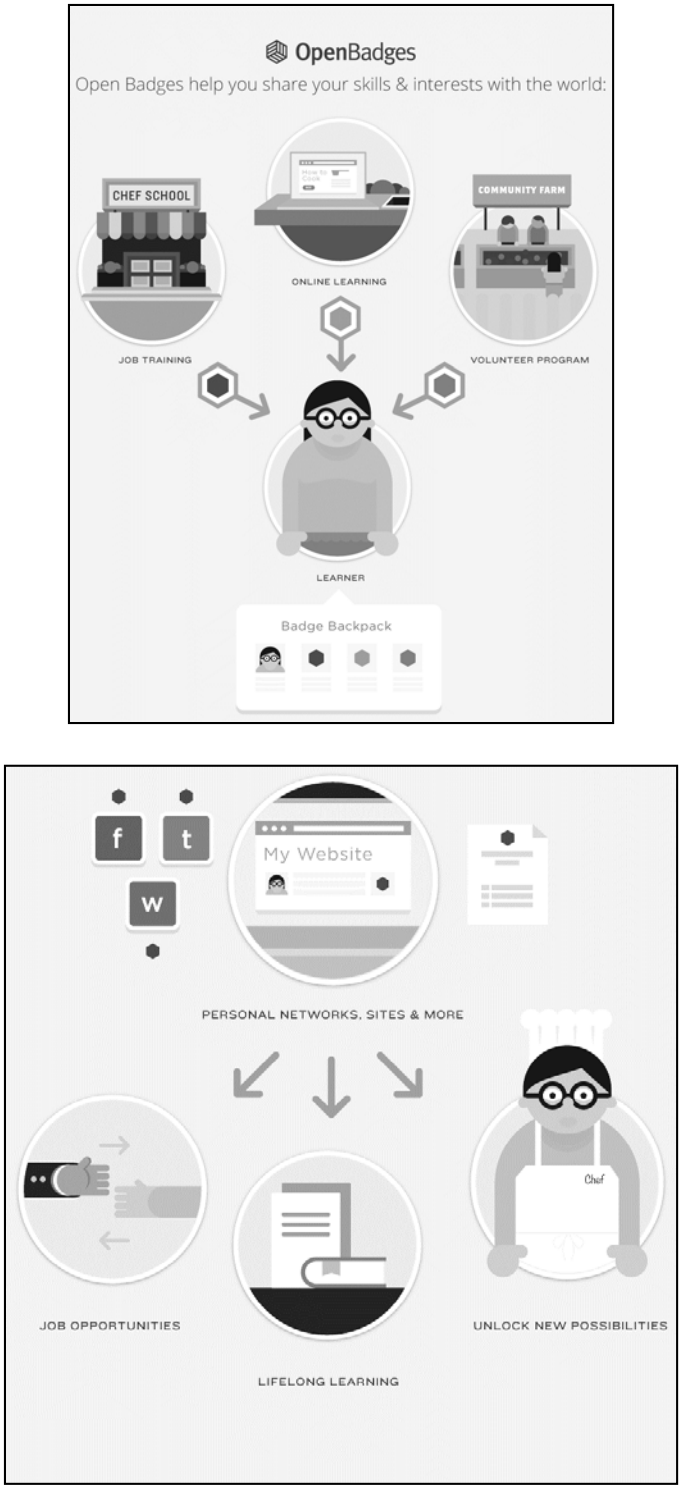


Figure 2.2. How Mozilla's Open Badges work (Mozilla, n.d.).

While the term *digital badge* refers to a representation of skills or knowledge earned by the individual, *Open Badges* have also been used in the literature. Knight et al. (2014) sets forth several distinct differences corresponding to this term (and specifically to Mozilla's unique badges). Open badges are free (software is open for everyone to use), transferable (badges can be collected from multiple outlets and displayed in a single source), stackable (badges display a progression of skills and knowledge), and evidence based (criteria and evidence is linked to each badge). The definition of Open Badges does differ based on various stakeholders' perspectives. Devedžić and Jovanović (2015) identify these perspectives as learner-centered, teacher-centered, institutional, Schools', and Employers'. While Open Badges does refer to Mozilla's digital badge project, within the literature the definitions (e.g. Open Badge, Digital Badge, Badge) are being used interchangeably.

2.1.1 How Do Digital Badges Work?

When a learner first begins their Digital Badge journey, they access a system where Digital Badges and their specific criteria are available for learner interaction. One such system, *Passport*, developed by Purdue University, will serve as a reference to guide us through the process a learner experiences. First, the learner logs into a particular course or topic of study (Appendix A1). Here various Digital Badges are displayed, and this page serves as an entry point for learning experiences. Next, the learner will choose a Digital Badge to complete. Once the badge is entered, the learner is presented with introductory materials (Appendix A2). Materials may consist of a simple overview, or include a variety of links, images, and/or multimedia. At this point, the learner decides to

get started with the various challenges and enters into the Digital Badge (Appendix A3). Here the learner is given more specifics: prerequisites, access to the various challenge levels, the challenge instructions and guidelines, and specific criteria for completing the challenge (e.g. points, grading criteria). After reviewing the materials and instructions, the learner will begin the challenge (Appendix A4). Opportunities for submitting links, videos, or attachments are provided, as well as open text boxes with various HTML capabilities and formatting structures. Additionally, the submission requirements are provided, and challenge instructions can be referenced. After submitting a Digital Badge, the instructor receives a notification to provide feedback and score the submission (Appendix A6). Instructors can *approve* or *deny* a submission. For the former, the instructor has the ability to provide a score, type comments, attach documents, videos, or other resources. For the later, the instructor has the ability to provide comments and include resources only. Additionally, feedback given will be displayed on subsequent attempts for learners and instructors to reference. Finally, once a learner has been awarded a Digital Badge they have the ability to display their accomplishments on their public profile (Appendix A5). Their public profile can be shared and embedded within various personal websites and social media outlets.

2.1.2 Addressing Educational Concerns

While not all badges are alike, badges have been described as, “a common currency to denote learning outcomes and give employers a visual representation and evidence of an applicant’s skills” (Bowen & Thomas, 2014, p.22). Digital Badges have the potential to address various concerns within formal education settings. Buckingham

(2014) has identified three challenges that plague the education system and how these challenges can be addressed by badges. First he notes many soft skills (e.g. team building, communication) are undervalued in formal educational settings. Digital Badges can be earned and awarded that specifically address acquiring these skills. Next, there is a challenge of how to encourage participants to maintain a high standard of work ethic while participating in voluntary activities. Digital Badges can be earned and awarded for high level work that is completed on the learners' own time. Lastly, Buckingham addresses the challenge of promoting self-regulated and directed learning. Digital Badges in conjunction with a community specialist and/or mentor can aid earners in progressing through the learning process.

2.2 Badges and Academic Settings

While Mozilla and other organizations are proliferating badges for recognizing accomplishments and learning outside of formal academic settings, universities and schools alike are applying the concept to reinvent traditional education.

- Brigham Young University (Brigham Young University: Instructional Psychology, n.d.; West, n.d.) is using badges to transform instructional technology. Specifically working with pre-service and in-service teachers, and people of interest, Dr. Rick West is using badges to offer opportunities for educational professionals to learn technological skills.
- Carnegie-Mellon University (CS2N, n.d.) is using badges within their computer science program (CS2N) to increase motivation for learning, and as a way to guide students and provide purposeful feedback.

- DePaul University (Foundation, n.d.) is developing a set of badges that supports secondary common core curriculum that will be used in and out of formal K-12 classroom settings.
- Purdue University (Tally, 2012) developed their own badge creation and awarding system, *Passport*. Instructors across the campus are participating in the program, providing students with multiple opportunities to earn badges in a variety of course content areas. Most notably, the *Passport* team is able to support instructors with technological skills and training on how best to implement the system. While the platform is in-house, it has the capabilities to integrate within other badge systems (e.g. Mozilla's Badge Backpack).
- Seton Hall (Seton Hall University's Teaching & Technology, n.d.) is using badges as an opportunity for students to receive credit and acknowledgement for attending school sponsored events such as new-student orientation, academic integrity, and professionalism workshops.
- The University of California, Davis (Buell, 2013; Fain, 2014) is using badges within their Agriculture Sustainability Institute, a competency based program. Specifically this program includes various hands-on activities within the field and is helping students develop higher-order skills (e.g. critical thinking, interpersonal communication).

While these are just a few of the programs using badges, much more is being developed and implemented. Many of these programs are still in their infancy, and research is increasing rapidly. In one study, researchers looked at the benefits of Digital Badges with regards to motivation theory (Abramovich et al., 2013). While the results indicated

increased interest, increased expectations, and both positive and negative effects on learning, they also noted the importance of providing learners with details on how to earn the badge (e.g. actions or behaviors that are necessary).

As formal education settings begin to discover how Digital Badges apply to their specific content and program areas, Gibson (2013) notes how this system can inform formal education in a way that produces students with a more complete understanding of their professional field.

> A badge can be a pointer or reference to a process by which a learner engages in and receives validation from a community that practices authentic assessment. A badge can also represent a guide for students who are seeking direction, and can provide transparency and motivation for moving from the periphery of a community to its core. Ideally, a badge can celebrate not just the accomplishment of co-discovered goals, but the engagement of the community in assessing and guiding the progress of the learner (p. 461).

Open Badges have the potential to give students a more holistic view of their future profession by incorporating formal and informal learning experiences as well as giving them opportunities to network and receive mentorship from professionals in their field.

2.3 Mastery Learning

In academic settings where Digital Badges are taking over conventional task formats, instructional designers are faced with the challenge of how to deliver and assess content and skills within badges. "The symbol, in the form of a badge, can then be displayed by the learner to let others know of their mastery or knowledge. Therefore,

instructional designers can use educational badges to influence engagement and learning" (Abramovich et al., 2013, n.p.). Much like other academic resources (e.g. textbooks, videos, lectures), not all badges are created equally. While many Digital Badges have automated award systems through the passing of online quizzes or completing required materials, in many cases there are content experts behind each badge. Digital Badges have been heralded for having the ability to show mastery of content, and more accurately reflect the actual knowledge and skills of learners (Mehta et al., 2013). In order to develop Digital Badge criteria and programs that capitalize on this technology, we must first explore Mastery Learning research and how it may be applicable to this system.

2.3.1 Definitions and Essential Elements

The Mastery Learning model can be traced back to an article written by Bloom (1968) in which he compares traditional education to that of the Mastery Learning model. Specifically, Bloom (1968) notes that in traditional contexts students receive virtually the same instruction, but it is the student's aptitude that varies. In traditional contexts, the time students have to learn is fixed resulting in varied knowledge. Within the mastery model time is fluid and the instruction is fixed. Instructors not only allow learners to work at their own pace, but provide varied levels of scaffolding to aid in the mastery of the content (Reigeluth & Karnopp, 2013).

In a later publication, Bloom (1976) emphasizes the change in time to master content shifts as learners master fundamental knowledge. Additionally, learners may

have a need for more mentorship as they wade through foundational materials that fades as the learners become more proficient.

As Mastery Learning began to gain traction within education, a set of core elements emerged. Guskey (2007) has identified several fundamentals essential to Mastery Learning instruction: 1) Feedback, Correctives, and Enrichment; 2) Managing Feedback, Correctives, and Enrichment; and 3) Instructional Alignment. These elements are displayed in Figure 2.3.

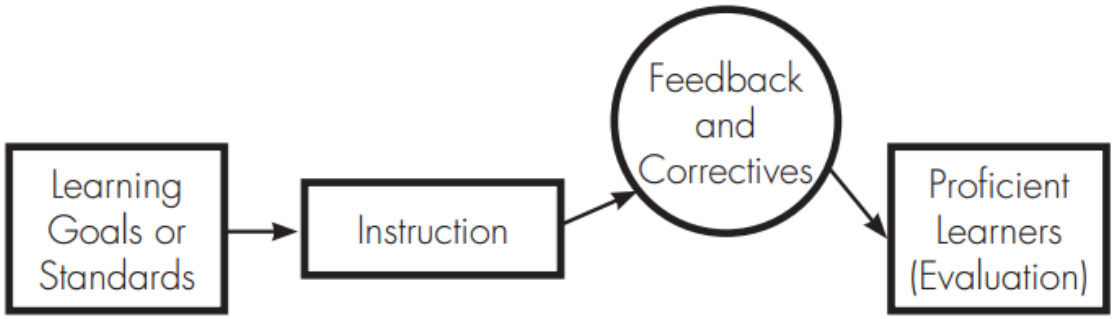


Figure 2.3. Major components in the teaching and learning process (Guskey, 2007)

2.3.1.1 Feedback, Correctives, and Enrichment

In order to support students in learning, Guskey (2007) emphasizes the importance of not only frequent feedback, but specific feedback. In addition to providing feedback, instructors must "pair with correctives: activities that offer guidance and direction to students on how to remedy their learning problems" (p. 16). Slavin and Karweit (1984) echo this sentiment in asserting that correctives bring about a new

perspective, one that differs from the initial teaching while differentiating guidance for each individual student. The aim is to clear up misconceptions and address small errors.

Furthermore, extension activities are crucial to the overall mastery of material. The time in which students are learning content is fluid, and therefore extension activities offer students the ability to deepen and apply their knowledge. For example, Slavin and Karweit (1984) applied the mastery model to math content individually versus within a team. As the team progressed, students completed assignments at varying times. Incorporating extension activities allows learners with a quicker pace opportunities to deepen their knowledge, while students working at a slower pace were given the correctives they needed.

2.3.1.2 Managing Feedback, Correctives, and Enrichment

In addition to incorporating feedback, correctives and enrichment, there have been concerns about time management specifically from the instructor's point of view. Guskey (2007) indicates that the addition of these components does add time initially, but as students gain a firm foundation guidance and mentorship fades (thus the time allocated to these also fades). A popular instructional method is the Flipped Instructional model (Bergmann & Sams, 2012). In this model students complete readings, watch instructional videos and build a foundation of knowledge for later application experiences outside of the classroom. It is inside of the classroom where instructors provide guidance and mentorship (correctives), as well as practical application, hands-on activities, and authentic problem-based learning (enrichment). Additionally, instructors are able to identify students that need targeted assistance or to improve their instructional strategies

(Guskey, 2003). The Flipped Instructional Method (Bergmann & Sams, 2012) aligns well with the Mastery Learning approach and Digital Badges, and provides instructors a practical way to focus their instructional efforts.

2.3.1.3 Instructional Alignment

Bloom (1971a) identifies three major components of teaching and learning: 1) the learning goals and objectives are clearly defined; 2) instruction that results in mastery; and 3) feedback and correctives are necessary to facilitate mastery. All three of these components must be aligned in order for students to achieve mastery. Not only is aligning learning goals and objectives to instructional methods important in regards to formal assessment such as standardized testing, it also has been linked to increased student achievement (Squires, 2012). Guskey (2007) also adds that instructors must be versed enough with the content that they can designate the evidence that is necessary to display that the learning goals and objectives have been met. Additionally, Wonder-McDowell, Reutzel, and Smith (2011) echo the importance of instructional alignment. In a study they did with struggling elementary school children, they explored aligned and unaligned core and supplemental reading material. While they found the aligned treatment group made significant gains in the pre and posttest, the notable idea is the addition of supplementary materials (correctives and enrichment). The addition of these materials speaks to the claims of Guskey (2007) and Bloom (1968, 1976) who emphasized the need for a curriculum that provides instruction in a way that varies from the initial explanation and provides additional opportunities for deeper learning and differentiation.

2.4 Mastery Learning Versus Competency-Based Learning

In current Higher Education contexts, instructors and institutions alike are looking for ways to equip students with knowledge for the global workforce. As students embark in a rapidly changing workforce, they need to have abilities to transfer knowledge to contexts that are continuously evolving. Institutions and instructors are imploring strategies that aid in students' abilities to do such a thing. One such strategy has been incorporating competency-based education (CBE) models into these traditional Higher Education contexts. In defining modern CBE, Sturgis, Patrick, and Pittenger (2011) indicate a need for students to master content. While some may categorize Mastery Learning and CBE as equivalent, there are distinct differences. Bramante and Colby (2012) write, "Competency-based learning asks students to learn important content information and skills. It also requires that a student demonstrate that learning by applying the content and skills in unique ways" (p. 63). Others have focused on students' ability to transfer knowledge to real-world situations (Johnstone & Soares, 2014), and reflect on how they apply knowledge (Weise, 2014). While Mastery Learning contexts can be found in classrooms throughout Higher Education, CBE more frequently occurs at the program or institutional level. At this level programs are organized around students' performance and meeting specific competencies rather than working through various courses (Gallagher, 2014), and this is often reflected within their transcripts (Bramante & Colby, 2012). Mastery Learning is the first step and foundation of CBE. However, without program-level and institutional endorsement it remains an instructional strategy used to increase learning and understanding. With increased use of this strategy Higher Education could see future CBE programs emerge.

2.5 Mastery Learning in Technology Infused Environments

We can see from the literature that Mastery Learning is not a new instructional approach, but what is occurring is educators are looking towards technology as a way to facilitate the process in a more efficient way for both the student and instructor. Emerging technologies allow us to reimagine Mastery Learning and leverage those technologies in a way that can make implementing this instructional approach easier for the instructor and more beneficial to the learner. Specifically, the uses of adaptive technologies are being incorporated into Mastery Learning contexts. Adaptive technologies refer to:

> Two main points: 1) sequence of instructional actions taken by the program varied as a function of a given student's performance history, and 2) the program is organized to modify itself automatically as more students complete the course and their response records identify defects in instructional strategies (Atkinson, 1974, p. 336).

Use of these kinds of technologies has been shown to increase achievement, overall comprehensiveness of learning, and increased fluency in learning (Mettler, Massey, & Kellman, 2011). While these systems are not always incorporated, they do offer a key point regarding the individualized nature of Mastery Learning contexts and how technology might be used to enhance this instructional model.

For example, Light and Pierson (2014) explored how teachers integrated the use of the Khan Academy as a teaching tool within math education. The authors found that the Mastery system changed how students engaged with the content, increased motivation, increased confidence among remedial students in areas of need, and lead to

instructional change among teachers. Most notably, teachers indicated that the Khan Academy platform gave them tools to efficiently draw diagrams in ways that improved the overall instruction. Additionally, students received immediate feedback and were given endless opportunities to practice their skills based on their individualized areas of need. Even in the best circumstances, it is difficult for instructors to provide immediate, varied, and differentiated feedback to all students.

In another example, Lin et al. (2013) sought to understand the effectiveness of using computer games for learning math content with remedial sixth-graders. The authors incorporated elements of Mastery Learning and gaming to deliver specific correctives through immediate feedback and additional practice. Similarly to Light and Pierson (2014), Lin et al. (2013) noted increased motivation and engagement among students. Markedly, when Mastery Learning is paired with elements of game-based design the results lead to greater benefits for learning.

2.6 Mastery Learning Meets Digital Badges

As we can see, leveraging technology is one way in which Mastery Learning might be enhanced. When we look to Digital Badges we see overlap among the Mastery Learning model: learners want to master content (Mehta et al., 2013), time is fluid and criteria is static (Reigeluth & Karnopp, 2013), mentorship and instructor support is crucial (Bloom, 1976; Guskey, 2007), and motivation and engagement are increased (Abramovich et al., 2013; Glover & Latif, 2013). In many mainstream outlets we see the intersection of Mastery Learning and game-based design within Digital Badges. For example, Khan Academy delivers content through short videos that allow students to

revisit material and receive supplemental activities to either correct or enrich. Furthermore, users are given Digital Badges for achievements in learning and completion.

As instructors begin to incorporate Digital Badges within formal educational settings, using a Mastery model seems to be a natural place to start. For example, at Carnegie-Mellon University (CS2N, n.d.) they are implementing badges within their computer science programs (CS2N). Within this program adaptive technologies are being used to track student progress and mastery of material, as well as informing educators on where interventions need to take place.

Incorporating Digital Badges and Mastery Learning can be challenging within the confines of traditional education. This instructional approach is providing instructors a set of guidelines to not only help their students' master content, but also give them greater direction in how to help them get there. Formative assessment through instructor feedback is crucial to mastering content and displaying achievement.

2.7 Formative Assessment and Feedback

Researchers (Bloom, 1968, 1976; Guskey, 2007; Kluger & DeNisi, 1996; Slavin & Karweit, 1984) alike have agreed feedback is a critical part of formative assessment, the learning process, and is a crucial component of Mastery Learning. Yorke (2003) concludes, "The central purpose of formative assessment is to contribute to student learning through the provision of information about performance" (p. 478). Instructors provide feedback to students as a way to inform them of their processes, to guide and mentor students, and to inform their own teaching. Black and Wiliam (1998) emphasize

the interactions between teachers and students, and of student's peer interactions. Moreover, they emphasize how feedback plays a part in crafting instructional learning interactions: "All such work involves some degree of feedback between those taught and the teacher, and this is entailed in the quality of their interactions which is at the heart of pedagogy" (p. 7).

Various definitions of feedback can be found throughout the literature. Kulhavy (1977) specifies feedback as a set of procedures used to inform the learner, whereas Ramaprasad (1983) defines feedback as the gap between ideal and actual achievement. Tucker (1993) highlights the importance of feedback when evaluating dynamic instructional programs because its "presence or absence can dramatically affect the accuracy required of human judgment and decision making" (p. 303). Additionally, some authors have begun to try to establish a set of broad purposes or roles. Price, Handley, Millar, and O'Donovan (2010) have defined five categories: correction, reinforcement, forensic diagnosis, benchmarking and longitudinal development (feed-forward) related to the roles feedback plays. While there have been developments in the role technology plays in automating the feedback process (Azevedo & Bernard, 1995) more often feedback falls on the shoulders of an instructor.

2.8 Principles of Good Practice

Best teaching practices offer educators and teacher education programs a set of guiding principles as they wade through their course instruction. These guidelines are not a magic bullet; educators still must contend with varying curriculums, instructional approaches, student characteristics, and academic personnel and support. What best

practices do is identify areas of importance and give educators a places to start when critically examining their instructional approaches. Chickering and Gamson (1987) developed a set of seven principles aimed at improving teaching and learning. Table 2.1 provides a description of each principle and examples of possible implementation.

Table 2.1. Seven Principles of Good Practice

Principle	**Description**	**Example**
1) Student-Faculty Contact	Frequent instructor contact in and outside of class. Faculty shows concern for student's academic and general well-being.	Providing students with a variety of communication technologies (e.g. email, video conferencing, blogs, discussion boards, and other asynchronous communication tools) allows students to communicate in the way that is most comfortable to them. They are not limited by time or space.
2) Cooperation among students	Learning is collaborative. Students have opportunities to share and negotiate their own thoughts and ideas.	Students have opportunities to solve problems and clear up misconceptions regarding learning tasks. Collaborative learning environments give students various perspectives, while also developing interpersonal skills. Technologies like social media, Google Drive, file sharing, and blogs are just a few ways that students are using technology to collaborate across time and space.

Table 2.1 Continued

3) Active Learning	Learning is student-centered. Students take an active role in the learning process and are able to apply their new knowledge.	Providing students with opportunities to engage, create, and reflect through hands-on activities or constructivist instruction. Exposing students to technologies like simulations can provide these rich experiences with decreased risk.
4) Prompt Feedback	Feedback focuses on performance that is corrective. Feedback is prompt and allows opportunities for reflection.	Instructors can use technology to leverage how much and how frequently they give feedback. Videos can be used to provide tips on presentation skills, computer-based quizzes give students immediate feedback, and Digital Badges give students multiple opportunities to correct and resubmit assignments.
5) Time on Task	Faculty assists students in time-management and planning for success. Expectations are clearly addressed.	Technology can make students more efficient. Using LMS platforms and other web-based tools affords students the opportunity to work across space. These tools extend the learning environment by allowing students to pick up where they left off in class.

Table 2.1 Continued

6) High Expectations	Faculties expect their students will be successful in the learning process, and finds ways to motivate students.	Clear expectations that are written and accessible via the web set students up for success. Using rubrics and providing examples give students a way to evaluate their own work. Communicating to your students that they can accomplish a task increases motivation.
7) Respect for Diverse Talents and Ways of Learning	Faculty has an appreciation for the various skills, knowledge and learning strategies students come to class with. They acknowledge there are many paths to take in the learning process and give students opportunities to use their many talents.	Technology can provide students with various forms of instruction – audio, visual, vicarious, virtual, and direct. Instructional videos give students opportunities to revisit materials, as well as meeting the needs of diverse learners. Opportunities for choice in how an assignment is completed or the subject of the assignment allows students a way to showcase their diverse skills and talents.

The set of principles offered by Chickering and Ehrmann (1996) and Chickering & Gamson (1989) have been a source of guidance for a variety of educational contents. Graham, Cagiltay, Lim, Craner, and Duffy (2001) and Bangert (2004) both used the principles as a framework for evaluating online instruction. Thurmond, Wambach, Connors, and Frey (2002) suggests the principles promote overall active learning. Martyn (2007) goes a step further in connecting the principles and active learning in her study integrating the use of technology within undergraduate course activities.

Chickering and Gamson (1987) posit that the *Seven Principles* promote activity, interaction, cooperation, diversity, responsibility, and expectations within teaching and learning. These "forces" (p. 3) could be considered precursors to today's 21st century skills: analytical thinking, creativity, collaboration, communication, problem solving (Skills, 2009), because their aim is developing students with skills, knowledge and expertise required for the modern world. Combining Chickering and Gamson's (1987) *Seven Principles* and 21st century skills gives educators an even greater framework in which to support their instruction. Additionally, using technology in conjunction with these principles affords educators opportunities to be more efficient and purposeful in their instructional decisions, while still including many of the principles of good practice. Bangert (2004) resonates this sentiment specifically when thinking about online instruction:

> Authentic instructional activities that include simulations, case-based examples, and other problem-solving exercises not only increase interactive learning but also support the principle of high expectations. Clear performance expectations that accompany authentic instructional activities inform students of the criteria necessary for demonstrating acceptable and proficient levels of performance (p. 218).

A common thread running through the Seven Principles of Good Practice is the impact feedback has on each principle. While Chickering and Gamson (1987) limit feedback to its own category, it is not independent of itself. Feedback radiates throughout each principle, and in many cases is crucial to the overall success of that principle. For example, cooperation and learning collaboratively have the power to clear

up misconceptions and affords students opportunities to share and negotiate their own thoughts and ideas. Without specific feedback to guide these interactions, students could be left worse off than without these experiences. Feedback allows each principle to be most effective, and gives students and instructors opportunities to maximize the impact the principle has within learning. In a study regarding peer and self-feedback among preservice teaches, researchers found feedback was shown to develop preservice teachers' critical thinking skills and resulted in an increased quality of learning results (Lynch, McNamara, & Seery, 2012). Likewise, in a similar study on the impact of feedback within a modular higher education degree program, researchers found feedback to have the potential to improve student learning (Higgins, Hartley, & Skelton, 2002). In addition to improving learning outcomes, students desire written feedback (Getzlaf, Perry, Toffner, Lamarche, & Edwards, 2009; Hmelo-Silver & Barrows, 2006). They want to read their instructor's comments and hear their thoughts and opinions. Furthermore, students expect that feedback and the effort put into the task are mutually exclusive (Higgins et al., 2002). Students believe the effort and time they put into an assignment should result in the same effort and time within assessment and feedback. The role feedback plays in the learning process is significant, but what is even more essential is the nature of the feedback that is being provided by instructors.

2.9 Nature and Characteristics of Good Feedback

As we begin to look at the characteristics of exemplary feedback to improve learning, we must first examine the types of feedback commonly demonstrated. Both Balzer et al. (1989) and Butler and Winne (1995) discuss the functions feedback plays

within learning, with Butler and Winne (1995) building upon Balzer et al. (1989)'s work. Table 2.2 provides a brief description of these topics.

Table 2.2. Functions of Feedback

Function	**Description**			**Example**
Outcome Feedback	Simple, indicates results about performance, no information regarding the task			"Correct", "Incorrect"
Cognitive Feedback	Elaborate, cues are tied to performance and task	*Task validity*	Observer's perception of the relation between cues and achievement	"Remember the video you were to watch on 21st century skills? If you had referenced the points made in that video, you would have understood 21st century skills better"
		Cognitive validity	The Learner's perception of the relation between cues and achievement	Prompted after reviewing the material: "Did you remember to watch the video on 21st century skills? If not make sure you do so and pay attention to the main points."
		Functional validity	Relation between the learners' estimate achievements and actual achievements	After reviewing required materials students might be presented with a quiz. Upon completion: "based on your score your understanding of 21st century skills is 40%."

2.9.1 Outcome Feedback

Outcome feedback is the simplest form of feedback. It provides rather limited information regarding the learners' performance and achievement. No elaboration is given regarding the task itself. The learner is provided a basic correct or incorrect message regarding their performance. Technology systems can be used to automate (e.g. adaptive feedback) this form of feedback, and many times this will be exhibited in the form of multiple choice evaluations.

2.9.2 Cognitive Feedback

Cognitive feedback provides learners with a more elaborated form of feedback. The learner is provided with cues that relate to their achievement. Information regarding the nature of the task is included within this form of feedback. Specifically there are three types of cognitive feedback as defined by Balzer et al. (1989).

2.9.2.1 Task Validity

This component of cognitive feedback relates to the observer's perception of the relation between cues and achievement. Often this is where instructors will refer students back to previously reviewed material and/or other required elements that would have helped them perform better within the evaluation measures.

2.9.2.2 Cognitive Validity

Cognitive validity refers to the learner's perception of the relation between cues and achievement. Specifically, this type of feedback is often used in adaptive technology settings where students are prompted with hints and/or cues such as, "Did you read the

article? Did you remember to note the pros and cons? Did you check the spelling and grammar?" These cues provide students with information that will inform their next steps.

2.9.2.3 Functional Validity

Within functional validity the relation between the learners' estimated achievements and actual achievements are emphasized. Again, technology can play a role in communicating the feedback to the students. For example, the student takes an online quiz. Upon completion they are provided with a prompt regarding their level of achievement, "Your score indicates you know about 80% of the material surrounding this topic."

2.9.3 Effective Feedback

The work presented by Balzer et al. (1989) and Butler and Winne (1995) explores the types of feedback instructors may provide to students. Yang and Carless (2013) argue that content plays a specific role into the nature of feedback. They offer a framework focusing on three distinct dimensions of feedback: cognitive, social-affective, and structural. The Feedback Triangle (Figure 2.4) shows an interplay of each dimension where each comes together in the feedback space. Both the cognitive and social-affective categories reflect areas that pertain to the student and teacher, whereas the structural dimension refers to actions that are often outside of their control (e.g. administration, policy, technology restrictive).

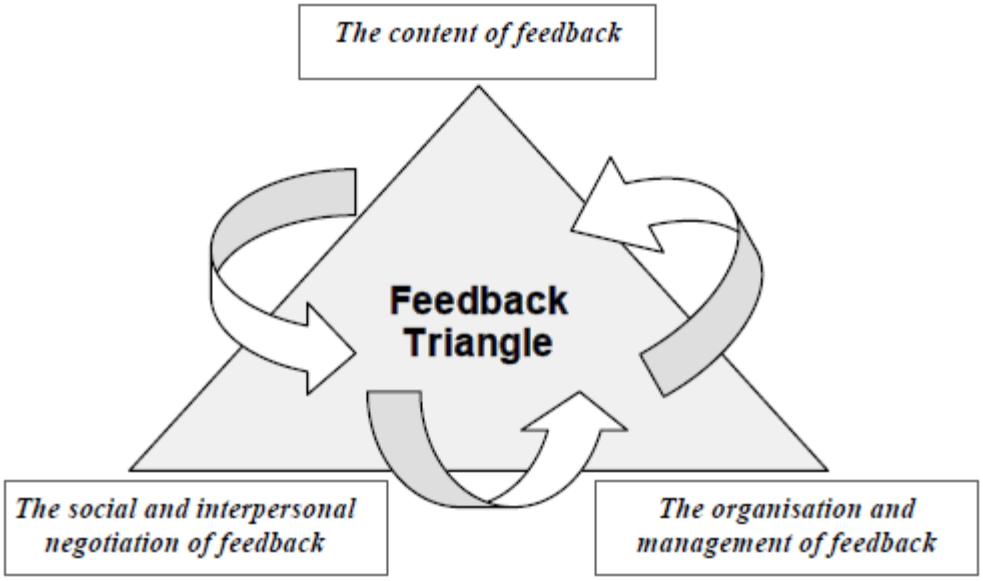


Figure 2.4. The feedback triangle (Yang & Carless, 2013)

2.9.3.1 Cognitive

The cognitive dimension focuses on the content. In addition to the academic knowledge, this dimension also refers to the underlying "beliefs, values, concepts and principles, as well as methodologies and skills for investigating disciplinary problems and practicing in the profession" (Yang & Carless, 2013, p. 288). Specifically, this dimension requires students to know the academic content, but also how to apply feedback in a way that lessens the gap in achievement.

2.9.3.2 Social-Affective

This dimension relates to "how feedback implies messages about students' social role in their learning environment, and how students' emotions are engaged as they undertake learning and assessment tasks" (Yang & Carless, 2013, p. 289). Specifically, in this dimension the emotional well-being and interactions play a role into how well the learner receives feedback, and is then able to apply it. Relationships between instructor

and student are an important factor and directly connects to Chickering and Ehrmann (1996) and Chickering and Gamson's (1987, 1989) principle of student-faculty interaction.

2.9.3.3 Organizational

Within the organizational dimension "structural constraints are a major barrier facing effective feedback processes and arise from assessment policies, practices and the ways universities are organized" (Yang & Carless, 2013, p. 292). The restrictions that are often in place regarding feedback result in the need for flexible systems that give instructors options for elaboration and for providing timely responses. The organizational dimension can be enhanced through the use of technology tools. Video and audio feedback can reduce the time it takes for instructors to produce elaborate answers. Tools like Digital Badges provide opportunities for instructors to provide feedback to students built within the systems.

2.10 Principles of Good Feedback

The characteristics of feedback brought forth through The Functions of Feedback (Balzer et al., 1989; Butler & Winne, 1995) and the contextual considerations provided by The Feedback Triangle (Yang & Carless, 2013) give instructors a general idea of the nature of feedback, but do not provide practical application of current research. Nicol and Macfarlane-Dick (2006) appeal to the practitioner in directly connecting the Seven Principles of Good Practice (Chickering & Gamson, 1987) to feedback in their model (Figure 2.5).

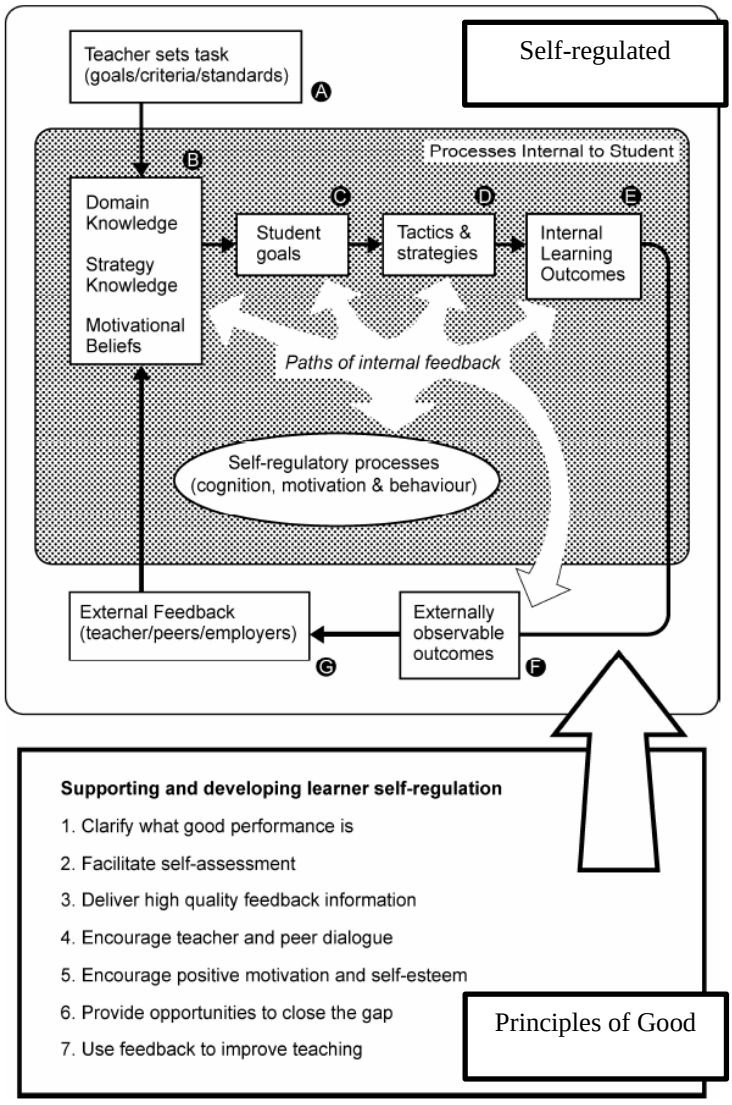


Figure 2.5. A Conceptual Model of processes of self-regulation and internal feedback.

The authors draw from the body of literature surrounding self-regulated learning, where they position feedback as a tool used to motivate and aid students during learning. Self-regulated learning is defined as:

> An active constructive process whereby learners set goals for their learning and monitor, regulate, and control their cognition, motivation, and behavior, guided

> and constrained by their goals and the contextual features of the environment (Pintrich & Zusho, 2007, p. 64).

Feedback provides a way for instructors to facilitate the learning process and provide information regarding performance. As students hone their skills and develop their knowledge, they become directors of their own learning. Especially in higher education, students are responsible for setting and meeting their own learning goals, as well as receiving and applying feedback in ways that will help them achieve those goals. Table 2.3 provides a summary of Nicol and Macfarlane-Dick's (2006) model of Principles of Good Feedback Practice

Table 2.3. Principles of Good Feedback Practice

Principle	**Description**	**Implementation**	**Example**
Clarify in performance	Feedback helps to clarify what good performance is and communicates the goals, criteria, and expectations of the task.	LMS's provide a repository for written criteria. Digital Badge systems give students criteria and a place to complete the task within a single system.	"Consider reviewing the objectives on page 1. Use these objectives to guide your essay writing."
Facilitates self-assessment (reflection)	Feedback gives students opportunities to self-assess or reflect.	Self-assessment with rubrics. Asking students to reflect on practice and how it relates to future goals/practice	"How might this task be used in your future profession? What skills are transferred?"

Table 2.3 Continued

Delivers high quality information	Feedback should explicitly inform students about the quality of their learning outcomes.	Explicit information about performance is required. Go beyond generic statements and give students clear areas on which to improve.	"I really like how you provided a detailed description of the learning environment. You took less time to explain your learners. Remember to include the age, grade level, and accommodations."
Encourages teacher and peer dialogue	Teacher- student and peer-student interactions are promoted with feedback.	Provide students with opportunities to clarify content and performance in and outside of the class. Technology tools are helpful in interacting across time and space.	"I see that you are not understanding the topic. What is specifically causing you confusion? Let's meet to discuss this."
Encourages positive motivational beliefs	Feedback should provide opportunities to increase students' motivation and self-efficacy.	Feedback should not always be critical. Provide comments that point out when exceptional work has been completed. This type of feedback can be used as a model to students in their future work.	"Well done! I can see that you have done a nice job clearly explaining the topic and providing detailed examples."

Table 2.3 Continued

Closes gap in learning	Feedback delivers important information regarding desired learning, perceived learning, and affords opportunities to decrease that gap.	Communicating goals and objectives to students in conjunction with feedback gives students information about where they stand regard the learning process and if they need to make adjustment to meet those goals.	"In this task you should have defined the topic and provided examples- you only defined the key words."
Helps inform teaching	The process of providing feedback and observing how students apply that feedback gives instructors valuable information regarding their teaching and learning methods and strategies.	Use student feedback as a way to inform your instructional methods and strategies. If many students are unsure of something, reteach using a different approach or set of tools.	"Thank you for sharing your frustrations. Next time I will try to provide more visuals"

2.10.1 Clarity in Performance

Feedback helps to clarify what good performance is and communicates the goals, criteria, and expectations of the task. Nicol and Macfarlane-Dick (2006) emphasize the need for instructors and students to share a common understanding regarding the task. Definitions, concepts, and requirements need to be established and communicated in a way that students understand. Instructors might consider communicating expectations through various media forms (e.g. visual, oral, and written). Technologies can help

instructors clarify performance requirements. For example, Learning Management Systems (LMS) can afford students opportunities to revisit requirements. Digital Badge systems give students various competencies and criteria within a single view. Students can then review material, submit tasks, and review assessment all in one place. Additionally, Pokorny and Pickford (2010) emphasize the need to teach the process of providing feedback. This is imperative during peer and self- assessment, but is an important part of instructing. Teacher education needs to model and shape student's feedback process and give preservice teachers opportunities to provide good feedback in an instructional setting.

2.10.2 Facilitates Self-Assessment (Reflection)

Feedback gives students opportunities to self-assess or reflect. Identifying gaps in expectations and actual learning gives students an opportunity to reflect on the strategies they use for learning, how they receive feedback, and how they apply that feedback. In doing the former, students reflect on the instructional content, instructional methods and student-teacher interactions that have or have not taken place. Instructors can make feedback a mutual process where they not only give feedback to students, but ask students to contribute to the type of feedback they receive. Student-directed feedback is often overlooked and is desired by the student (Carless, 2006). Implementing opportunities for students to think about their work and how it might apply to their future profession is one way educators can use this principle. Additionally, providing students with rubrics and requiring self-assessment could possibly identify gaps in their knowledge.

2.10.3 Delivers High Quality Information

Feedback should explicitly inform students about the quality of their learning outcomes. Feedback provided by instructors should be explicit and relate directly to goals, criteria, and expectations. While generic feedback might provide a positive comment to a student, it does not give enough information to where the student can then apply feedback. Being specific will help the student clear up any misconceptions, recognize areas of strength and weakness, and provide direction for next steps (Guskey, 2007). Nicol and Macfarlane-Dick (2006) define "quality external feedback [as] information that helps students trouble-shoot their own performance and self-correct: that is, it helps students take action to reduce the discrepancy between their intentions and the resulting effects" (p. 9).

2.10.4 Encourages Teacher and Peer Dialogue

Teacher-student and peer-student interactions are promoted within feedback. While feedback provided by the teacher is essential, another way for students to receive and learn how to provide feedback is through peer-assessment. In one study, researchers examined peer feedback within online instruction (Ertmer et al., 2007). Specifically, the authors examined the impact peer feedback had on the quality of online discussion postings. Findings resulted in students having greater abilities in providing feedback, and increased the value of the process.

Not only does peer feedback provide students with increased opportunities to learn from the process, it is equally important to devote time to cultivating the teacher-student relationship. This principle directly relates to Chickering and Gamson's (1987,

1989) principle of student- teacher interaction. Various technologies give instructors choice in how and when they interact with students. When class ends, the student-teacher interaction doesn't have to stop. Instructors can provide multiple opportunities to clarify content and performance outside of class.

2.10.5 Encourages Positive Motivational Beliefs

Feedback should provide opportunities to increase students' motivation and self-efficacy. Instructor feedback must include a balanced representation of positive and critical comments. When exceptional work is completed, students need to be informed of their achievements. These areas are places where students can look to as models to inform their future work. Giving students multiple opportunities to resubmit and make changes to drafts makes the assessment process more motivational (Nicol & Macfarlane-Dick, 2006).

2.10.6 Closes Gap in Learning

Feedback delivers important information regarding desired learning and perceived learning, and affords opportunities to decrease that gap. Nicol and Macfarlane-Dick (2006) write, "In higher education, most students have little opportunity to apply the feedback they receive to close the performance gap especially in the case of planned assignments" (p. 13). Students are often presented with feedback in response to an assignment, and then move on to a new topic without having opportunities to deepen their learning (Lynch et al., 2012), clear up misconceptions, or reflect on previous learning. Mastery-based learning environments may be the answer to this issue.

Instructors can give students tasks with guidelines and objectives clearly defined and provide specific feedback directly related to these criteria. Additionally, they can then allow for multiple submissions, therefore allowing students opportunities to fully master the concepts before moving on. Hepplestone and Chikwa (2014) suggests technology can assist the process of receiving and applying feedback. In their study, undergraduates were asked to blog and journal about their actions towards the feedback process. The results found students archived written feedback and used it for later tasks. Students also revisited the comments multiple times and tried to internalize the feedback in different ways (e.g. committing to memory, taking notes). Furthermore, students felt frustrated when feedback wasn't useful toward future work.

2.10.7 Helps Inform Teaching

The process of providing feedback and observing how students apply that feedback gives instructors valuable information regarding their teaching and learning methods and strategies. How students are using and applying feedback is another form of instructional feedback educators can use to inform their teaching practices. Soliciting student's opinions on the type of feedback and information they found useful can be informative to instructors.

2.11 Digital Badges Meet Instructor Feedback

We've looked at general definitions of feedback and the types of feedback instructors provide. We've begun to explore the contextual factors that play a role into how feedback is received and then applied. We've also examined how the principles for good instruction provide a set of guidelines to inform the kind of feedback instructors are

providing. The body of literature surrounding feedback can provide guidance to instructors using Digital Badge systems within Mastery Learning contexts.

Digital badge systems pair well with Mastery Learning because of the need to meet a specific set of objectives and criteria. Giving students opportunities to work at their own pace and demonstrate mastery of knowledge is rewarded within the badge system, while also communicating deep learning. It is through these rewards (Digital Badges) that students are able to display their knowledge for the world to see, appealing to professionals in their fields (Randall et al., 2013). Pairing Digital Badges with Mastery Learning has the potential to produce similar results to studies without Digital Badge technology, like increased motivation and engagement among students (Light & Pierson, 2014; Lin et al., 2013) and increased student learning outcomes (Wonder-McDowell et al., 2011). While badges themselves are not necessarily assessment, they depict that assessment has taken place and the criteria that was needed to get there (Ostashewski & Reid, 2015). Systems like *Passport* (Tally, 2012) offer capabilities that assist feedback practice. These systems have the potential to increase student learning (Higgins et al., 2002), the quality of learning (Lynch et al., 2012), and critical thinking (Lynch et al., 2012). Instructors are able to give assessment, while students are able to display that assessment (through awarded badges) all within one platform. The process of receiving and applying feedback is not only essential in Mastery Learning contexts but within Digital Badges systems. Detecting students' gap in knowledge (or lack thereof) is required in receiving Digital Badge achievements.

Additionally, within Digital Badges systems students are able to be the creators of their own educational experiences.

> Allowing students to choose the pathways they will follow to achieve learning goals is necessary for self-regulated learning and an increased sense of self-efficacy. The practice of allowing students to choose instructional activities that are aligned with their unique learning styles, academic strengths, and interests further contributes to learner self-efficacy (Bangert, 2004).

Expert mentorship and varied forms of assessment are key, but leads to students attaining their professional goals (Gamrat, Zimmerman, Dudek, & Peck, 2014).

One potential challenge to implementing Mastery Learning approaches and subsequent increased feedback may pose is the increased interactions among teachers and students. These interactions lead to increased time (Davidson-Shivers, 2009) often spent developing objectives and criteria, providing feedback, and reevaluating multiple task submissions. Furthermore, instructors take on a role of mentorship with an emphasis on assessment. Assessment occurs multiple times throughout a task, and instructors need to be well-versed in how to provide rich, quality feedback (Orsmond, Merry, & Reiling, 2005), where students learn how to receive and apply it.

Despite the challenges which combining Mastery Learning and Digital Badges may pose, the outcomes for students make this a meaningful option for educators. Specifically, these learning and instructional strategies offer educators a practical way to implement Digital Badges within traditional educational contexts.

2.12 Summary

Chapter 2 included a review of the literature surrounding the key topics of this research. Chapter 3 included a description and justification of the research methods.

Educators are looking toward Digital Badges as a way to increase student engagement (Abramovich et al., 2013; Glover & Latif, 2013), develop mastery with critical concepts (Mehta et al., 2013), and reduce gaps in student knowledge (Bowen & Thomas, 2014; Guskey, 2007). Feedback is emphasized as a critical component (Bloom, 1968, 1976; Guskey, 2007; Kluger & DeNisi, 1996; Slavin & Karweit, 1984).

A qualitative case study can provide insight into how instructors are providing feedback and the value feedback holds for students. This study involved administering a survey to the students and instructors of an introductory preservice technology course from a large Midwestern public university. Analysis of the data ensued and then overarching dimensions occurred through the categorization and synthesis of codes. Chapter 3 includes a discussion of the methodology for the research.

CHAPTER 3. METHODOLOGY

The pairing of Mastery Learning approaches with Digital Badges is giving educators a way to transform their current curriculum. This is especially imperative within teacher education programs, where students are taking teaching and learning knowledge into formal education. Educators are looking toward Digital Badges to increase engagement (Abramovich et al., 2013; Glover & Latif, 2013), develop mastery with critical concepts (Mehta et al., 2013), and reduce gaps in student knowledge (Bowen & Thomas, 2014; Guskey, 2007). Feedback is emphasized as a critical component (Bloom, 1968, 1976; Guskey, 2007; Kluger & DeNisi, 1996; Slavin & Karweit, 1984). The purpose of this study is to examine the role feedback plays in the instructional process and how students are using feedback to inform their coursework within Digital Badge contexts. Specifically, this study examines the ways in which instructors are providing feedback and how students are applying that feedback to their assignments. Therefore, this research will investigate the following questions:

1. In what ways do instructors provide feedback to assignments in a Digital Badge system?
2. What types of feedback do students find of most and least value and how do they report applying such feedback?

3.1 Research Design

In order to examine the role feedback plays in the instructional process and how students are using feedback to inform their course work within Digital Badge contexts, this study used a descriptive multiple-case study approach (P. Baxter & Jack, 2008). Case studies are defined as "research that provides a detailed account and analysis of one or more cases" (Johnson & Christensen, 2012, p. 395). Using case studies provided the opportunity to fully examine how feedback is being utilized by students and instructors within a Digital Badge system, and allowed for an in-depth examination into how the badge system is impacting assessment within teacher education. Case study research will increase the knowledge and understanding of these phenomena (Yin, 2009). Within this study a case is defined by the instructor, as each instructor takes on his or her own unique instructional style. Each case will allow the researcher the ability to take an in depth look at the instructional style of each instructor. Additionally, student viewpoints were defined as a single case regardless of the instructor. Although the instructors' styles dictate the experiences of the students, the overall course content, activities, and goals are consistent allowing for the identification of central themes and patterns. Further examination of students corresponding to each instructor reflected a more holistic student perspective that more readily reflected the overall course experience. This study intentionally did not want to compare instructors, but provide a base for future comparison studies.

In order to address the research questions, a descriptive qualitative design was used. Despite Digital Badges' gaining popularity within popular media and academia, research in this area is still in its infancy. This qualitative study hopes to add to the topic

and further understand student and instructors' experiences and perspectives (Johnson & Christensen, 2012). Data were collected from multiple sources, including electronic instructor feedback from selected course assignments and open-ended responses from a student survey. This qualitative study hopes to add to the topic and further understand the experiences of instructors and students in a Mastery Learning Digital Badge system.

3.2 Context

In order to gain an understanding of how feedback is utilized in a Digital Badge system, data were gathered from an introductory technology course within the College of Education at a large Midwestern public university. In this undergraduate course foundations of educational technology are examined, including the integration of instructional design, multimedia, Web 2.0 applications, and various computing software, all within the classroom setting. This course is required by all teacher education students in order to learn the basics of technology integration before entering the formal classroom through student teaching.

3.2.1 Course Structure

This large-scale course runs on a traditional semester schedule with sixteen weeks of instruction. The course is comprised of both a one-unit lecture and two-unit lab. The lecture component is taught by a faculty member who is the lecture instructor, course designer, and supervisor of teaching assistants.

This course runs in agreement with a flipped instruction model, where students engage in course content prior to attending class. Within the one-hour lecture, students engage in case studies that provide opportunities for course content application. Over the

progression of the semester, students engage in three cases-studies presented outside of the Digital Badge platform, and therefore these assignments was excluded from this study. The focus was on assignments given within the lab sections of the course. The weekly two-hour lab course is taught exclusively by teaching assistant instructors (referred to as 'instructors' here on out). Appendix B details the course schedule. Four technology literacies are explored over the course of the semester: 1) Digital, 2) Information, 3) Instructional Design, and 4) Social. Through the exploration of these literacies, students gain skills and knowledge related to each topic through various assignments.

This course maintains a modified Mastery Learning style. Students were presented with the majority of coursework upfront and then chose when to complete their assignments. Within the schedule are feedback deadlines to help students progress through the course in a timely way. A student may submit an assignment an unlimited amount of times without penalty in which they will receive feedback until they reach mastery. After the deadline, students were allowed one additional attempt and then received a final score without an opportunity to apply feedback (as in traditional classroom learning environments).

3.2.2 Courses Management System

Canvas is the learning management system for this course. Each week, students are presented with their week goals and are referred to the Digital Badge system in order to complete their assignments. Additionally, assignment scores are documented once feedback deadlines have passed.

3.2.3 Digital Badge Platform

The *Passport* Digital Badge System will be used to deliver content, complete assignments, receive feedback, and share coursework and achievements. Appendix A provides detailed screen shots of the *Passport* Digital Badge System. Students are presented with 45 badges and they must complete 28 of them over the course of the semester. Basic badges are considered prerequisites that deliver course content (e.g. articles, websites, lecture videos) and provide a foundation for more complex badges. Fifteen badges are considered foundational badges that provide opportunities for students to meet competencies within the four technology literacies. When a student attempts a badge assignment, they are presented with multiple challenges that provide them with details of the badge, including the point value. In order to receive the badge, students must receive the equivalent of an 85 percent on the collective badge challenges. Regardless of their score students will receive the points, but if their score is less than 85 percent they will not receive the badge (and therefore cannot share their accomplishments on their public profile).

Instructors provide all feedback within the *Passport* system (screenshots can be viewed in Appendix A). Instructors can enter text into the open text box, provide links and additional media, as well as elicit expertise from additional specialists. Feedback is chronicled within the system, where students and instructors can view past feedback attempts.

3.3 Participants

This study examines feedback given on courses assignments within a Digital Badge system from both the perspective of the instructor and student. Student survey responses were organized into one data set, while each instructor was organized into a second and third data set.

3.3.1 Instructors

Course lab sections were instructed once per week by teaching assistants, during which they engaged in student-teacher interactions, provided demos, instructional support, and completed all the coursework assessments for their individual students. Table 3.1 presents detailed information regarding teaching assistants.

Table 3.1. Teaching Assistant Information

Instructor	Teaching Classification	Academic Classification	Experience in course (No. of labs taught)	Teaching background	No. of students per lab
Skylar	TA	Ph.D.- 3rd year	9	Higher Education	20 20
Avery	TA	M.A.- 1st year	4	K-12, Higher Education	18 20

Additionally, Skylar is a doctoral student in an educational technology related department. She has taught approximately nine lab sections over the course of a three-year time span. She was paired with a more experienced mentor TA which allowed her to become established in the labs. She has 4 years' experience using *Passport* inside and outside of this course. Her background is in educational philosophy. Avery is a Master's

student in an educational technology related department. She has taught approximately four lab sections over the course of a one-year time span. Avery received support from an experienced TA, but she did not participate in a formal mentoring program for this course. She has one year's experience using *Passport* and all of it has been related to this course. Her background is in teacher education and she currently holds a teaching license.

3.3.2 Students

Students enrolled in this introductory technology course have representation in all academic classification areas (Table 3.2); however, the majority of students are underclassmen (79%). Student majors are mainly comprised (69%) of education related subjects because of the teacher education requirement, although this semester had considerably more non-education majors than in the past (fall 2014 education majors comprised of 85%). Table 3.3 presents this information.

Table 3.2. Spring 2015 Student Demographics

Academic Classification	No. of Students
Freshman	34
Sophomore	28
Junior	9
Senior	7
Total	78

Table 3.3. Spring 2015 Student Majors

Major	No. of Students
Agricultural Education	6
Animal Sciences	2
Biochemistry	1
Biology	2
Chemical Engineering	1
Chemistry	1
ECE and Exceptional Needs	6
Elementary Education	20
Explorers	11
Engineering	1
Health Science PreProfessional	**2**
Health/Physical Education	1
Indust Tech/Indust Distrib	1
Law and Society	1
Mathematics Education	1
Movement & Sport Sciences	1
Nutrition, Fitness & Health	1
Physics	1
Pre Mgmt	2
Pre Pharmacy	2
Pre Psychology	1
Social Studies Education	2
Special Ed/Elem Education	2
Speech, Language & Hearing Sci	2
Technology Education	1
Temporary Ag Pathway Program	1
University Division	1
Visual Arts Design Education	1
Visual Arts Education	2

3.4 Sampling Procedure

This study used a typical-case selection method in order to include participants that provided information relevant to the research and in order to examine all relevant

cases related to the typical case within the research context (Johnson & Christensen, 2012).

3.4.1 Instructors

Instructors were included based on their assigned lab section. Instructors self-selected lab times that fit within their personal schedules at the end of the fall 2014 semester. Instructors who selected lab times associated with the Digital Badge labs were included. Lab instructors' actions fell within their normal job descriptions and they were not asked to complete any additional tasks. Two instructors were selected, and Table 3.1 presents detailed information regarding teaching assistants.

3.4.2 Students

Students enrolled in the Digital Badge lab sections were included in this study. Normal course activities and behaviors were included in this study with the exception of an online survey. Students were presented with the survey opportunity through an in-class announcement during their lab sections by their instructor. A survey description and link to a Qualtrics survey was provided by instructors, as well as an appropriate amount of time to complete the survey. Informed consent occurred within the online survey. Seventy-eight students participated in this study, and Tables 3.2 and 3.3 reflect student information.

3.5 Data Sources and Collection

In order to address the research questions, a variety of data were collected from two major sources: instructor evaluation comments on course assignments within *Passport*, and an open-ended survey completed by students.

3.5.1 Course Assignment Selection

Assignments included in this study are bolded (Appendix B). Assignments included in this study are representative examples from within the course. Assignments were chosen based on the nature of the task, and represent a variety of deliverables and skills. For example, the *Being Digitally Literate in the 21st century* badge is largely text-based with various required narratives detailing students' understanding and application of the topic. Whereas, the *Integrating Web 2.0 Applications for Teaching and Learning* badges ask students to not only master digital tools, but also the meaningful integration of these tools within educational contexts. Lastly, the *Writing Effective Lesson Objectives* badge requires students to master the beginning stages of instructional planning. In addition to the lecture assignments not included in this study, the Individualized Instruction and Video Production badges were excluded. The Individualized Instruction badge is a large-scale assignment where students put their instructional design skills to task. Much of the feedback given to students is done in a face-to-face format and the task only requires students to post their final deliverables within the Digital Badge system. The Video Production badge is linked to and integrated within the Individualized Instruction badge, and also doesn't elicit opportunities to fully examine the relationship the instructor and students are having concerning feedback.

3.5.2 Passport Feedback

Coursework was completed within the *Passport* Digital Badge System. Students submitted their assignments, and instructors accessed the assignments and in turn provided feedback. After comments and resources were provided, instructors were able to 'deny' a submission for students that did not show mastery level comprehension of the content. Students had the opportunity to resubmit their assignments. After resubmission, the instructor had another opportunity to provide feedback. This process continued until one of the two situations occurred, 1) the student reached mastery of the content and the badge was approved; or 2) the feedback deadline passed resulting in only one extra grading attempt. *Passport* archived all the feedback within the system; at the conclusion of the semester the comments were pulled from the system by a member of the *Passport* team outside of this study. Data was first organized into Excel, where data were de-identified by another member of the *Passport* team. The results were then sent to the researcher through secure file-sharing software. The researcher then followed using Nvivo 10 software to aid in the process of organizing the data into themes and patterns.

3.5.3 Open-ended Survey

Educators are looking toward Digital Badges as a way to increase engagement (Abramovich et al., 2013; Glover & Latif, 2013), develop mastery with critical concepts (Mehta et al., 2013), and reduce gaps in student knowledge (Bowen & Thomas, 2014; Guskey, 2007). Feedback is emphasized as a critical component (Bloom, 1968, 1976; Guskey, 2007; Kluger & DeNisi, 1996; Slavin & Karweit, 1984). Therefore questions were developed in order to investigate what types of feedback students find of most and

least value and then how they reported applying such feedback. Student participants were asked to complete a voluntary open-ended anonymous online survey to better understand the strategies and behaviors students engage in when internalizing and applying instructor feedback. The survey was created using the online survey creator Qualtrics. Participants were asked to spend 20-25 minutes on the survey. Survey questions are provided in Appendix C. Nvivo 10 software aided in the process of organizing the data into themes and patterns. Student surveys were organized into a single case based on the shared experiences of students applying feedback within a Digital Badge context.

3.5.4 Timeline

The following Table (3.4) details the timeline for data collection.

Table 3.4. Data Collection Timeline- Spring 2015

Week	1	2-10	10-14	13-14	16-17
Procedure	Students and instructors begin course introductions	Students and instructors begin coursework and administering feedback	Students complete badge work and instructors continue administering feedback	Open-ended survey announcement is made, then the survey is administered	All assignments and feedback are pulled from *Passport*
Source of Data	N/A	*Passport* Feedback	*Passport* Feedback	Survey	*Passport* Feedback

To protect the privacy of the instructor and student participants, pseudonyms were assigned and institution review board (IRB) approval oversaw this study.

3.6 Role of the Researcher

The researcher is a graduate student and employed as a teaching assistant within the same introductory technology course. The researcher's background degrees are in Liberal Studies and Educational Technology from two California universities. The researcher has experience teaching in a variety of elementary schools throughout the state of California. Additionally, the researcher has experience teaching both undergraduate and graduate students in the areas of education, instructional technology, and educational technology. Specifically in this course, the researcher holds two positions: instructor and supervising head teaching assistant. In her first role she serves as an instructor within 1-2 lab sections of the course. She has experience teaching twelve lab sections in this course since 2011, and has worked with *Passport* since 2012. In her second role, the researcher serves as the supervising head teaching assistant maintaining many organizational, managerial, and leadership duties. Within this role she provides support to all teaching assistants over the course of the semester.

Throughout this study the researcher's role included data collector and analyst. The researcher is situated as the researcher tool and will be the lens in which data are studied. In order to remain as neutral as possible (Creswell, 2007, 2009), the researcher was assigned to lab sections outside of the Digital Badge class, and did not have access to assignment feedback within the *Passport* Digital Badge system until after data collection was completed. In addition the researcher engaged in self-reflection in attempts to monitor biases (Johnson & Christensen, 2012), and additionally sought out the help of another graduate student to aid in the data analysis process (further explained below).

3.7 Data Analysis

Content analyses were used to analyze the data and incorporated a variety of methods and procedures, as well as utilizing several instruments. During the analysis of the data, both deductive (RQ 1) and inductive (RQ 2) coding processes guided the procedures. Data were collected from sources, organized, read, and then coded. Codes were developed both in an open-coding scheme (RQ 2), as well as stemming from the functions of feedback (e.g. task, cognitive, and functional validity information) (Balzer et al., 1989; Butler & Winne, 1995), principles of feedback (e.g. principles supporting self-regulated learning) (Nicol & Macfarlane-Dick, 2006), framework of effective feedback (e.g. content, social and interpersonal negotiation, organization and management) (Yang & Carless, 2013), and essential elements of Mastery Learning (e.g. feedback, correctives, enrichment) (Guskey, 2007) (RQ 1). Themes and descriptions emerged from the data and were then collected and grouped into well-suited cases (Yin, 2014). Based on these themes and descriptions, interpretation and discussion points emerged (Creswell, 2009). Narratives, figures, and tables were used to create a rich-description of the cases and provide an in-depth representation. The following details the analyses process for each research question.

3.8 Research Question 1

RQ1: In what ways do instructors provide feedback to assignments in a Digital Badge system?

In order to examine the ways in which instructors provide feedback individual case studies were developed. Each case was investigated and analyzed holistically as a

single entity representing the distinct evaluation style of that instructor. Each feedback entry provided to students within *Passport* was classified as one evaluation reference. Codes were developed to capture the nature of the feedback instructors provided. The coding schema was created using a deductive process based on feedback and Mastery Learning research including the functions of feedback (e.g. task, cognitive, and functional validity information) (Balzer et al., 1989; Butler & Winne, 1995), principles of feedback (e.g. principles supporting self-regulated learning) (Nicol & Macfarlane-Dick, 2006), framework of effective feedback (e.g. content, social and interpersonal negotiation, organization and management) (Yang & Carless, 2013), and essential elements of Mastery Learning (e.g. feedback, correctives, enrichment) (Guskey, 2007). The process included the development of emergent codes, broadening and narrowing of previous codes, collapsing codes, and deletion of codes. The final coding schema consisted of six categories: 1) Outcome Feedback; 2) Clarification; 3) Decreasing Gaps in Knowledge; 4) Motivation & Interaction; 5) Opportunities to Further Knowledge; 6) Promotes Overall Learning and Cognitive Development. A total of 18 codes were used. See Appendix D for the final coding schema. After the initial review, emerging patterns and themes were noted; finally, patterns were collected and grouped into well-suited cases (Yin, 2014).

3.9 Research Question 2

RQ2: What types of feedback do students find of most and least value and how do they report applying such feedback?

In order to examine the strategies and behaviors students take when internalizing and applying feedback, an open-ended survey was developed and analyzed. An inductive

analysis process was completed, starting first with reviewing the data, followed by making notes and developing open codes. After the initial review in agreement with axial coding (Miles, Huberman, & Saldaña, 2014), emerging patterns and themes were established and then gathered into overarching dimensions. The process included the development of emergent codes, broadening or narrowing of previous codes, collapsing codes, and deletion of codes. The final coding schema was established upon reaching the point of saturation (Creswell, 2014), and consisted of three categories: 1) Importance and Nature of Feedback; 2) Authority Over Learning; 3) Learning for Mastery. A total of 66 codes were used. See Appendix E for the final coding schema. Cases were synthesized and then relationships were explored across cases (Yin, 2014).

3.10 Reliability and Validity

In order to promote reliability and validity in the study the researcher will use data triangulation by viewing multiple sources (Lincoln & Guba, 1986): 1) Instructor evaluation comments on course assignments within *Passport*; 2) An open-ended survey completed by students. In order to validate the research methods, four established case study tactics have been utilized (Yin, 2014). In order to test construct validity a chain of evidence was created. Procedures, questions, and methods were explored and connected to the research questions and previous literature. Additionally, survey questions were further validated by having student and instructor experts evaluate them for content appropriateness. Before surveys were administered, the questions were piloted on students from previous semesters (n=4), as well as previous instructors with *Passport* experience (n=1). To test for internal validity another researcher was solicited to validate

both coding schemas and independently code both the instructor evaluations and open-ended student survey (Miles et al., 2014). Results were then compared and allowed for 98.8% inter-coder reliability with instructor evaluations and 99.1% inter-coder reliability within open-ended surveys (Creswell, 2014; Creswell & Clark, 2007). In order to address external validity, research methods were replicated among instructor case studies. To ensure reliability, case study procedures were documented in order to minimize errors and bias (Yin, 2014). Testing for reliability and validity strengthens the ability to analytically generalize.

3.11 Limitations

Despite the researcher's attempt to conduct sound research, there are still limitations. First, participating instructors were selected based on their self-assignment of lab schedule. While the expectations of teaching assistant instructors are established, it is inevitable that instructors will have variation within their courses. Each week all instructors meet with the faculty instructor to discuss the week's activities and address any areas of concern. It is in these meetings that variations in feedback and student assessment are discussed in detail and resolved.

Additionally, while in-class course assignments may exhibit exemplary examples of feedback, the focus on this study is the pairing of feedback with a Digital Badge system. The background and experiences of the instructor is not a criterion; therefore the sample may include concentrated levels of technology skills, teaching abilities and tenure. However, instructors often have varying levels of skills that may be concentrated

in one area over another, and therefore this adds to the overall understanding of real-world cases.

Lastly, because of the in-depth nature and uniqueness of each case, generalization is not the sole purpose of this study (Denzin & Lincoln, 2011). However, general themes and overarching dimensions have emerged among the participants, and results indicate areas of discussion and future research.

3.12 Summary

Chapter 3 included a description and justification of the research methods. Educators are looking toward Digital Badges as a way to increase student engagement (Abramovich et al., 2013; Glover & Latif, 2013), develop mastery with critical concepts (Mehta et al., 2013), and reduce gaps in student knowledge (Bowen & Thomas, 2014; Guskey, 2007). Feedback is emphasized as a critical component (Bloom, 1968, 1976; Guskey, 2007; Kluger & DeNisi, 1996; Slavin & Karweit, 1984). An open-ended student survey and critical examination of instructor assignment feedback provided information from which themes emerged

Chapter 3 included a description of the population of the study as well as the sample, data collection procedures, and rationale for the procedures. An explanation of the reliability and validation measures regarding the development of the questionnaire and coding schemas were presented in this chapter.

The data analysis process included using Nvivo 10 software to aid in the identification of themes and patterns related to the central phenomenon under study. After coding both open-ended survey data and instructor feedback responses, overarching

dimensions occurred through the categorization and synthesis of codes. Discussion of the themes is presented in narrative format in Chapter 4.

CHAPTER 4. FINDINGS

The purpose of this qualitative case study was to examine the role feedback plays within the instructional process, and how students are using feedback to inform their course work within Digital Badge contexts. Imposing a Mastery Learning approach to a Digital Badge system may be a potential solution towards using Digital Badges within higher education. Digital Badges provide a set of detailed criteria, allow the learner to work at their own pace and receive feedback to enhance their practice, and give students the ability to demonstrate mastery of content and deepen their learning. Formative assessment through instructor feedback is crucial to mastering content and displaying achievement. A critical component of Mastery Learning is the role of instructional feedback. Understanding the nature of feedback and how instructors are providing feedback can help increase learning outcomes and provide more effective instruction.

A sample of 78 students and 2 instructors from a large Midwestern public university participated in this study. Analysis of both instructors' assignment feedback and students' survey responses followed using Nvivo 10 software to aid in the process of organizing the data into themes and patterns. Student survey responses were organized into one data set, while each instructor's evaluation feedback was organized into a second and third data set.

Chapter 4 includes an overview of the data analysis procedures. The findings are presented by research question. During the analysis of the data, both deductive (RQ 1) and inductive (RQ 2) coding processes guided the procedures. Data were collected from sources, organized, read, and then coded. Codes were developed in an open-coding scheme (RQ 2), and also stemmed from the functions of feedback (e.g. task, cognitive, and functional validity information) (Balzer et al., 1989; Butler & Winne, 1995), principles of feedback (e.g. principles supporting self-regulated learning) (Nicol & Macfarlane-Dick, 2006), framework of effective feedback (e.g. content, social and interpersonal negotiation, organization and management) (Yang & Carless, 2013), and essential elements of Mastery Learning (e.g. feedback, correctives, enrichment) (Guskey, 2007) (RQ 1). Six majors thematic groups are presented concerning the ways in which instructors provide feedback: Outcome feedback, Motivation and Interaction, Clarification, Opportunities to Further Knowledge, Decreasing Gaps in Knowledge, and Promotes Learning and Cognitive Development (refer to Appendix D). Three major thematic groups are illustrated concerning feedback from the students' perspective: Importance and Nature of Feedback, Authority over Knowledge and Learning, and Learning for Mastery (refer to Appendix E).

4.1 Data Analysis

Preparation for analysis involved organizing data from the open-ended student survey and instructor feedback items within *Passport*. The open-ended survey responses were inputted from Qualtrics into Microsoft Word (Appendix C) and then into Nvivo 10 software as responses to particular questions. Instructor feedback items were first de-

identified by a member of the *Passport* team and then the results were sent through secure file-sharing software. The data were then organized into Nvivo 10 software according to instructor. The software provides the opportunity to categorize information by key words, phrases, and ideas. Various themes and dimensions emerged through the analysis of student surveys and instruction feedback items.

4.2 Findings: Instructors

RQ1: In what ways do instructors provide feedback to assignments in a Digital Badge system?

Course instructor feedback was examined regarding student assignment submissions. Two course instructors were selected. Skylar and Avery are both instructors for an introductory technology course which is specifically targeted to preservice teacher educators. In this undergraduate course foundations of educational technology are examined, including the integration of instructional design, multimedia, Web 2.0 applications, and various computing software all within the classroom setting. This course is required by all teacher education students in order to learn the basics of technology integration before entering the formal classroom through student teaching. Skylar is a doctoral student in an educational technology related department. She has taught approximately nine lab sections over the course of a three-year time span. She was paired with a more experienced mentor TA which allowed her to become established in the labs. She has 4 years' experience using *Passport* inside and outside of this course. Her background is in educational philosophy. Avery is a Master's student in an educational technology related department. She has taught approximately four lab

sections over the course of a one-year time span. Avery received support from an experienced TA, but she did not participate in a formal mentoring program for this course. She has one year's experience using *Passport* and all of it has been related to this course. Her background is in teacher education and she currently holds a teaching license.

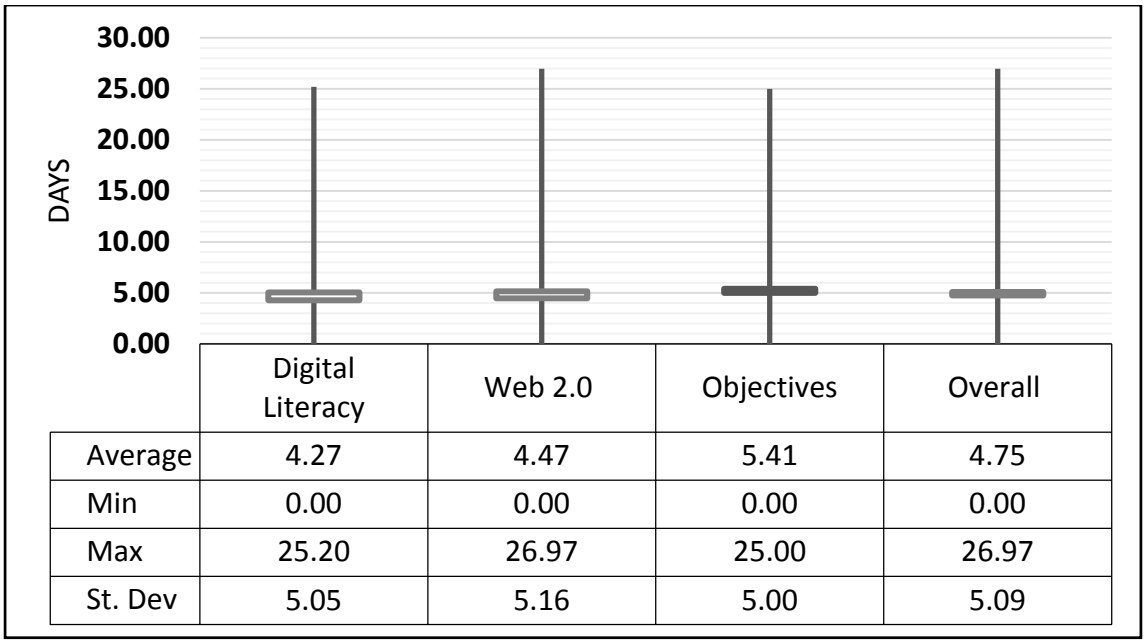
For this research three badge categories were selected as representative assignment content: *Being Digitally Literate in the 21st Century*, *Web 2.0 Applications for Teaching and Learning*, and *Writing Effective Lesson Objectives*. All thematic groups concerning the ways instructors provide feedback (e.g., Outcome Feedback, Motivation, and Interaction) were represented in each assignment. The most prominent themes represented by both instructors were Decreasing Gaps in Learning (e.g. "Although you mentioned these skills, you need to elaborate on these items."), followed by Clarification (e.g. "Make sure to include the definition of digital literacy") and finally Outcome-Specific Correctives (e.g. "Good").

Findings will be presented by instructor. First, an overview of the number of feedback items will be presented followed by the amount of time required to provide feedback items to students. Next, an instructor profile will be described. This profile will start with the general strategies that make up each instructor's style, followed by a more detailed discussion according to badge and then challenge level. Finally, each instructor's style will be summarized.

4.2.1 Skylar

Skylar provided students with 670 individual feedback accounts for the three selected badges. Of this 80 items of feedback related to two surveys where a simple 'approval' of the submission was required (these numbers were deducted from the overall results because they were being used for research purposes outside of this study). Additionally, there were 273 items where no written feedback was given to students (within these items students were provided feedback through a simple 'approval' or 'denial' of the submission, but no comments were given). A total of 317 feedback items provided written comments out of a total of 590 possible items (53.7%). Within the total possible feedback items 1,302 total references were coded.

Mastery Learning affords students the opportunity to reach mastery of course content with the aid of instructor feedback to direct their learning and understanding. The key component of this process is the ability to receive prompt feedback during learning. *Passport* affords students these types of opportunities. Chart 4.1 provides an overview of the amount of time required for Skylar to provide feedback to students.



	Digital Literacy	Web 2.0	Objectives	Overall
Average	4.27	4.47	5.41	4.75
Min	0.00	0.00	0.00	0.00
Max	25.20	26.97	25.00	26.97
St. Dev	5.05	5.16	5.00	5.09

Chart 4.1. Amount of time taken to provide feedback: Skylar

Skylar was fairly consistent in how prompt she was at providing feedback, increasing in time as the semester continued. Skylar was able to provide the quickest feedback to the first assignment, *Being Digitally Literate in the 21st Century* at 4.27 days. She slowed slightly and averages 4.47 days for the *Integrating Web 2.0 Applications for Teaching and Learning* badge, and then finished up at 5.41 days for *Writing Effective Lesson Objectives*. In general she took about 4.75 days to provide feedback to students (average feedback range of 0-9.8 days). What is impressive is that Skylar was able to provide feedback almost instantly at times. While, she was able to provide feedback that rivals the promptness of face-to-face communication, other times feedback was extremely delayed; at times taking up to almost 27 days. Although these delays are extreme and not the norm, the delay doesn't allow students the ability to receive the information necessary to augment their learning and understanding needs. Additionally, while an average of

4.75 days initially seems fairly prompt, this is a little misleading. In traditional learning contexts of this same course, instructors are required to provide feedback to students within a 6 day time frame. While the time required to provide feedback was decreased, it is important to note the sheer volume of feedback items given to students in contrast to the amount of time used. On average within the 4.75 days Skylar provided 124.2 feedback items per day. Another impressive note is that the selected assignments accounted for only three of the total 28 required badges (per student), and 670 out of an impressive 1,732 total feedback items provided to students within the course (38.7%).

4.2.1.1 Instructor Profile

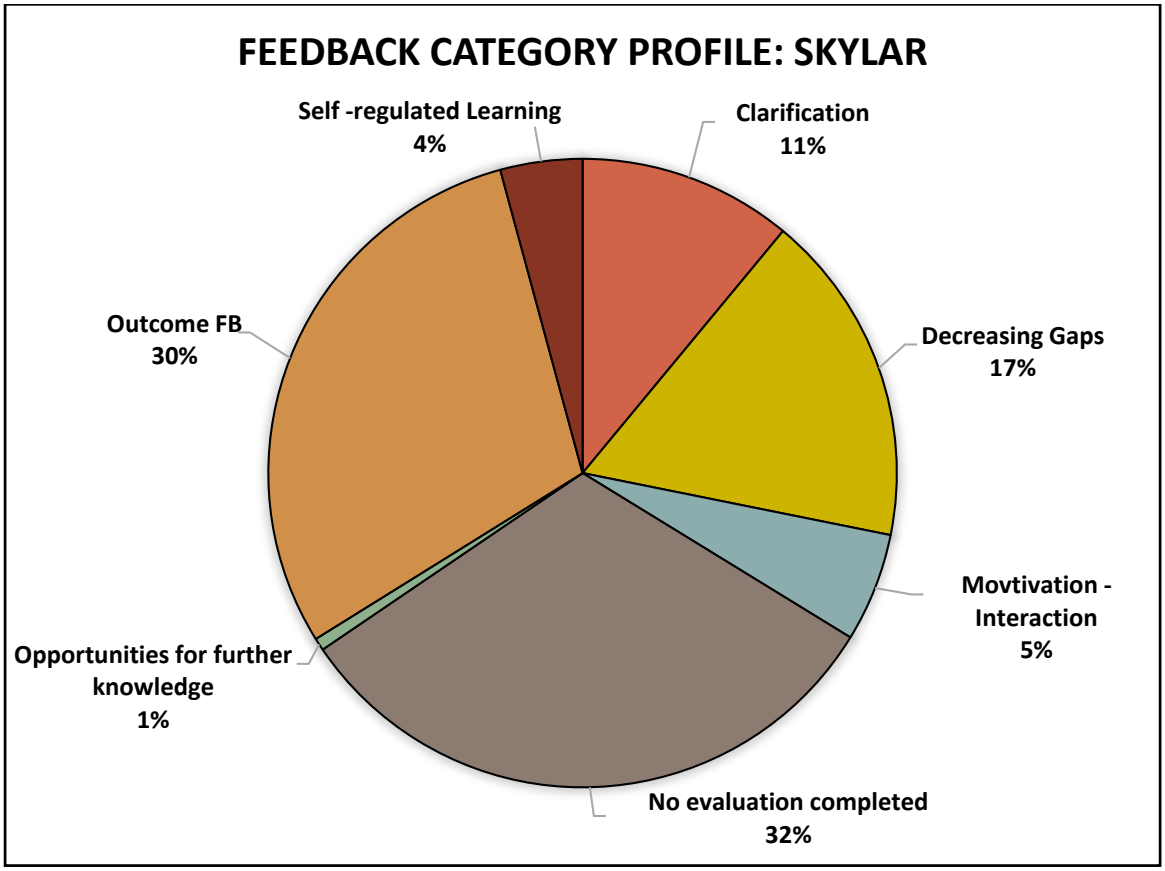


Chart 4.2. Feedback Category Profile: Skylar

In examining instructor feedback, Skylar uses several distinct strategies in how she provides feedback to students. In general, her style is to provide students with information that allows the student to be the director of knowledge, staying away from providing direct edits and answers. Specifically she uses reflective strategies such as giving prompts, identifying gaps in learning, and explaining how students might aim to fill those gaps in order to meet goals and objectives. Additionally, she helps clarify the goals, objectives, criterion, and expectations of each challenge (and thus the badge). Chart 4.2 provides Skylar's feedback profile in regards to overall category themes, whereas Table 4.1 provides coding frequency for the three selected course assignments.

Table 4.1. Number of codes per badge: Skylar

	Being Digitally Literate in the 21st Century	Integrating Web 2.0 Applications for Teaching and Learning	Writing Effective Lesson Objectives
FB-Technical	7	14	2
FB-Dialogue	2	4	3
FB-Gap	39	44	23
FB-GapPos	23	20	10
FB-Inform	1	1	1
FB-NegCor	0	69	6
FB-Novel	1	0	0
FB-PosCor	28	211	9
FB-Reflect	13	25	6
FB-Soc-Aff-Mot	27	17	9
Emojis	19	30	20
FB-Specific-Corr	5	1	9
Grammar-MinorErrors	4	0	0
FB-TaskClarity	42	44	3
Reference to grade deadlines	0	0	0
FB-Transfer	0	1	1
ML-Confirm	27	36	12

Table 4.1 Continued

ML-ExResource	3	3	1
ML-ExAct	0	0	0
ML-Goals	22	3	1
No evaluation completed (Null)	139	103	104
Total Number of feedback items	402	626	220

4.2.1.2 Being Digitally Literate in the 21st century

This badge requires students to acquire knowledge related to basic skills needed by students and facilitated by teachers to promote learning. This content serves as a foundation that is used for developing lesson curriculum using meaningful technology integration. Student deliverables are composed largely of text-based responses (challenges 1 and 4), as well as identifying and creating supporting multimedia resources (challenges 2 and 3). This badge is the first major badge for which students receive feedback from instructors within the overall course. Table 4.2 provides coding frequency for the four challenges and overall badge feedback items.

Table 4.2. Number of codes per challenge: Being Digitally Literate in the 21st century: Skylar

	Skills of the 21st Century	Teaching in the 21st Century	Developing a workshop	Digital Literacy Narrative	Total Badge
FB-Technical	0	0	5	2	7
FB-Dialogue	0	1	1	0	2
FB-Gap	21	0	3	15	39
FB-GapPos	13	0	3	7	23

Table 4.2 Continued

FB-Inform	0	1	0	0	1
FB-NegCor	0	0	0	0	0
FB-Novel	0	0	1	0	1
FB-PosCor	6	6	8	8	28
FB-Reflect	7	1	0	5	13
FB-Soc-Aff-Mot	14	2	7	3	27
emojis	7	0	7	5	19
FB-Specific-Corr	2	0	0	3	5
Grammar - MinorErrors	3	0	0	1	4
FB-TaskClarity	27	0	1	14	42
Reference to grade deadlines	0	0	0	0	0
FB-Transfer	0	0	0	0	0
ML-Confirm	9	5	10	3	27
ML-ExResource	1	0	0	2	3
ML-ExAct	0	0	0	0	0
ML-Goals	18	0	0	4	22
No evaluation completed (Null)	10	25	11	15	139
Total Number of feedback items	138	41	57	87	402

4.2.1.2.1 Skills of the 21st Century

In the first challenge, Skylar sets the tone of her feedback style. She largely clarifies the task requirements, while also referencing the overall badge goals and objectives. For example,

> Hi, _____! I know the badge is subtitled "digital literacy…" but in this prompt we actually want you to talk to Julie specifically about "21st century

> skills"…which you might notice don't include "digital literacy" (at least, according to Crockett). Take another look at the 21st century skills basic badge and look at what Crockett calls the 21st century skills! Technology is an important thing…but it takes a back seat to what you're trying to teach!

Skylar refers this student back to the required readings within the badge instructions (e.g. Crockett article) and directs their attention to specific concepts, while still not giving them the direct answer. She specifies the expectations of the task by clarifying the prompt in which students are responding. Furthermore, she often aides students in decreasing the gap in learning by calling attention to perceived learning versus desired learning by specifically noting what was done versus what they should have done. For example,

> Hi, _____. I'm going to need a little bit more to accept this submission for credit. Note that the prompt asks you to identify the 21st century skills (see the Crockett article in the basic badge), and then critique how the teacher in this case is failing to teach 21st century skills. Note while you're doing this that 21st century skills have less to do with technology than you might think...they're a different list than the digital literacy skillset!

In many instances, Skylar uses this as an opportunity to provide a statement validating student work and effort, or providing motivating comments.

> Hi, _____! Thanks for getting into the badges early -- good work! My feedback: in this badge, we wanted you to think about the key skills that STUDENTS need in the 21st century (consider looking at the Crockett article again), and the teacher's role in DEVELOPING these skills in students. You gave me a list of

> skills (information literacy, etc.), but they were definitely on the teacher side. I'd like to hear about what 21st century skills the teacher in this scenario is failing to develop in her students. How could she do a better job?

Skylar's feedback strategies are ones in which she guides her students toward learning through discovery on their own. Often she does so through leading prompts focused around learning goals and objectives. In one instance she writes,

> However, for the purposes of this class, consider looking again at the 21st century skills basic badge, and reading the attached Crockett article about 21st century skills. What do you think of Crockett's list? How is the teacher in this story failing to serve the types of skills on Crockett's list of 21st century skills?

The intention of the prompts are to further student thinking and aid in meeting the overall badge and course goals and objectives.

4.2.1.2.2 Teaching in the 21st Century

In this second badge challenge, Skylar's feedback strategies shift largely due to the nature of the task. Students not only provide text-based submissions, but also multimedia resources to support their learning from the previous challenge. She takes an approach that is outcome specific. For instance, 61.0 percent of the feedback items did not contain any instructor comments- a simple 'approval' was designated for the challenge. Positive correctives ("Nice find, _____!") comprised of 14.6 percent of the items, whereas comments confirming student learning and understanding ("Bloom's taxonomy has a lot to do with the higher-order 21st century skills we're talking about! Great find, _____") comprised another 12.2 percent.

4.2.1.2.3 Developing a workshop

In this third challenge, students are required to build on previous challenges and create a screencast in answer to a prompt. Skylar's feedback strategies remain outcome specific in nature, much like the previous challenge. Additionally, she provides more instances of encouraging statements likely due to students' unfamiliarity with the tools and varying technical skills ("This was quite a list of topics, _____! Nicely chosen and presented. Thank you; I liked it."). Positive correctives and confirming student learning and understanding again dominated the items.

4.2.1.2.4 Digital Literacy Narrative

This final challenge asks students to reflect and respond to several prompts regarding their understanding of the overall topic of digital literacy. In this challenge, Skylar reverts back to strategies similar to challenge one. She focuses largely on decreasing gaps in student learning, often pairing her points with positive and/or encouraging statements. Such as,

> Hi, _____! I like most of what you have here, but you've not totally demonstrated, with this submission, that you understand what the ISTE standards are. They don't have much to do with facilitating students' technology usage…it has a lot more to do with teachers! Review the standards and see if you can be just a tad more specific. You're really close, here! :)

Moreover, she clarifies the task requirements by referring students back to the required task prompts and specific challenge instructions.

While this challenge mirrors challenge one, outcome specific items (12.1%), and lack of feedback items (22.7%) are increased from challenge one. Additionally, Skylar

does provide a limited amount of reflective prompts and comments (n=5); she does not provide any feedback statements related to professional development and/or future teaching to aid students in transfer of knowledge. This particular challenge affords the opportunity to reflect on learned content and apply concepts; and instructors have the opportunity to make these connections within their feedback items.

4.2.1.3 Integrating Web 2.0 Applications as a Teaching and Learning Tool

In examining instructor feedback in regards to using Web 2.0 applications as a tool for teaching and learning, Skylar's strategies varied based on the challenge type. In order to meet requirements, students had to select three badges under the umbrella of Web 2.0 applications. While the applications differed, all badges consisted of two challenges: 1) Using the designated application; 2) Integrating the application as a tool for teaching and learning. Naturally, this section contained the largest frequency of feedback items. Appendix F details the frequency of coded references for all Web 2.0 badges and subsequent challenges.

Feedback items pertaining to *using* the tool consist largely of outcome-specific feedback (14.3%) and confirming learning (6.2%), with emphasis on addressing technical needs (8.1%). For example, "I can't access your Prezi. :(Need to give me the share link; this takes me to log in to your account." As with other badge challenges the largest category is in not providing any feedback items (46.0%), instead allowing the simple approval to delineate necessary feedback.

Another strategy Skylar frequently uses when it comes to *using* Web 2.0 applications is the addition of motivating and encouraging remarks. Additionally, she

uses emoticons twofold. First, she includes emoticons as a way to express emotion within a paired statement (e.g. ":) Thanks for your thoughtful work on this!"). Second she uses emoticons as an alternative to simple outcome feedback (e.g. ☹).

Skylar uses a very specific strategy when it comes to evaluating how students *integrate* Web 2.0 applications. Within this portion of the challenge, students are provided with a list of challenge prompts that must be included within their deliverable. Skylar copies this list and then inserts her specific feedback into that list. For example (emphasis added to Skylar's feedback),

> 2. Generate a list of the relevant affordances this tool might offer. - *Good.* 3. Based on your course theme, identify and briefly describe a specific learning, teaching, classroom management, or other educational problem where this tool might be integrated as a solution or partial solution to the problem**.** - *Hmm, okay. First, this isn't stated as a problem.* 4. Based on your theme-related problem, briefly address each of the following: Describe one or more ways this tool could be used to address your learning problem**.** - *Be wary of using technology simply for "entertainment" purposes. Engaging students is a good goal, but you don't say what is engaging about Prezi from an instructional point of view. This makes me think that you are actually referring to Prezi's bells and whistles and fancy movements, which are nice and all, but the best use of technology is to support learning -- not just entertainment.* Identify and list who will be using the tool in this solution. -*Okay*. In addition, identify and list those individuals in the solution who may benefit from the use of this tool (may or may not be the same individual(s)). - *Okay*. Describe the key planning steps involved in the

integration of this tool? -*Okay*. Describe your current ability to carry out the integration of this tool to the level that the problem would be addressed. What level of knowledge will you need of the content, the pedagogy (how best to teach it) and the tool in order to effectively integrate the tool to resolve the problem? - *Okay*. Describe the benefits and challenges of integrating this tool to solve this problem. - *Okay -- though again, I think the benefit could go beyond entertainment*. After integrating this tool to address your learning problem, how will you know if it did or did not address the problem? - *Hm, how would exam scores give you a good measure of whether students were engaged? Bored students can do well on exams. There might not really be a natural link here*.

Using this method delivers a low number of student submissions without feedback (6.8%). However, while this draws attention to exactly which requirement is missing, the feedback items largely consist of outcome-specific feedback (59.7%). As illustrated in the above, many prompts have little information regarding the students' performance. Skylar uses terms such as, "Good," "Okay," and "Missing." As students must complete three of these badges with identical directions, these correctives give little information for students to use on subsequent tasks.

Going beyond correctives, Skylar helps guide students by identifying their learning in comparison to the desired learning outcomes. She often pairs reflective prompts to help guide student thinking. For instance,

-- Hm, your thoughts here sound very general. Yes, you need to assess student understanding. How will you make sure that your use of Blogger is effective?

> Since you haven't identified what problem Blogger is going to solve, I see why it was hard for you to answer this question!

These statements are not only integrated within the blocks of text, but frequently are provided on subsequent student submissions.

The overall goals of this badge and specifically within challenge two is for students to think critically about how these tools might be used for teaching and learning. This is an opportunity for instructors to help students focus their thinking toward their future classrooms and develop practical ways these tools might be used. Skylar provides just one general statement aiding in transfer. This is a key area of guidance that is being overlooked.

4.2.1.4 Writing Effective Lesson Objectives

This badge provides information regarding effective lesson objectives and assists students in creating their own objectives. This challenge breaks down the parts of an objective to clarify and emphasize each component, whereas the final challenge deliverable requires a fully completed objective. Overall, Skylar often (55.3%) does not provide any feedback when responding to student work. Her focus is on providing important information regarding desired learning versus perceived learning, while trying to decrease that gap. Additionally, she provides clarification regarding the task requirements, as well as providing a fair number of outcome specific items. Table 4.3 provides coding frequency for the four challenges, and overall badge feedback items.

Table 4.3. Number of codes per challenge: Writing Effective Lesson Objectives: Skylar

	Defining Condition	Defining Criterion	Defining Performance	Writing Lesson Objectives	Total Badge
FB-Technical	0	0	0	2	2
FB-Dialogue	2	0	0	1	3
FB-Gap	8	9	3	3	23
FB-GapPos	0	6	1	3	10
FB-Inform	1	0	0	0	1
FB-NegCor	0	0	0	6	6
FB-Novel	0	0	0	0	0
FB-PosCor	2	0	4	3	9
FB-Reflect	4	2	0	0	6
FB-Soc-Aff-Mot	1	3	2	3	9
Emojis	4	3	1	12	20
FB-Specific-Corr	4	1	4	0	9
Grammar - MinorErrors	0	0	0	0	0
FB-TaskClarity	0	2	1	0	3
Reference to grade deadlines	0	0	0	0	0
FB-Transfer	1	0	0	0	1
ML-Confirm	4	2	2	4	12
ML-ExResource	0	0	0	1	1
ML-ExAct	0	0	0	0	0
ML-Goals	1	0	0	0	1
No evaluation completed (Null)	31	24	29	20	104
Total Number of feedback items	63	52	47	58	220

4.2.1.4.1 Defining Condition, Criterion, and Performance

In these first three challenges, the majority of feedback consists of no feedback items, and instead students are given approval for the challenge. While outcome

feedback is not specifically given within the textbox, students are given this form of feedback with a simple ‘approval' (additionally, both positive and negative outcome-specific feedback occurs). The remaining feedback items largely consisted of items related to decreasing gaps in student learning.

> Ah! This is a "false given." You don't want your condition statement to give information about the instruction that will help students achieve the goal. Instead, you want the condition to reflect the TESTING or ASSESSMENT conditions. In what situations, given what information, and under what conditions should students be able to distinguish these cows? That's what I want to hear about in a condition statement.

Skylar also tries to pair information regarding gaps in learning with positive statements. For example,

> Give the criterion another try. Time constraints are an easy way to make a criterion, I know - but actually, you're asking your students to perform a reasonably complex skill (that's good!). Your criterion needs to be appropriately more detailed. Think: what are the hallmarks of a good poster? What makes for a good, thorough 'compare and contrast' exercise? These are the questions you should be answering in your criterion.

As in the above responses, Skylar does provide reflective prompts and opportunities to transfer knowledge (albeit infrequently). It is important to note that the nature of these three tasks elicit specific feedback responses, where feedback aiding in transfer and self-regulation are not always appropriate.

Skylar's overall strategies consist of guiding students toward learning, but in these challenges there is evidence of specific feedback that corrects or provides students with ways to augment their deliverables. For example, "A condition statement is not even a full sentence, usually. :) 'Given (whatever the students will be prompted with so that they can 'perform' the performance'….'" While Skylar does provide specific guidance, she does so in a way that references the task instructions and general guidelines (e.g. objectives formula and how it may apply to students' work), and then requires students to adapt and apply the feedback to their own work.

4.2.1.4.2 Writing Lesson Objectives

The final challenge gives students an opportunity to put all three objective pieces together into one final objective. Feedback on this challenge represents the lowest number of feedback items. This is understandable because students need to take the three deliverables created in previous challenges and put them together into one final objective. Therefore, feedback was largely outcome-specific ("Nice job, _____."), as well as providing specific corrections related to the task requirements ("Try starting it with 'students will be able to' and look at the list of suggested performance verbs (identify, describe, compare, contrast, etc...)").

Overall, '*Writing Effective Lesson Objectives'* had the fewest number of recorded feedback items of all three selected badges. Using and applying learning objectives are demonstrated within other challenges, badges, and course work, whereas in this badge students are developing skills that will aid them in future course work. It is these future tasks that pose an opportunity for instructors to make connections regarding the value of the challenges.

4.2.1.5 Summary of Skylar's Feedback Style

Skylar provided students with 590 feedback items representing 53.7 percent of possible items. While Skylar's largest category consisted of not providing feedback, her strategies largely consisted of providing students with guidance that included information about their perceived learning versus their expected learning outcomes. She provided very few corrections or specific edits, but rather provided students with self-reflecting prompts and referenced the goals, objectives, and expectations of the task. Additionally, a third of the feedback she provided was outcome specific and resulted largely because she inserted challenge requirements with corrective comments as her feedback items. Categories that Skylar rarely addressed related to transfer of knowledge.

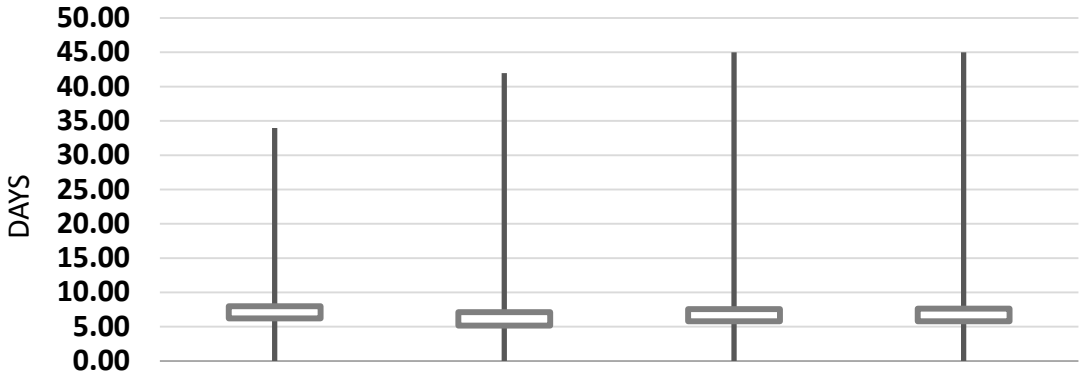
While Skylar provides a good portion of outcome-specific correctives, her main focus is on emphasizing higher-order thinking and self-regulating skills, all of which are necessary for applying content in the future. She can easily broaden her strategies to explicitly include direct statements in which she calls attention to transferable skills and knowledge. Furthermore, Skylar provides evidence that the quantity of feedback items may not be of direct value; rather, the quality of the feedback being provided is of greater importance.

4.2.2 Avery

Avery provided students with 769 individual feedback accounts for the three selected badges. Of this total, 77 consisted of items of feedback relating to two surveys where a simple 'approval' of the submission was required (these numbers were deducted from the overall results). Additionally, there were 65 items where no written feedback

was given to students (within these items students were provided feedback through a simple ‘approval’ or ‘denial’ of the submission, but no comments were given). A total of 627 feedback items provided written comments out of a total of 692 possible items (90.6%). Within the total possible feedback items 1,293 total references were coded.

Prompt feedback is an important characteristic within Mastery Learning environments, and *Passport* aided instructors in this process. Chart 4.3 provides an overview of the amount of time required for Avery to provide feedback to students.



	Digital Literacy	Web 2.0	Objectives	Overall
Average	6.20	5.16	5.78	5.78
Min	0.00	0.00	0.00	0.00
Max	33.96	41.96	45.00	45.00
St. Dev	7.98	7.13	7.56	7.62

Chart 4.3. Amount of time taken to provide feedback: Avery

Avery took the longest to provide feedback to the first assignment, *Being Digitally Literate in the 21st Century* at 6.2 days. She gained momentum and averages 5.16 days for the *Integrating Web 2.0 Applications for Teaching and Learning* badges, and then finished up at 5.78 days for *Writing Effective Lesson Objectives*. At times

Avery was able to provide feedback almost instantly. While, she was able to provide feedback that rivals the promptness of face-to-face communication, other times feedback was extremely delayed; at times taking up to almost 45 days (a traditional semester consists of 105 days). While these delays are extreme and the reasoning is unknown, on average Avery was able to provide feedback within 5.78 days (average feedback range of 0-13.4 days). These substantial delays don't provide students with the ability to receive the information necessary to meet their learning and understanding needs. Again, while an average of 5.78 days initially seems fairly prompt, this is misleading. In traditional learning contexts of this same course, instructors are required to provide feedback to students within a 6 day time frame. On average Avery was virtually giving feedback at the same rate as within traditional learning contexts. One potential explanation to the lack of prompt feedback is the volume of feedback items given to students in contrast to the amount of time used. Avery provided feedback on 90.6 percent of student work and on average within the 5.78 days she provided 119.72 feedback items per day. Another impressive note is that the selected assignments accounted for only three of the total 28 required badges (per student), and 769 out of an impressive 2,014 total feedback items within the course (38.2%).

4.2.2.1 Instructor Profile

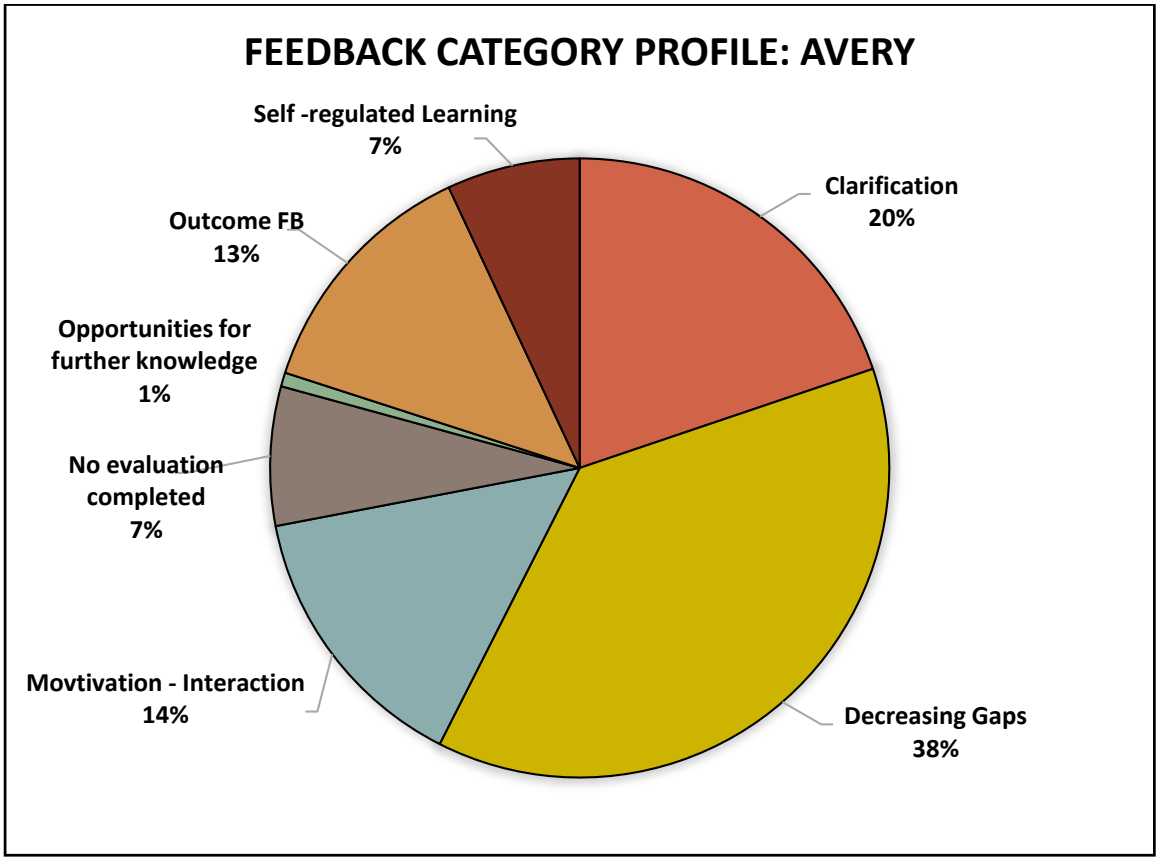


Chart 4.4. Feedback Category Profile: Avery

In examining instructor feedback, Avery uses specific strategies when providing feedback to students. In general, her style is detailed and corrective in nature. She maintains a positive perspective by offering statements that draw on students' strengths and positive correctives. While Avery does help students see where their perceived learning outcomes fall short of expected learning outcomes, the majority of these feedback items merely consisted of confirming student understanding (within the category of *Decreasing Gaps*, 58% consisted of these statements; the remaining 42 % of

feedback items consisted of identifying learning shortcomings and drawing attention to overarching learning goals and objectives).

Her dominant strategy consisted of specific edits on student work. The largest subsection within the *Clarification* theme consisted of grammatical, spelling, syntax, or formatting edits. Overall, Avery prioritized these types of edits over content corrections where students worked toward meeting task and course goals. Additionally, references to grade deadlines were frequently found within her items. Avery not only provided details regarding minor grammatical errors, but often provided students with specific comments regarding how to change their assignment submissions. She often provided specific examples and ideas for students within their responses. For example,

> What needs to be modified: I would have the teacher make a Prezi lesson for in-class instruction and then after going through the lesson the teacher created, have the teacher assign a Prezi group project for a small students to focus on a different aspect of the lives of the pioneers.

Within feedback items that largely consisted of technical troubleshooting and clarification of the challenge task, Avery often used novel methods including screen capture images, screencast videos, and direct edits on student work using MS Word track changes. Chart 4.4 provides Avery's feedback profile in regards to the overall category themes, whereas Table 4.4 provides coding frequency for the three selected course assignments.

Table 4.4. Number of codes per badge: Avery

	Being Digitally Literate in the 21st Century	Integrating Web 2.0 Applications for Teaching and Learning	Writing Effective Lesson Objectives
FB-Technical	16	14	0
FB-Dialogue	0	1	1
FB-Gap	38	19	31
FB-GapPos	22	18	5
FB-Inform	0	0	1
FB-NegCor	3	0	4
FB-Novel	28	5	3
FB-PosCor	83	0	36
FB-Reflect	5	3	2
FB-Soc-Aff-Mot	47	27	28
Emojis	0	0	0
FB-Specific-Corr	12	8	42
Grammar - MinorErrors	72	61	23
FB-TaskClarity	27	58	21
Reference to grade deadlines	16	4	0
FB-Transfer	14	43	0
ML-Confirm	119	133	18
ML-ExResource	0	5	2
ML-ExAct	0	0	0
ML-Goals	15	1	18
No evaluation completed (Null)	7	1	62
Total Number of feedback items	524	401	295

4.2.2.2 Being Digitally Literate in the 21st century

This badge requires students to acquire essential information required by students and encouraged by instructors to advance learning, and is essential for developing lesson curriculum using meaningful technology integration. Student deliverables are composed largely of text-based responses (challenges 1 and 4), as well as identifying and creating

supporting multimedia resources (challenges 2 and 3). This badge is the first major badge for which students receive feedback from instructors within the overall course. Table 4.5 provides coding frequency for the four challenges, and overall badge feedback items.

Table 4.5. Number of codes per challenge: Being Digitally Literate in the 21st century: Avery

	Skills of the 21st Century	Teaching in the 21st Century	Developing a workshop	Digital Literacy Narrative	Total Badge
FB-Technical	0	0	13	3	16
FB-Dialogue	0	0	0	0	0
FB-Gap	32	1	2	3	38
FB-GapPos	20	0	2	0	22
FB-Inform	0	0	0	0	0
FB-NegCor	3	0	0	0	3
FB-Novel	15	5	0	8	28
FB-PosCor	4	0	3	6	83
FB-Reflect	4	1	0	0	5
FB-Soc-Aff-Mot	17	9	7	14	47
Emojis	0	0	0	0	0
FB-Specific-Corr	11	0	1	0	12
Grammar - MinorErrors	38	23	1	10	72
FB-TaskClarity	11	10	4	2	27
Reference to grade deadlines	4	2	5	5	16
FB-Transfer	11	3	0	0	14
ML-Confirm	29	32	28	30	119
ML-ExResource	0	0	0	0	0

Table 4.5 Continued

ML-ExAct	0	0	0	0	0
ML-Goals	11	2	0	2	15
No evaluation completed (Null)	1	0	0	0	7
Total Number of feedback items	211	88	66	83	524

4.2.2.2.1 Skills of the 21st Century

In the first challenge, Avery establishes her positive feedback style. Specifically, she often praises students and confirms their learning outcomes. Here she writes, "Great job _____! You really made sure to include great examples of the 21st Century Skills and how important they are when it comes to instruction and the demonstration of knowledge." Avery consistently draws attention to student strengths within the task. Moreover, she reuses feedback items for multiple students especially when confirming student learning and understanding. In addition to confirming learning outcomes, Avery often aides students in decreasing the gap in learning by calling attention to perceived learning versus desired learning by specifically noting what was done versus what they should have done. For example,

> Hi _____, Although you mentioned collaborating and creativity, you are not providing a strong argument to why these skills are needed. You should hone on those skills, such as problem solving, critical thinking, creativity, collaboration, and communication. (*For example, problem solving allows students to increase their critical thinking skills and develop strategies that they feel would fix a*

> *problem. This can be done through engaging case studies or science experiments where students develop a hypothesis and have their hypothesis tested.*) This is the type of information I am looking for you to tell Julie and especially include in your narrative for this assignment. You really need to persuade Julie and her teacher to want to develop these skills.

In the above statement (as illustrated in the emphasized portion), Avery not only identifies areas of improvement in order to reach mastery, but often paves the way by providing specific details and answers on how to get there. While the intention may be to help students towards mastery, providing answers may affect how students self-regulate their learning, and in how they transfer these skills and knowledge to other course tasks, outside courses, professional development, and future teaching.

In many instances, Avery prioritizes minor errors such as grammar, spelling, syntax, and formatting. For example,

> Modify the following: It is really important for teachers to have an understanding of 21st century skills because (REMOVE: by creating a more engaging environment they are creating) (ADD: they can create/foster) an environment (REMOVE: for) (ADD: where) students (Remove: to) share their ideas and gain more knowledge and understanding.

Sloppy, careless, and unreadable text-submissions are rightfully concerning within higher education, especially within a teacher education course; however, these types of edits do not give students the necessary information required to reach mastery. Having students focus on their writing skills, albeit important, will not help them learn how to integrate technology in a pedagogically sound way.

In a few cases (n=14), Avery does try to connect students' learning and understanding to future course tasks, future teaching, and encourages transfer. For example, "As we continue this semester, I'm sure you will acquire more knowledge on how these skills can be incorporated into instruction and diverse strategies that can be implemented to reach all students." While the previous statement is representative of only three original statements regarding transfer, she does make an effort to draw attention to how content and learning can be used in the future.

4.2.2.2.2 Teaching in the 21st Century

In this second badge challenge Avery continues strategies developed in the first challenge. Students not only provide text-based submissions, but also multimedia resources to support their learning from the previous challenge. While the largest category regards decreasing students' gaps in learning, of that the majority of feedback items again confirms student learning. One such statement is,

> _____, Although you mentioned collaboration, communication, and creativity, you did not address the other skills, such as critical thinking, problem solving, and accountability. To increase the effectiveness of your letter to Julie, you should define the skills and illustrate the skills by the use of examples or strategies that she or her teacher could use in the classroom. Make sure you look at both sides, the teacher and the students.

Overall, Avery's strategy in the above statement is to clarify the challenge goals and objectives, while also identifying the ways in which the student falls short in learning. However, with the high percentage of positive, confirming statements it seems unlikely that most students achieved mastery on the first submission. Additionally, minor errors

such as grammar, spelling, syntax, and formatting comprised almost a third of all the feedback items in this challenge (26%).

4.2.2.2.3 Developing a workshop

In this third challenge, students are required to build on previous challenges and create a screencast in answer to a prompt. Avery's feedback strategies remain positive and continue to confirm learning similar to the previous challenge. Additionally, she provides more instances of encouraging statements likely due to students' unfamiliarity with the tools and varying technical skills ("Keep up the good work!"), along with technical troubleshooting ("Your video is set for private on YouTube. You need to change your settings to unlisted."). Providing technical support and confirming student learning and understanding dominated the items.

4.2.2.2.4 Digital Literacy Narrative

This final challenge asks students to reflect and respond to several prompts regarding their understanding of the overall topic of digital literacy. In this challenge, Avery focuses largely on confirming student learning, often pairing her points with positive and/or encouraging statements. Such as,

> Great job _____! You really elaborated on how teachers and schools can become more digitally literate. I'm glad that you mentioned that teaching should be blended with technology. Neither one can stand on its own. With the blending, the teachers have more flexibility of bringing resources to students and providing technological opportunities to students.

As represented in this response, she draws out statements centered on students' work.

While this challenge is consisted with her style, outcome specific items (7.2%) are increased, while minor errors including grammar decreases (12.0%) from previous challenges. It is interesting to note that Avery does not provide any feedback items related to aiding students in developing self-regulated learning or to professional development and/or future teaching to aid in transfer of knowledge.

4.2.2.3 Integrating Web 2.0 Applications as a Teaching and Learning Tool

In examining instructor feedback in regards to using Web 2.0 applications as a tool for teaching and learning, Avery's strategies varied based on the challenge type. In order to meet requirements, students had to select three badges under the umbrella of Web 2.0 application. While the applications differed, all badges consisted of two challenges: 1) Using the designated application; 2) Integrating the application as a tool for teaching and learning. Additionally, this assignment should consist of the largest number of feedback items because students each needed to select three tools to meet the requirements. However, the number of feedback items decreases from challenge one despite the increase of student submissions. Appendix G details the frequency of coded references for all Web 2.0 badges and subsequent challenges.

Feedback items pertaining to *using* the selected tool consist largely of statements confirming learning (26.9%), providing encouraging and motivational responses (9.8%), while also clarifying the task requirements, expectations, criteria, goals, and objectives (15.4%). In these challenges, Avery has a high number of statements regarding the transfer of skills and knowledge (16.2%). In one instance she writes, "You will find that both your students, parents, and other teachers will find this tool very helpful, especially

when explaining complex topics." In all accounts (n=38) she refers to the transfer of technological skills. Specifically within this challenge the goals relate to the use and development of technology and tool skills, whereas within the *integrate* challenges the focus is on the meaningful integration of technology for teaching and learning. This is an opportunity for instructors to help students focus their thinking toward their future classrooms and emphasize practical ways these tools might be used.

When it comes to evaluating how students *integrate* Web 2.0 applications, Avery again focuses on confirming student learning. Within this portion of the challenge, students are provided with a list of challenge prompts that must be included within their deliverable. The majority of feedback items follow similar formats to the following item,

> Great job _____! You certainly comprehend how to use this tool and your students would definitely be able to use this during complex subjects such as Renaissance poetry. You also made a great point that pre-planning is the key to making this tool effective.

The *integrate* challenges are perhaps the most challenging tasks out of the selected assignments because students' are asked to critically examine the selected tools for teaching and learning. These challenges have considerably less feedback statements than the *using* challenges.

As with previous challenges, Avery spends a fair amount of time correcting student grammar and minor errors. For example,

> Good job so far! Make the following modifications: -Capitalize Internet -Make sure it's: Venn Diagram -The comment and note features of Creately will allow parents and student (students to) directly post to the ven diagram site so that

> people can compare ideas and so that teachers only have to answer questions once in one place. -The major components of development will be diagraming (diagramming) the “Three Circle Model,”

Also, within these challenges Avery provides statements that clarify the task requirements. For instance,

> To have achieved a higher score, you needed to address the following: Describe your current ability to carry out the integration of Diigo to the level that the problem would be addressed. What level of knowledge will you need of the content, the pedagogy (how best to teach it) and Diigo in order to effectively integrate the tool to resolve the problem?

In many cases she calls attention to prompts students may have overlooked or further explains the expectations of the challenge. Overall, within this assignment Avery provided a written feedback statement to all but one item (400 items).

4.2.2.4 Writing Effective Lesson Objectives

This badge provides information regarding lesson objectives and assists students in creating their own objectives. This challenge breaks down the parts of an objective to clarify and emphasize each component, whereas the final challenge deliverables require a fully completed objective. Within this badge the largest quantity of Avery not providing any written feedback when responding to student work (24.8%) was demonstrated. Her focus is on providing important clarification regarding the task requirements, as well as providing a fair number of outcome specific items. Consistent with her overall style, she

provides a fair number of feedback items confirming student learning. Table 4.6 provides coding frequency for the four challenges, and overall badge feedback items.

Table 4.6. Number of codes per challenge: Writing Effective Lesson Objectives: Avery

	Defining Condition	Defining Criterion	Defining Performance	Writing Lesson Objectives	Total Badge
FB-Technical	0	0	0	0	0
FB-Dialogue	0	0	0	1	1
FB-Gap	7	7	6	11	31
FB-GapPos	0	2	0	3	5
FB-Inform	1	0	0	0	1
FB-NegCor	0	3	0	1	4
FB-Novel	0	1	0	2	3
FB-PosCor	17	14	5	0	36
FB-Reflect	0	0	2	0	2
FB-Soc-Aff-Mot	0	1	1	26	28
Emojis	0	0	0	0	0
FB-Specific-Corr	7	5	12	18	42
Grammar - MinorErrors	0	4	4	15	23
FB-TaskClarity	1	3	4	13	21
Reference to grade deadlines	0	0	0	0	0
FB-Transfer	0	0	0	0	0
ML-Confirm	0	0	0	16	18
ML-ExResource	0	1	0	1	2
ML-ExAct	0	0	0	0	0
ML-Goals	0	2	1	15	18
No evaluation completed (Null)	14	16	27	5	62
Total Number of feedback items	47	59	62	127	295

4.2.2.4.1 Defining Condition and Criterion

In these first two challenges, the majority of feedback consists of outcome-specific feedback ("Great job!") or no feedback items. The remaining feedback items largely consisted of items helping to clarify requirements and involved specific corrections. Avery writes, "The 'went over in class' focuses on the instruction and not on the students. It would be better to say 'Given certain passages.'"

Avery also provides a limited number of items helping students close the gap in their learning. For example,

> Your learning objective needs some help. I want to point your attention to not including multiple components to a learning objective. I know this can be quite tricky. It is so easy to add multiple criteria because it can be quite challenging and you want to cover your bases, but you actually only need one. Always remember our formula: Condition + Performance + Criterion= Learning Objective. By having the condition come first, it makes the learning objective look and sound better.

In these challenges, Avery's overall strategies seem to shift to more instances of outcome-specific. It is unclear what is causing this shift in her strategies.

4.2.2.4.2 Defining Performance

In this challenge the number of no written feedback items is at its highest. When feedback is provided it is for the purposes of clarification and to offer specific guidance. She writes,

> Still needs some adjustments: a. Distinguish the correct verb tense on the worksheet through matching. Problem: The word distinguish is a verb and

> matching is a verb and you only need one. Solution: Match the correct verb tense
>
> b. Explain how you would solve the math equation and circle the final answer you calculated. Problem: After the word equation, that information is not needed.

In many of the feedback statements regarding explicit edits, Avery provides specific details and answers in order for students to achieve mastery. It is important to note that the nature of these first three challenges (Defining Condition, Criteria, and Performance) elicit specific feedback responses, where feedback aiding in transfer and self-regulation are not always appropriate.

4.2.2.4.3 Writing Lesson Objectives

The final challenge gives students an opportunity to put all three objective pieces together into one final objective. Feedback items in this challenge were roughly split between three categories: Clarification (31.9%), Motivation & Interaction (30.9%), and Decreasing Gaps (29.8%). Avery clarified task expectation and requirements by offering feedback that emphasized specific corrections, referencing task criteria, and providing minor edits (e.g. grammar). In one item she writes,

> I want to point your attention to not including multiple components to a learning objective. I know this can be quite tricky. It is so easy to add multiple criteria because it can be quite challenging and you want to cover your bases, but you actually only need one.

Additionally, Avery encourages students through the process by offering motivating statements (e.g. “Great job! Learning objectives can be quite challenging”). Within the *Decreasing Gaps* category, again Avery confirmed students learning and understanding, while also identifying areas students fell short. What is interesting to note is that in all

previous challenges these types of items are usually paired with a positive statement, whereas in this specific challenge these statements more frequently lack a positive referenced to student work. Another area of interest is that in this challenge alone, Avery provided feedback items related to the overarching course goals. All instances (n=16) were identical statements and related to the overall format when writing objectives.

Overall, '*Writing Effective Lesson Objectives'* had the smallest number of recorded feedback items of all three selected badges. Using and applying learning objectives are demonstrated within other challenges, badges, and course work, where in this badge students are developing skills that will aid them in future course work. It is these future tasks that pose an opportunity for instructors to make connections regarding the value of this badge.

4.2.2.5 Summary of Avery's Feedback Style

Avery provided students with 769 feedback items representing 90.6 percent of possible items. The largest category consisted of providing students with comments validating their learning and mastery of the content. Additionally, she provided students with task clarification that mainly consisted of specific edits and detailed answers, as well as minor edits such as grammatical, spelling, syntax, and formatting errors. She provided very few items that were outcome-specific. She also almost always provided some form of feedback to students. Overall, Avery's statements were encouraging and positive in nature, and provided motivation for students to work towards mastery. Categories that Avery rarely addressed related to self-regulated learning.

Avery's main focus was providing feedback to all students on almost all assignments. While she provides some statements that emphasized higher-order thinking, these statements got lost in the sea of positive task-specific statements and attention to detail (e.g. minor edits, grammar, and providing students with specific answers). Avery can easily broaden her strategies to more specifically include direct statements in which she calls attention to transferable skills and knowledge, as well as providing opportunities for students to reflect. Additionally, recognizing where students fall short in learning directly related to course and task goals and objectives will increase students' ability to develop content mastery. Furthermore, Avery provides evidence that the quantity of feedback items may not be of direct value; rather, it is the quality of the feedback provided that is of greater importance.

4.2.3 Instructor Feedback Style Summary

Within this course both Skylar and Avery communicated distinct styles to how they provide feedback concerning student work. Skylar provided students with 590 feedback items representing 53.7 percent of possible items. Avery provided students with 769 feedback items representing 90.6 percent of possible items.

Skylar's largest category consisted of not providing feedback; her strategies largely consisted of providing students with guidance that included information about their perceived learning versus their expected learning outcomes. She provided very few corrections or specific edits, but rather provided students with self-reflecting prompts and referenced the goals, objectives, and expectations of the task. Additionally, a third of the feedback she provided was outcome specific and resulted largely because she inserted

challenge requirements with corrective comments as her feedback items. Whereas Avery's largest category consisted of providing students with comments validating their learning and mastery of the content. Additionally, she provided students with task clarification that mainly consisted of specific edits and detailed answers, as well as minor edits such as grammatical, spelling, syntax, and formatting errors. She provided very few items that were outcome-specific. She also almost always provided some form of feedback to students. Overall, Avery's statements were encouraging and positive in nature, and provided motivation for students to work towards mastery.

While Skylar provides a good portion of outcome-specific correctives, her main focus is on emphasizing higher-order thinking and self-regulating skills, all of which are necessary for applying content in the future. Categories that Skylar rarely addressed related to transfer of knowledge. She can easily broaden her strategies to explicitly include direct statements in which she calls attention to transferable skills and knowledge.

Avery's main focus was providing feedback to all students on almost all assignments. While she provides some statements that emphasized higher-order thinking, these statements got lost in the sea of positive task specific statements and attention to detail (e.g. minor edits, grammar, and providing students with specific answers). Categories that Avery rarely addressed related to self-regulated learning. Avery can easily broaden her strategies to more specifically include direct statements in which she calls attention to transferable skills and knowledge, as well as providing opportunities for students to reflect. Additionally, recognizing where students fall short in learning directly related to course and task goals and objectives will increase students' ability to

develop content mastery (Guskey, 2007; Ramaprasad, 1983; Yorke, 2003). Both Skylar and Avery provide evidence that the quantity of feedback items may not be of direct value; rather, it is the quality of the feedback provided that is of greater importance.

4.3 Findings: Students

RQ2: What types of feedback do students find of most and least value and how do they report applying such feedback?

The sample for the study consisted of 61 of the 78 potential preservice teacher education students (78%). Students enrolled in this introductory technology course have representation in all academic classification areas; however, the majority of students are underclassmen (79%). Student majors are mainly comprised (69%) of education related subjects because of the teacher education requirement, although this semester has considerably more non-education majors than in the past (in fall 2014, education majors comprised 85%) (See Chapter 3: Methods). When surveying students about their thoughts on the topic of feedback, students expressed sentiments that fell within three main categories: Importance and Nature of Feedback, Authority over Knowledge and Learning, and Learning for Mastery.

4.3.1 Importance and Nature of Feedback

When asked about how important students view feedback, the majority of students indicated that feedback was an important part of the learning process (n=33). As one student expressed, “Feedback is very important because it allows me to see which areas need improvement in my work.” In addition to general feelings on the nature of feedback, various features of feedback were identified as particularly important. Students

identified the importance of confirming understanding and learning, giving examples related to application (e.g. future teaching), and extending thoughts surrounding content. (n=20). For example, as explained by one student, "I think receiving feedback is very important because it helps to gear you towards what's most important to learn and what concepts you should take away from the project." Furthermore, students indicated a need for instructors to provide corrections, clear instructions with details, explanations, hints, and examples (n=22), as described by one student:

> The most important feature of feedback is the crucial part to me. I think it is very important for feedback to state the points that are weak in the assignments but I also like when there [are] examples to fix the problems.

Additionally, while students wanted clear instructions on how to make changes to their assignments, many (n=12) emphasized a desire for feedback to improve the overall quality of their work. One student explains, "Improvements are the most important feature of feedback to me. I think this because I always like knowing what I can improve on. That is the best way for me to improve my overall performance."

Moreover, other features indicated as important by students pertained to Mastery Learning and the *Passport* platform. The ability for feedback to be readily accessible for review and having opportunities to resubmit, extending the feedback cycle, were of particular importance. While the topics of Mastery Learning and the Digital Badge system were not directly identified, key features of the process were emphasized (e.g. mastery of topic, online access).

However, while students expressed positive views of the nature of feedback, some expressed negative and indifferent remarks (n=5).

> In my case, I did not think it was important. When my TA sent the feedback saying I missed a comma, I knew there should have been a comma in that spot; however, I did not care enough to proofread what I wrote so of course I would have mistakes.

While the frustration of this student is evident, the nature of the feedback is of particular contention, and not the feedback in and of itself.

4.3.1.1 When feedback is most crucial

Considering when feedback is most crucial, students identified specific badges: Writing Effective Objectives (n=19), various Web 2.0 badges (n=7), and Being Digitally Literate (n=3). Most frequently, students did not identify a specific badge or task, but components that fell within three categories: 1) Assistance was needed; 2) Content they deemed important; 3) Tasks that directly impacted their grades/scores.

4.3.1.1.1 Assistance was needed

In this category students desired feedback in order to make corrections and resubmit coursework (n=20). Additionally, when the content was new, unknown, or required complex steps, feedback was crucial to learning outcomes. Specifically in this course many students have very little experience with using Web 2.0 applications and integrating them in sound pedagogical ways. This is likely why students identified these tools as being among the most crucial to receiving feedback.

Furthermore, another component of this category is when students are struggling with a concept or need additional help or guidance. For example, “The ones that were

most important to me were the web 2.0 badges because the questions asked were more difficult to understand."

4.3.1.1.2 Content students deem important

In this category, feedback is crucial to content that is related to other class badges, outside courses, and key content (specifically related to future teaching) (n=15). Students place value on tasks which they can transfer and apply to various environments. When students feel they will have to demonstrate mastery of a particular skill/task, they find feedback to be most valued. The assignments listed by students indicate a need to receive feedback when it comes to writing objectives. One student writes, "Feedback about objectives was most helpful because we continued to use those through class and other projects." Furthermore, another student emphasizes the transfer of skills to their future teaching:

> Writing Objectives because those are the ones I think I'm actually going to use when I become a teacher. I never knew how to write lesson plans or objectives before this class, but all the technology stuff, I honestly think I could have figured most of that out by myself.

Another student emphasizes the value of improving the quality of their work: "Writing objectives is a HUGE component of teaching and writing lesson plans. I felt that it was very helpful to be taught this and given feedback on what our objectives needed to improve." Content that can be transferred to other tasks and skills are of particular value to students.

4.3.1.1.3 Tasks that directly impacted their grades/scores

In this category, students' attention is focused on their role as a student and how assessment effects their overall grade (n=9). One student writes, "the ones that were worth the most points were the most important to receive feedback on because those will affect my grade the most if I do something wrong." While this category is not surprising, what is unexpected is the relative low number of responses. Additionally, another interesting point is that the *Writing Effective Objectives* badge did not have points attached to it. Students were asked to complete this badge, as it consisted of foundational material that was woven throughout the curriculum (e.g. quizzes, other badges, and in-class assignments and tasks) without receiving points.

In specific regard to formal student assessment within quizzes and exams, students noted that receiving feedback at the completion of each badge was of extreme importance (n=33). Specifically, students discuss feeling prepared for formal assessments, as well as understanding the expectation for the written exams. For example, one student writes, "The feedback for the digital literacy badge helped me review for the quiz because I knew what the teachers were looking for in an answer." Another student writes,

> Some badges contained material that was going to be on a quiz. I would go back through the badges that had quiz material and check for feedback on ones that I had completed in case there was anything that I did not understand when completing the badge, knowing that those things would be the most likely ones that I would miss on the quiz.

In addition to feeling prepared, instructor feedback was used to clear up misconceptions directly related to student learning and formal assessment. For example, “It somewhat helped me to make sure that I was looking in the right direction. Some of the topics I was thinking about in the wrong way and my TA helped to steer me in the right direction.”

It appears that while students do think about how they will be assessed and the impact this has on them for the short and long term, a stronger indicator is the value the content holds for the student.

4.3.1.2 Most helpful forms of feedback

When students were asked to describe the most and least helpful forms of feedback, many expected responses were recorded, as well as some surprise remarks. Consistent with students’ general remarks about feedback, the most requested type of feedback from instructors consists of clear instructions with details, explanations, hints, and examples (n=23). For example one student wrote, “I found direct instructions feedback to be most helpful. If I had to resubmit a badge, I liked when I was given exact steps in order to get full credit with my resubmission.” Additionally, another student emphasized the detailed nature of feedback, “The feedback that I found most helpful was the feedback that provided specific guidance. Meaning, it helped for my TA to tell me exactly what I needed to change and an example of how I could do that.” Contrasting to students’ general thoughts on feedback, when asked about specific forms of helpful feedback, they valued quality (n=5) and confirming learning and understanding (n=6) far less than specific details regarding corrections and edits.

The general thoughts on the nature of feedback from students appears to get at how they would likely give feedback to their students or in idealized situations, whereas when they are asked to provide specific types of helpful feedback they reference their specific experiences within this course. In theory students want to learn more, increase their understanding and knowledge of various topics, but when it comes down to it they "just wanted the badges to be done."

The preferred format of feedback was reportedly within *Passport* (n=21). One student wrote, "I enjoyed the direct feedback on *Passport*. It allowed me to see the feedback and my work all at once." While another emphasized the wealth of available feedback, "I liked the format of it being online and in person or via email. It was nice having the ability to get feedback so readily." Additionally, students mentioned other forms of feedback that were used to clarify or communicate additional information, "Feedback through *Passport* via comments seemed to be most helpful. If a student had a question on comments, they could always come to class or open lab for clarification." Other forms of feedback students experienced or would have preferred were short, sometimes bulleted text blocks (n=6), face-to-face communication (n=6), directly on the assignment documents they submitted (e.g. MS Word track changes) (n=5), and through email (n=1).

4.3.1.3 Least helpful forms of feedback

Considering the least valued forms of feedback, some surprising themes emerged. Feedback pertaining to minor errors such as correcting spelling, grammar, or syntax mistakes were regarded as the least valued form of feedback (n=20). Students expressed

a wide range of thoughts regarding this category. Many students tried to see the positive in correcting these minor mistakes with one student writing,

> At times the extreme attention to detail was frustrating when an entire badge would be rejected due to a single misspelled word or missing comma. That being said, it forced me to pay closer attention during work completion and proof reading to avoid making silly grammatical and spelling errors. The feedback forced me to be more competitive with myself and ultimately made me a better student and writer.

Other students found these mistakes to be "tedious and very annoying to do." Additionally, students recognized that the attention to minor errors were not the focus of the task. One student noted, "When resubmitting the badges, it was more like based on changing the grammar errors or sentence structures. Instead, I think it should be more like based on the content itself." Surprisingly, all mention of feedback pertaining to minor errors, including grammar and spelling, were exclusively noted by Avery's students. While assessment details (e.g. assignment guidelines and grading rubrics) do indicate students need to submit high quality work with limited spelling and grammatical errors, students see this form of feedback as Avery's top priority.

A theme spread throughout the course from students within both instructors' courses regarding the least valued form of feedback pertained to unclear feedback (n=17). This includes assignment feedback that did not provide details, was vague, too general or unclear, referenced students back to the badge content (original assignment description), or did not explain why points were lost. Specifically, students wrote sentiments like, "I didn't like vague feedback saying reread the question and write back again" or "I didn't

like that I couldn't see where I missed specific points." While this theme was an expected response from students, what was less representative was students' disfavor for corrective comments only (n=4). For example, "I guess that the least helpful feedback would be just addressing that I did a good job, but not highlighting what specifically was good about it."

One theme that emerged that was rather unexpected in the kinds of feedback least valued by students was the overwhelming positive response when asked to identify negatives. For example, "Overall, I feel feedback in all forms was helpful; I cannot think of any that was less helpful." Students were reluctant to identify areas of weakness with the feedback they received (n=19). Several students who did identify areas on least value followed up with positive statements- "None accept the 'good' (really short, non-descriptive kind of feedback) -- all feedback was helpful." Additionally while both instructors had these types of student comments represented, 32% was represented in Skylar's classes, whereas Avery's classes comprised of 27%. One explanation for this may relate to Skylar's experience in not only teaching the course content, but also vast experience using the *Passport* platform.

Furthermore, when asked if feedback could be enhanced through another format many students said no (n=17), while others identified tools like screencasts and videos (n=21), and audio (n=5) as possible ways to enhance feedback.

4.3.2 Authority over Knowledge and Learning

In examining the steps and actions students reported taking during the feedback cycle within this course (e.g. submitting and resubmitting an assignment), remarks fell within two broad categories: teacher-centered learning and student-centered learning.

4.3.2.1 Teacher-Centered Learning

The response of students indicated a need to correct submissions and conform to instructors' suggestions (n=32). As one student explains, "I would go back and correct the change[s] the TA pointed out." Another student emphasizes the adherence to specific details prescribed by instructors, "I tried to use feedback as directly as possible into my projects, meaning I would fix exactly what was said to be fixed and try to follow the specifications given as best as I could." Moreover, while adhering to instructors' recommendations students are performing within a traditional teaching and learning model. S. Baxter and Gray (2001) agree that for effective learning, students must be actively engaged in the process, while Tärnvik (2007) emphasizes that "the student [is no longer] expected to be a passive absorber of information; instead, the teacher acts as a facilitator and does not need to be an expert in the particular content" (as cited in G. B. Wright, 2011, p. 94).

While many students reported following exact instructions of their instructors, these statements were not negative. Students testified positively concerning the instructors and acknowledged the intent of their feedback was to help them improve their work (n=7). For example, "I really liked their feedback because it helped me improve my assignments that I submitted." Additionally, students indicated instructors aided in their learning by

providing feedback that was helpful, informative, meaningful and constructive (n=17), and included personal or encouraging statements (n=5). Students wrote statements like, "My TA is very personable, and was very helpful to me when I needed it. She was very informative and knowledgeable about the subjects," "She was consistently helpful," and "She was very helpful. She just wanted our assignments to be the best they could be. She gave feedback to make that happen."

4.3.2.1.1 Interactions between students and instructors

The interactions between students and instructors took place primarily within the *Passport* system (n=30) (see Appendix A figure A.6). Just as in how many instructors grade assignments in traditional learning contexts, the feedback in this system was often not immediate (Refer to Charts 4.1 and 4.3). The nature of the delay in feedback caused students to utilize other means for more immediate feedback. Emails and face-to-face interactions were commonly noted (n=12). For example, "My interactions with my TA was very good. When I didn't understand the requirements of a badge I would either ask my TA in lab or send her an email and receive immediate feedback."

Furthermore, while many students did not indicate a change in the interactions with their instructors over time (n=28), those that did were consistent with current research. For example, students spoke about student-instructor interactions becoming more effective and efficient over time (n=6). Students gained increased comfort in receiving feedback. Various researchers (Thorndike 1931 described in Mayer, 2008; Trowbridge and Cason 1932 described in Bloom, 1976; Guskey, 2007; Mayer, 2008) have described how scaffolding and guidance fades as students become more proficient with the

feedback and Mastery Learning cycle. Despite only having two students directly echo these research findings, these types of questions were not directly asked of students.

4.3.2.2 Student-Centered Learning

Contrasting teacher-centered learning, some students reference approaches that align more closely with student-centered learning. Pedersen and Liu (2003) highlight features of this approach:

> In student centered learning, students work to provide a response to a central question. Since students must sort out for themselves what they need to do and know in order to develop this response, student-centered approaches are more likely to promote student ownership over their process and learning than do teacher-directed approaches (p. 58).

Consistent with previous research findings (Bangert-Drowns, Kulik, Kulik, & Morgan, 1991). some students began to take ownership over their learning by completing several key steps: 1) Reevaluating their own work (n=9); 2) Referencing badge (assignment) content (n=2); 3) Clarifying instructor feedback and asking questions (n=3). One student sums up these steps succinctly:

> 1. I would read the comments that the TA had given on my work. 2. I would look in my work for the specific things that the TA had talked about. 3. I would read back through the prompt for the badge and see if there was anything that correlated to the feedback or anything else that I had missed. 4. I would go back into the work i submitted and make changes which I thought were appropriate

> with the feedback I was given and with the existing badge submission requirements.

Additionally, some students (n=5) would store their feedback externally for future use. There is no consistent strategy students are using when storing feedback. Some store for organizational reasons as one student writes,

> Sometimes, I usually use a word document to put down my answers, and when I get the feedback I will copy and paste it to the same document. It is easier that way for me to make changes. Then I will save the document with the feedback.

Others stored as a method of self-affirmation and evaluation, "I wrote down some of feedback on my diary in order to remind myself what is my weakness and strengths when completing badges and also in order to be aware of what I need to look for." When it comes to externally storing feedback, this appears to be a personal preference. The overwhelming response (n=40) indicated students didn't store their feedback. Some students mentioned that they did not see a need to store their feedback given the accessibility of *Passport*, while others wished they had thought of doing so.

What's more, while few students externally stored their feedback, many indicated they revisited feedback after initially receiving it (n=28 compared to n=23 that did not revisit feedback). Those revisiting feedback did so for one of two reasons: 1) Confirming understanding and 2) Application to other coursework or tasks. In regards to reason 1, confirming understanding, students wanted to revisit their strengths and weaknesses and to assess their own learning (n=15). Specifically students intended to use feedback to identify actions that should be continued or avoided. For example, "I did revisit some previous feedback. I wanted to know how well I did on the challenge, and what I can do

to improve." and "I looked back a few times on feedback to look for repeated mistakes that I had made."

Concerning reason 2, students wrote about revisiting feedback for use on other course tasks, similar coursework outside of this course, as well as for future teaching. For example,

> My purpose in reviewing feedback was to become aware of ways to improve further on class work such as case studies, additional badges (especially the ones that build upon basic badges), and for any lesson planning and materials I use in a future classroom setting.

In examining how students approach feedback and the steps they take to move through the cycle, the results indicate a wide range of performance within the extremes of pure teacher-centered and student-centered learning.

4.3.3 Learning for Mastery

In asking students how Mastery Learning effects motivation, they had a lot to contribute. While Mastery Learning is not a new idea, it is one that is not often implemented within higher education. Students don't often see feedback as a continuous cycle of improvement, but more as a form of critical communication. As one student articulately expresses,

> Positively, my motivation increased with the reduced stress from knowing that I could submit my work multiple times, and that one submission did not automatically equal a bad grade. Negatively, my motivation decreased with the

> anxiety of receiving feedback, as it is not a common practice by instructors in my classes.

As with this student, most students mentioned both positive (n= 66) and negative (n=63) effects on motivation while participating in a Mastery Learning course (a small number of students (n=4) mentioned motivation was neither positively nor negatively affected).

4.3.3.1 Positive effects on motivation

In looking at the themes surrounding positive effects on motivation students mentioned how Mastery Learning positively effects their grades and scores within the course and thus has a positive effect on their motivation (n=25). In regards to feedback, students were only able to receive feedback up until the deadline, after which they could still submit their work but would not have the ability to work towards mastery. This system encouraged students to "get my badge[s] done early." One student writes,

> I was positively motivated to complete all of my badges before the feedback deadline since I wanted the chance to gain feedback. I liked the idea of being able to retry the badges if I needed to until each assignment was perfect.

Again, here students are focused on the direct impact Mastery Learning had on their grades and scores, and how that specifically impacted motivation. When asked about the importance of feedback, though, the ability to increase their grades and scores was reported as being of low importance. Here students are reflecting on their actual performance, with increased grades a strong influencer towards motivation.

However, not all students were solely focused on their overall course outcome but more concerned with the learning that was taking place through the mastery approach.

For example, one student wrote, “I learned more about the badge when I had to resubmit badges because I kept having to review the material.” Another student writes, “I have always thought that this was a very useful and helpful aspect of this course and I felt that I learned more because of this process.”

In addition to gains in learning, students highlighted increases in confidence (n=8). One student writes,

> It affected my motivation because it made it much more rewarding to complete a badge. After a badge was accepted, I knew that it was at the appropriate level and that I had done good enough work to be proud of.

As students completed and resubmitted badges, learning outcomes increased and confidence in learning, ability, and the process also increased. Students also indicated an increased understanding of assignment expectations (n=7). One student wrote, “It shows you what exactly needs to be understood in the assignment.” The reported positive effects on student motivation correspond to the overall course learning goals and objectives, and influence content mastery.

4.3.3.2 Negative effects on motivation

Whereas students were less apt to identify features of feedback regarding ‘least helpful feedback,’ students had much to say about how Mastery Learning effected their motivation negatively. Specifically, motivation was decreased by one of four categories: 1) Poor time management (n=18); 2) Strict attention to detail (n=17); 3) Repeatedly denied submissions (n=11); 4) Instructor feedback was varied (n=8).

Within category 1, students specifically contrasted this course's Mastery Learning approach to that of their other courses. One student eloquently writes,

> Initially, I was very excited at the idea of being able to resubmit challenges until mastery and highest grade were achieved. Upon further advancement into the semester I realized that my schedule and the way I manage my time outside of class did not permit for me to benefit much from the feedback deadlines. I attended the workshop for time management for class to improve this but found the actual application of this was unrealistic for me given other commitments. Part of the problem I faced, as I'm sure other students face, is my own mentality about assignments, where because the hard and feedback deadlines were far out, I prioritized the assignments for classes that have quizzes and reading assignments for every day class meets (additionally essays and group work every 2-3 weeks). I believe the feedback deadline is an excellent way to motivate students to improve performance, I only wish more classes incorporated it so that I could give even focus to my classes instead of prioritizing one class over another.

As expected, students spoke about poor time management and study skills, as well as procrastination habits. As instructors expected this outcome, an optional 'time management' workshop was offered in conjunction with the campus' student success center. Students were provided with strategies to help them overcome some of these anticipated deficits. What was not expected was the ways in which students had to prioritize their time. The approach in this course gave students a false sense of time with the fluid deadlines and ability to work towards mastery. At times students'

underestimated the time a badge or challenge would take, and other courses' rigid schedules took priority.

In category 2, students echoed thoughts mentioned earlier regarding 'least helpful feedback.' Extreme attention to detail regarding not only grammar, spelling and syntax errors, but also perceived minor errors and corrections negatively affected motivation. For example,

> My motivation to do the badges because of the feedback aspect was nonexistent. I was pretty much positive each time I submitted a badge, that my work would be sent back for something very small, and something that was not necessarily incorrect

While grammar, spelling, and syntax errors were reserved to comments by Avery's students only, both instructors' students indicated small corrections negatively affecting motivation.

In category 3, students spoke about the sometimes repeated submission process. Although students worked toward mastery, too many resubmissions impacted students negatively. For example, one student candidly wrote, "I got annoyed with it and just didn't want to do it anymore." Additionally, another student elaborated, "I think having to resubmit a badge numerous times decreased my motivation because I didn't want to spend a lot of time doing badges over and over again."

For the same reason Category 3 negatively affects student motivation, Category 4 has a similar effect. Students shared frustration with regards to varied instructor feedback. For example,

> I thought the feedback was unnecessary at times. The TA should also give all the feedback at once instead of sending it back multiple times for minor things that could have been fixed the first time it was sent back.

While there are grading and feedback guidelines within this course, they are loose and leave a lot of interpretation up to the instructor. Specific point values or areas of delineated proficiency are not emphasized or consistently communicated across badges.

4.3.3.3 Continuous feedback cycle

In traditional learning environments feedback is static and often one directional, whereas within the Mastery Learning approach feedback is a continuous cycle. Slavin and Karweit (1984) assert that through feedback students gain new perspectives and clear up misconceptions through differentiated instruction. Bangert (2004) goes a step further and emphasizes students' ability to strengthen such skills as self-regulated learning and an increased sense of self-efficacy, tailoring to their unique learning styles, academic strengths, and interests. While the benefits of a continuous feedback cycle are evident, students had much to say about the general process of receiving feedback within a Mastery Learning approach (n=74). Responses resulted in polarizing views on the process of feedback. For example, one student wrote, "I really liked the idea of being able to resubmit it if I had to. It was nice to know that the possibility to correct my work existed if I forgot something." Others were hesitant about the overall process,

> In the beginning, I was hesitant about the process of submitting and resubmitting badges because I saw how many errors I made. However, as the semester

> progressed I was able to see that through this process I was given positive feedback.

Additionally, one student mentions a possible misconception, “I didn't think that I [had] to really ever resubmit a badge. This assumption was for the most part incorrect.” The goal of feedback is to provide students with information regarding their progress towards learning goals and objectives for given tasks until they reach mastery. This student introduces a good point in that this path is individualized and some students don’t need this form of communication from instructors—they have the skills to meet the goals and objectives on their own.

While the feedback cycle’s purpose is to improve learning, this concept was lost on many students due to their experience with a static, one directional feedback experience. One student expertly writes,

> I did find, however that the more familiar I became with the feedback process, the less stress I experienced. I believe a lot of stress and anxiety over feedback is due to the ingrained negative perception of feedback. I believe if more classes incorporated feedback so that students would become more familiar with it, then feedback would have more of an initial positive perception, and students would then be more receptive to it.

As expected, many students resonated this statement in increasing comfort with the process as the semester progressed.

4.3.3.3.1 Deadlines for feedback

Another key factor impacting students’ overall experience with feedback in this Mastery Learning approach is the overall organization and schedule of feedback.

Feedback deadlines are set within the course schedule to help students progress through the course in a timely way and to manage the instructor's feedback load (28 badges were required for each student). A student may submit an assignment an unlimited amount of times without penalty in which they will receive feedback until they reach mastery. After the deadline, students were allowed one additional attempt, and then received a final score without an opportunity to apply feedback (as in traditional classroom learning environments). Students had much to say about this structure (n=36). The vast majority of responses consisted of negative opinions that focused on students' inability to meet these deadlines (and thus waiving the option of receiving feedback to help them achieve mastery). For example, "I never got the chance to resubmit. I turned them after the deadline," and "I only submitted before the feedback deadline a handful of times at the beginning of the semester, so I didn't use feedback that much if at all." Forgoing the option to receive information pertaining to their performance and progress towards achieving learning goals and objectives for given tasks likely resulted in these students' inability to achieve mastery.

4.4 Summary

When surveying students about their thoughts on the topic of feedback, students expressed sentiments that fell within three main categories: Importance and Nature of Feedback, Authority over Knowledge and Learning, and Learning for Mastery.

Students indicated that feedback was an important part of the learning process. Students identified the importance of confirming understanding and learning, giving examples related to application (e.g. future teaching), and extending thoughts

surrounding content. Furthermore, students indicated a need for instructors to provide corrections, clear instructions with details, explanations, hints, and examples. The most important badges fell within three categories: 1) Assistance was needed; 2) Content they deemed important; 3) Tasks that directly impacted their grades/scores. Students valued quality and confirming learning and understanding, whereas feedback which pertained to minor errors (such as correcting spelling, grammar, or syntax mistakes), lacked details, was vague, too general, or unclear, were regarded as the least valued forms of feedback, although students were reluctant to identify negatives.

In examining the steps and actions students reported taking during the feedback cycle within this course (e.g. submitting and resubmitting an assignment), remarks fell within two broad categories: teacher-centered learning and student-centered learning. The responses of students indicated a need to correct submissions and conforming to instructors' suggestions, adhering to a teacher-centered learning approach. Some students began to take ownership over their learning by completing several key steps: 1) Reevaluating their own work; 2) Referencing badge (assignment) content; 3) Clarifying instructor feedback and asking questions.

Students don't often see feedback as a continuous cycle of improvement, but more as a form of critical communication. Students reported how Mastery Learning positively effects their grades and scores within the course and thus has a positive effect on their motivation. Additionally, learning outcomes increased and confidence in learning, ability, and the process also increased. Motivation was decreased by one of four categories: 1) Poor time management; 2) Strict attention to detail; 3) Repeatedly denied submissions; 4) Instructor feedback was varied.

While the feedback cycle's purpose is to improve learning, this concept was lost on many students due to their experience with a static, one directional feedback experience. Another key factor impacting students' overall experience is the overall organization and schedule of feedback where students often opted out of receiving feedback. Forgoing the option to receive information pertaining to their performance and progress towards achieving learning goals and objectives for given tasks likely resulted in these students' inability to achieve mastery.

4.5 Findings Summary

The purpose of this qualitative case study was to examine the role feedback plays within the instructional process, and how students are using feedback to inform their course work within Digital Badge contexts. Participants included 78 students and 2 instructors from a large Midwestern public university. Instructors provided assignment feedback to students, and students completed an online survey consisting of open-ended questions about the nature and value of instructional feedback within a Digital Badge system.

Through analysis, research question one resulted in six major thematic groups concerning the ways in which instructors provide feedback: Outcome feedback, Motivation and Interaction, Clarification, Opportunities to Further Knowledge, Decreasing Gaps in Knowledge, and Promotes Learning and Cognitive Development. Research question number two resulted in three major thematic groups illustrating feedback from the students' perspective: Importance and Nature of Feedback, Authority

over Knowledge and Learning, and Learning for Mastery. Within each of the thematic groups, several subthemes emerged.

Chapter 4 reflected a description of the data collection and analysis processes, and referenced the feedback and survey data. Chapter 5 is focused on the discussion of conclusions and implications for future research and practice based on this study.

CHAPTER 5. DISCUSSION

The purpose of this qualitative case study was to examine the role feedback plays within the instructional process, and how students are using feedback to inform their course work within Digital Badge contexts. Digital Badges are being utilized in higher education as a way to increase engagement (Abramovich et al., 2013; Glover & Latif, 2013), develop mastery with critical concepts (Mehta et al., 2013), and reduce gaps in student knowledge (Bowen & Thomas, 2014; Guskey, 2007). Using Mastery Learning (Bloom, 1968, 1971a) approaches along with Digital Badges is giving educators a way to incorporate this new system into traditional learning contexts. Within this approach instructors not only allow learners to work at their own pace, but provide varied levels of scaffolding to aid in the mastery of the content (Reigeluth & Karnopp, 2013).

Feedback is a critical component of Mastery Learning (Bloom, 1968, 1976; Guskey, 2007; Kluger & DeNisi, 1996; Slavin & Karweit, 1984). To support student learning feedback should be frequent, specific (Guskey, 2007), detailed, provide a source of information (Trowbridge and Cason, 1932 described in Mayer, 2008), and prompt (Chickering & Gamson, 1987). These promote activity, interaction, cooperation, diversity, responsibility, and expectations within teaching and learning (Chickering & Gamson, 1987). In order to not only make the process of providing feedback more

efficient, but to capitalize on the established features of effective feedback, educators are using technology such as Digital Badges.

Instructors and students from a large-scale preservice teacher introductory technology course participated in this study. Students completed an open-ended survey and instructors' evaluation feedback was examined. Data analysis involved organizing the results of the survey and assignment feedback into themes. Chapter 5 includes a description of the findings, discussion of results, implications for current practice, recommendations for future study, and conclusions.

5.1 Findings

Chapter 4 presented the findings of this qualitative case study. Through analysis, research question one resulted in the identification of six major thematic groups concerning the ways in which instructors provide feedback: Outcome feedback, Motivation and Interaction, Clarification, Opportunities to Further Knowledge, Decreasing Gaps in Knowledge, and Promotes Learning and Cognitive Development. Research question number two resulted in three major thematic groups illustrating feedback from the students' perspective: Importance and Nature of Feedback, Authority over Knowledge and Learning, and Learning for Mastery. Within each of the thematic groups, several subthemes emerged. In Chapter 5, the themes are discussed in terms of the literature and current research, followed by implications for current practice, recommendations for future study, and conclusions

5.2 Instructors' and Students' Views of Feedback

The findings of this study resulted in various viewpoints among instructors and students; there was more overlap that initially expected. While the views and opinions of instructors were not directly questioned, examining their actions can possibly shed light on the elements of feedback they value. Figure 5.1 depicts the commonalities and differences among students' views of feedback versus the actions (and possibly the areas) instructors value as described through the data (specifically through the coding of instructor evaluation items and student surveys).

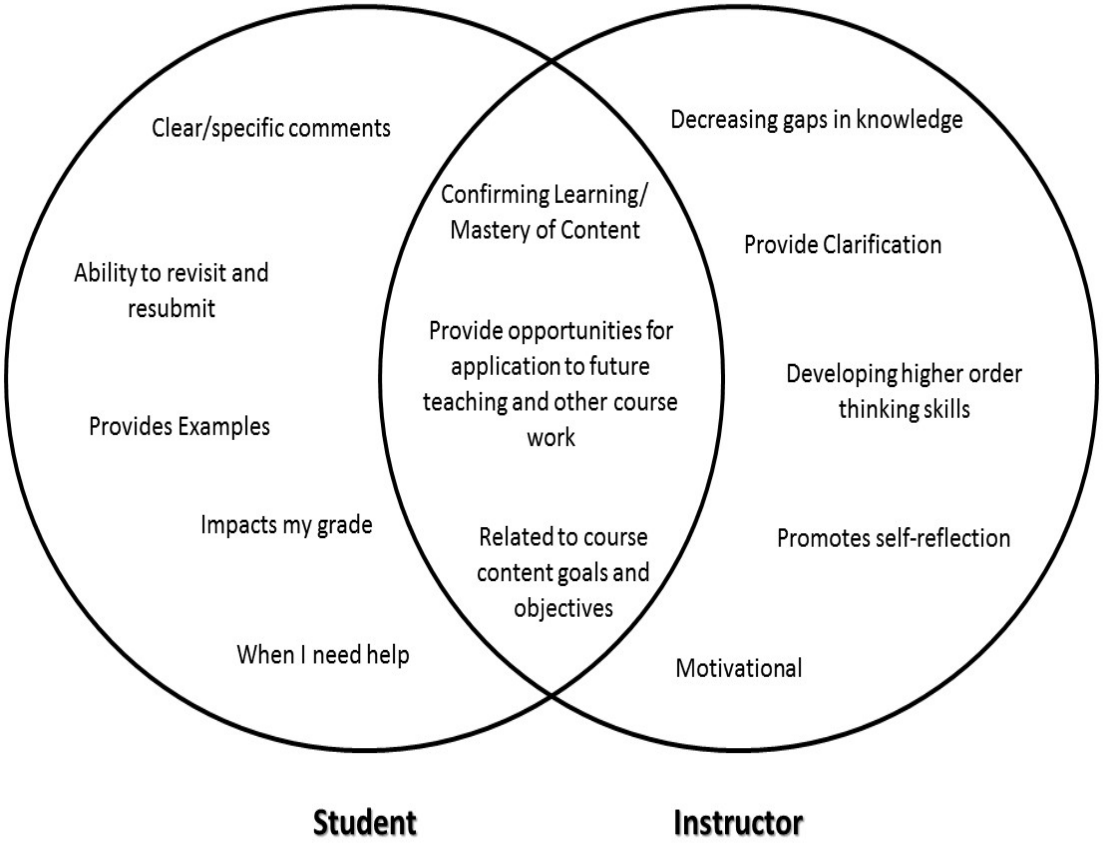


Figure 5.1. Instructor and student views and actions regarding feedback

Students' views related to two main areas: 1) Views related to their role as a student; 2) Views related to their role as a future educator. The difference is understandable because of the dual roles preservice teachers must assume within teacher education courses. Instructors' views surround values rooted in not only cultivating successful students, but also successful future educators.

While there are some differences in the types of feedback that students desire versus the actions and values instructors hold, what is encouraging is the desire for teaching and learning to come out of providing (instructors) and using (students) feedback. Both groups seek feedback that confirms their learning outcomes and performance while being closely connected to course content goals and objectives. Additionally, both students and instructors recognize that learning within this course is not independent, and look for ways to integrate skills and knowledge within other areas of this course, outside course work, future teaching, and professional development.

5.3 The Role of Feedback

In examining how instructors provide feedback, the various themes and dimensions that emerged resulted in specific categories of feedback. While many students indicated a want for any and all types of feedback, further examination reveals that not all feedback is appropriate or helpful. These characteristics of feedback focus on general forms of feedback and move towards more specific feedback that focuses on developing high-order thinking skills among students. Table 5.1 depicts the characteristics of instructional feedback instructors' move through based on the interpretation of the data.

Table 5.1. Characteristics of Instructional Feedback

Feedback Characteristic	Description	Sample Feedback
Outcome	Simple, indicates results about performance, no information regarding the task.	"Incorrect", "Follow the instructions", "poorly executed"
Motivation & Interaction	Feedback should provide opportunities to increase students' motivation and self-efficacy, and promotes student-instructor relationship.	"I know you have struggled with this assignment, congrats on a job well done!" "Well done! I can see that you have done a nice job clearly explaining the topic and providing detailed examples."
Clarification	Feedback helps to clarify what good performance is and communicates the criteria, and expectations of the task, and may refer student back to task. Feedback explicitly informs students about the quality of their learning outcomes, and helps them troubleshoot and self-correct.	"Remember the video you were to watch on 21st century skills? If you had referenced the points made in that video, you would have understood 21st century skills better"
Extension	Instructor provides resources that extend the instructional task. The student may have mastered initial content, but is provided with ways to go beyond the initial task and increase learning.	"Here is a site that walks you through how to write objectives. Go through this activity to help you master the process."

Table 5.1 Continued

Closing Gaps in Learning	Feedback delivers important information regarding desired learning, perceived learning, and affords opportunities to decrease that gap. Sometimes positive statements confirming learning is included.	"In this task you should have defined the topic and provide examples- you only defined the key words." "In the assignment you did a nice job describing the learners' abilities, but forgot to include information about the learning context."
Self-Regulation	Feedback gives students opportunities to self-assess or reflect, often in the form of prompts.	"How might this task be used in your future profession? What skills are transferred?"
Transfer	Promotes professional development and success in future positions and coursework.	"Learning how to write objectives well now will help you as a practicing teacher."

5.3.1 Outcome Feedback

First, Outcome feedback provides students with comments confirming or denying their performance without referencing the task requirements or students' work. Comments are usually vague and resemble filler types of phrases (e.g. nice work, try again). In most cases, instructors in this study try to stay away from these types of phrases. Butler (1995) describes outcome feedback as,

> The most common kind of information students receive after engaging in academic tasks, provides the least guidance about how to self-regulate. The benefits of outcome feedback depend heavily on learners' (a) being attentive to

> multiple cues' values and performance during study, (b) having accurate memories of those features when outcome feedback is provided at the task's conclusion, and (c) being sufficiently strategic to generate effective internal feedback about predictive validities (e.g., "Which factors boost my performance?") (p. 252).

Outcome feedback as the first form of information regarding student performance requires a lot from students with regard to monitoring their performance and learning, as well as communicating their needs.

Within traditional feedback contexts this approach is not very effective (Bangert-Drowns et al., 1991), however within Mastery Learning settings there may be a place for this type of simple feedback. As students move through the feedback cycle, once mastery is reached additional comments regarding the criteria and expectations, as well as providing extension activities, may not be necessary, especially if the task includes foundational materials that build with each additional challenge.

5.3.2 Motivation and Interaction

This category provides some information regarding the task criteria and expectations, but the main focus is on the personal interactions between the student and instructor. Instructors use motivational strategies to encourage students such as, “You are almost there, keep up the good work!” The use of motivational statements and interactions is a key component of building self-efficacy within students, and especially holds value when students are struggling with performance (Bandura, 1986; Schunk, 1989c; Schunk, Meece, & Pintrich, 2012) or as they begin to learn new concepts and

skills. Moreover, as students perceive proficiently and gain confidence with learning there is a greater likelihood of knowledge transfer (Zimmerman, 1995).

Using motivational forms of feedback and continued positive interaction with students is of particular importance within Master Learning because of the potentially frequent resubmissions. Instructors use these types of interactions as a way to personalize learning and appeal to students' need to see that the instructor behind the interface is in fact a real person who is assessing their work. While instructors may find that this form of feedback is unnecessary, or may even try to streamline the process through general motivational comments (e.g. "I know this is a challenging concept) written to all course students, the value of these comments and interactions should not be overlooked. Zimmerman (1995) writes, "[students'] self-beliefs regulate a variety of self-regulatory processes that influence performance, cognition, motivation, choice, and affect (e.g., anxiety and despondency)," therefore contributing to overall learning and understanding (p. 220). Additionally, these types of interactions and statements communicate the importance of the overall content and encourage students to invest time and effort within each challenge task.

5.3.3 Clarification

Within this study, instructors spend large amounts of time clarifying assignment criteria, expectations, and requirements. Face-to-face environments provide opportunities for questioning and clarifying, but within Digital Badge systems, these interactions happen within the assessment process. Often students will submit an assignment draft to an instructor rather than follow-up with additional questioning;

instructors will then provide further clarification on where the student went wrong, what they missed, as well as what was done well. This process may at times be faster than if they waited for a response over email or during class time. Moreover, the process of completing Digital Badge challenges may be synonymous with some online learning environments. Within this course structure, while students had face-to-face opportunities to engage with their instructors, almost all of the instructional materials and resources were provided within the online space. Garrison (2011) emphasizes that instructors should expect the need for further instruction, and the benefits of this are a deeper understanding and learning of content. Additionally, as students engage with content and develop deep and meaningful learning, the goal is to progress through instruction to transfer through self-regulatory skills (D. R. Garrison & Cleveland-Innes, 2005).

As within many educational contexts, but especially within Mastery Learning and Digital Badge environments, it is important for instructors to clear up misconceptions and guide learning throughout the feedback cycle (Lynch et al., 2012). Neglecting the clarification of learning and understanding can become a critical mistake as identified by students in this study. In doing so, instructors fall victim to varied forms of feedback provided to students, and students may get off track in hard to correct ways later on, in turn increasing the feedback cycle, prolonging mastery, and inhibiting motivation, self-regulation, and knowledge transfer.

5.3.4 Extension

In this category instructors provide opportunities to help further clarify course expectations, criteria and content. Students may be provided with an additional resource,

instructional video, or activity that helps them greater understand the core goals and objectives of the learning tasks. This type of feedback goes beyond redirecting students to assignment materials. It is through these extension activities that students gain the skills and knowledge to complete the assignment and meet task goals. Some extension resources and activities may indeed clarify course content or skills (e.g. instructional videos); many times instructors are providing self-created resources and using them to personalize learning.

Personalizing student learning through extension resources and activities aids in the mastery of content (Guskey, 2007). Instructors can tailor their feedback styles to fit learning needs as well as the students' professional goals (e.g. elementary instruction versus secondary instruction). Additionally, providing various activities allows students the opportunity to work through a variety of contexts, further deepening their knowledge and ability to transfer learning.

5.3.5 Closing Gaps in Learning

This category is a very common feedback practice demonstrated by both instructors within this study. Here instructors provide students with information regarding their performance and how it relates to the criterion, goals, and objectives of the tasks. Often instructors will provide statement such as, "In this assignment you listed the key terms but did not define them," drawing on the students' actual performance versus desired performance. Many times this form of feedback is paired with a positive or motivational statement (often referred to as the "Feedback Sandwich") (Cantillon &

Sargeant, 2008). As teachers often teach how they were taught (Lortie, 1975), this form of feedback is the most familiar to students and instructors alike.

Within traditional feedback contexts instructors often provide this type of feedback where students learn information regarding where they fell short in performance, but often don't have opportunities to augment their learning therefore creating (sometimes large) gaps in their learning and understanding. In the field of teacher education this is quite concerning. Using Mastery Learning approaches not only gives students information regarding their gap in learning and understanding, but also gives them the power to close that gap. Without the power to modify learning and understanding, content mastery is unlikely and the value feedback holds vastly diminishes.

5.3.6 Self-Regulation

Much of the previous categories have laid the ground work for students to successfully self-regulate their learning. "Self-regulated learners plan, set goals, organize, self-monitor, and self-evaluate at various points during the process of acquisition." (Corno, 1986, 1989; Ghatala, 1986; Pressley, Borkowski, Schneider, 1987 as cited in Zimmerman, 1990, p. 4). Often this category is not explicitly representative within the feedback cycle (as illustrated by Avery). In static one-way feedback communication contexts, instructors do not use instructional strategies to further student self-regulation. More often these types of strategies are reserved for two-way communication regarding formative assessment (e.g. online discussions, forums, face-to-face interactions). However, within Mastery Learning and through online Digital Badge

platforms, this type of feedback is not static but a continuous feedback cycle or loop that is used as a form of communication between instructors and students. Providing students with prompts has been shown to increase student achievement, self-regulatory skills, and curriculum-design skills (Michalsky & Kramarski, 2015). Additionally, using prompts (e.g. Skylar) versus providing answers (e.g. Avery) gives students the opportunity to monitor their own learning, negotiate academic challenges, develop persistence and confidence, all the while developing higher-order critical thinking skills (Lent, Brown, & Larkin, 1984; Pajares, 2002; Pintrich & De Groot, 1990).

It is especially imperative that instructors not only use this category of feedback, but also make it explicit to preservice teachers. Kramarski and Michalsky (2010) expertly write,

> First, preservice teachers must be able to achieve [self-regulated learning (SRL)] for themselves (the learner's perspective in SRL), that is, be themselves self-regulated learners. Second, preservice teachers must be able to understand how to help their students achieve SRL (the teacher's perspective in SRL) (p. 435)

Preparing future educators is a challenging task; not only is nurturing the student an important undertaking, but also developing the educator within. Instructors then also must help preservice teachers develop ways for students to use their learning and skills in a variety of contexts, as well as know how to cultivate that within their own students.

5.3.7 Transfer

Much like self-regulation, the previous categories have all contributed to students being able to transfer skills and knowledge into new contexts. In this category, students

have achieved mastery, and instructors have the opportunity to draw attention to how the student may apply these new-found skills and knowledge. Within preservice teacher education, students are required to not only wear the student "hat" but also the "hat" of an experienced teacher. They are often thrown into situations where they have to make decisions regarding student performance and achievement, behavior modification, curriculum design, technology choices, and ethics, among other things, without firsthand knowledge or experience. Once mastery of skills and knowledge is reached, instructors can then draw attention to how these might be utilized in the future.

While this doesn't supplement firsthand experience, it demonstrates the value of the knowledge and helps students negotiate how knowledge and skills might be used later on, as well as providing effective models of technology integration practices (Brown & Warschauer, 2006). For example, an instructor might write,

> In this task you have provided an excellent example of how you might use this Web 2.0 tool in your future classroom. While using this tool as a way to present information is a great idea, you may consider having students use the tool to demonstrate their knowledge on a given topic. Think about putting the tool in the hands of the students.

It appears that while students do think about how they will be assessed and the impact this has on them for both the short and long term, a stronger indicator is the value the content holds for the student. Explicitly demonstrating the value of student performance and transfer further illustrates the significance of knowledge and skills.

Furthermore, badge assignments with multiple challenges may find that feedback specifically relating to transfer may be best reserved for the completion of all badge

challenges, where instructors can pull together all key assignment goals and objectives, and then help students see the value of those skills and knowledge. Lambert, Gong, and Cuper (2008) further write,

> They [preservice teachers] must understand the relationship between technology and its usefulness in improving the processes of teaching and learning (Lambert, 2005); gain confidence in using technology tools in a classroom environment (Mims et al.); and be able to plan instruction that uses these tools to promote the higher-order thinking and problem-solving skills their students will need in the 21st Century (Brown & Warschauer) (p. 387-388).

Explicitly focusing on transfer when providing feedback will aid students in developing the necessary abilities and expertise needed to integrate technology in the future.

5.4 Feedback, Mastery, and Transfer of Skills

Now that the Characteristics of Instructional Feedback (Table 5.1) has been presented, it is necessary to examine how the categories are leveraged for Mastery Learning as well as effective teaching and learning. Figure 5.2 illustrates this association:

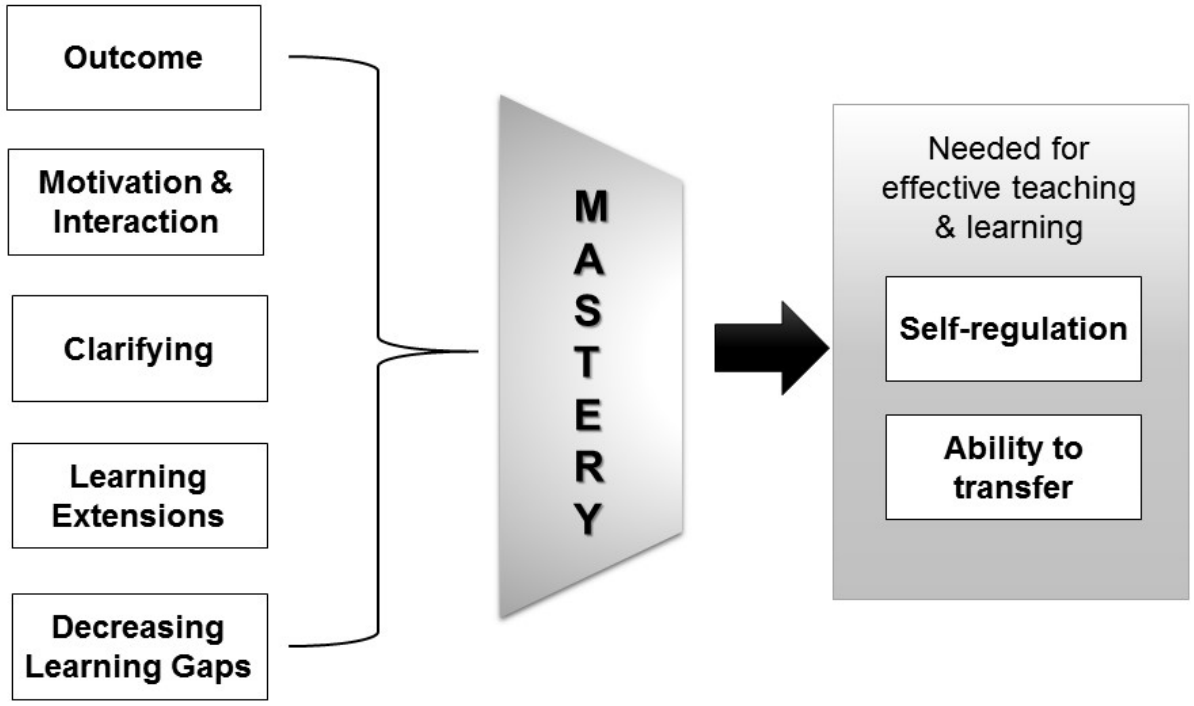


Figure 5.2. Feedback Categorization for Mastery and Effective Teaching & Learning

Feedback related to Outcome, Motivation, and Interaction are all the vaguest forms of feedback, but they do hold value when coupled with more informative forms of feedback. Feedback related to Clarifying or providing students with specific details is of most value to students. In general when asked about feedback students often think about idealized situations in which they imagine how they would like to receive feedback and how they see themselves providing feedback in the future. Students also generally understand that as a teacher educator there should be the desire for increased knowledge and understanding, self-regulation, as well as transfer. But in thinking about details related to specific tasks, students boil their thoughts down to what they need in order to get through the given task and course (clarification feedback that includes specific examples, details,

and changes to their work). These three categories are often what students are exposed to in most traditional forms of assessment feedback.

However, in order to reach mastery of skills and content, instructors need to go beyond vague, motivational, and clarifying comments. Learning Extensions can be valuable in personalizing content for both remediation, as well as challenging students to go beyond initial thoughts. While many times forms of learning extensions are created by instructors (as illustrated in this study), technology can be leveraged to reduce the time required to differentiate. Resources such as video tutorials, images, articles, and handouts may already be available via the web. Personalized learning can be even more streamlined by creating feedback blocks of text and resources that can be geared toward specific academic groups of students (e.g. all students that lack an example to goal 3 will be provided with one statement and resource related to meeting that goal) and then reused for all students that fall within that group. Often this form of feedback is prevalent among elementary school students but is not utilized within higher education.

Feedback items related to Decreasing Learning Gaps is an area in traditional feedback contexts students and instructors are familiar with; however, students often do not have the ability to close learning gaps and clear up misconceptions. They are only given information regarding where they stand without the ability to do anything about it. Providing opportunities to modify learning and close the gap contributes to mastery. Additionally, within traditional assessment contexts students are not using feedback to improve their learning and understanding, but are using it instead as a way to inform them on their overall performance (e.g. their task or course grade). While the category of Decreasing Learning Gaps primarily focuses on increasing learning and understanding

related to learning goals and objectives, this is not always the case. Feedback related to supplementary skills such as writing conventions, spelling and grammar, and information management (e.g. organizing resources, citation management) often don't provide specific ways students can decrease gaps in learning. Feedback should be content-specific and relevant to overall learning goals and objectives.

Feedback items pertaining to Outcome, Motivation, and Interaction, Clarifying, Learning Extensions, and Decreasing Learning Gaps all contribute to mastery. Instructors providing a variety of items related to these types of categories will increase the likelihood of students achieving mastery. However unlike in other courses, preservice teachers must not only master course materials and skills, but be able to understand the content in a way where they can then teach said content and skills to others (perhaps in the distant future). Feedback items pertaining to Self-Regulation and Transfer are necessary to go beyond mastery and promote effective teaching and learning.

5.5 Digital Badges for use in Mastery Learning

Examining both the *Characteristics of Instructional Feedback* and *Feedback Categorization for Mastery and Effective Teaching & Learning* can provide instructors with a framework to guide their current assessment practices. However, technology can be leveraged offering capabilities to aid feedback practice. Digital Badge systems have the potential to increase student learning (Higgins et al., 2002), the quality of learning (Lynch et al., 2012), and critical thinking (Lynch et al., 2012). This study has revealed

several benefits and limitations related to using Digital Badge systems for Mastery Learning listed and described in Table 5.2.

Table 5.2. Digital Badge Platforms: Benefits and Limitations

Benefits	Ability to provide prompt, frequent feedback that scaffold students' immediate learning needs. Students' confidence is increased through the continuous feedback loop. Motivation is increased as students meet course goals through student-instructor interactions. Feedback is easily accessible for current and future use. Specifically aiding in summative assessment. Ability to demonstrate learning in ways that are more detailed than a single course grade. Displaying achievement, receiving recognition, and sharing learning with interested stakeholders.
Limitations	Feedback cycle results in increased submissions and formative assessment. Instructors' time is greatly increased. Students' are required to manage their time and learning, and may struggle to do so. Badges separated into challenges can display somewhat segmented learning, inhibiting the ability to recognize the overall goal or objective. Varied forms of feedback or extreme attention to detail decreases student motivation.

5.5.1 Benefits

Using Digital Badges as a way to facilitate the Mastery Learning process has several benefits for students and instructors. Specifically, instructors are able to provide students with personalized prompt feedback. Within the *Passport* system, students and instructors can set notifications regarding the submissions and evaluation processes. Instructors are only limited by their own time management regarding prompt feedback. Additionally, as students complete assignments, instructors are able to scaffold student performance in more manageable bursts of feedback that occur more frequently than in a

traditional context. Through this process, students are not only provided with information needed to augment their learning in relation to course goals, but become more familiar with the feedback process. While some research (Abramovich et al., 2013) has shown that students who are overly assessed can be motivated to master the exams rather than the content, within this course the challenge levels and badges provide students with a wide range of varied tasks. With more exposure to receiving and using feedback, students become more proficient at self-regulation and more confident with the process. Students view feedback less as a form of criticism than as a form of information.

Additionally, Digital Badge systems provide students with a platform that is easily accessible, extending the learning environment. Students can view their feedback for use in transfer within this course as well as outside of the course (consistent with the results by Hepplestone and Chikwa (2014)). Students specifically noted their positive views on how easy accessing feedback is within *Passport*. Having the ability to revisit feedback not only aids in self-regulation and transfer, but also is beneficial during summative assessment. Formative assessment informs teachers and students on teaching and learning during instruction, which in turn effects student performance on summative assessments (C. Garrison & Ehringhaus, 2007). Students are able to use the information regarding performance to meet summative assessment in their learning.

Digital Badges have been known as a way to recognize informal learning (Foundation, 2014); however, within this study, the focus has been on how Digital Badges can be used within formal learning contexts. Much of how informal learning is being documented is applicable to formal learning. For example, students in this course

have the opportunity to display their achievement within their public profile. What's displayed is a detailed look into the achievement and learning of the student. Typically, preservice teacher educators take on the burden of explaining, documenting, and illustrating their relevant achievements for employment and professional development. Through the use of Digital Badges, interested stakeholders are able to look beyond a simple academic grade or degree and examine the content students have mastered. Digital Badges may provide greater insight into teacher candidates and offer stakeholders vital information that can set preservice teachers apart.

5.5.2 Limitations

While Digital Badges provide multiple benefits to both students and instructors, these systems have their limitations. Within a Mastery Learning approach, where the feedback cycle is continuous, instructors are faced with a monumental task. Instructors' time is increased within online learning environments compared to traditional learning contexts (Cavanaugh, 2005; Davidson-Shivers, 2009; Jin, 2005; Tomei, 2006). Consistent with previous research, this study resonated findings in increased time when communicating with students and providing feedback. The instructors within this study provided a total of 3,746 pieces of individual feedback over the course of a sixteen week semester, and while the attention and dedication to student learning needs is impressive, it further illustrates the amount of time required to do so.

Digital Badge systems have been shown to increase student motivation (Davidson, 2011 as cited in Abramovich et al., 2013), and pairing these systems with Mastery Learning has indicated both positive and negative influences to motivation.

Within Digital Badge systems learning activities can be segmented into various challenges (as represented within this study). Segments may become disjointed and students may not fully understand how the various challenges come together within the badge as a whole. Instructors too struggle in providing feedback that is varied and not related to overall badge goals. While Digital Badge systems provide an easy way for students to submit work and instructors to provide feedback, often the feedback provided to challenges can become bottle-necked by extreme attention to detail which increases the overall denied submission rate and decreases student motivation.

Many of the benefits of Digital Badges falls within the broad affordance categories developed by Gibson, Ostashewski, Flintoff, Grant, and Knight (2013): Motivation, Status Recognition, Evidence of Achievement, and Research Implications. While there are limitations, the benefits in conjunction with affordances far outweigh any of these.

5.6 Implications and Recommendations for Current Practice

A set of "Best Practices" may aid in navigating the potential challenges instructors of preservice teachers may experience as they begin to adopt Digital Badge systems, Mastery Learning approaches, and augment their instructional feedback style.

5.6.1 Best Practices for Providing Instructional Feedback

While it appears that there is not a specific formula when it comes to providing feedback, much can be gleaned from this study. Often instructors provide a "sandwiched" approach: pairing a positive comment with a constructive one and then concluding with a positive statement (Cantillon & Sargeant, 2008). While this method

may be of value as a starting point, this approach on its own may not be entirely effective. When administering feedback, instructors need to not only be aware of the types of appropriate feedback, but also the organization and management of feedback and how students can be utilized in this process, as well as not underestimating the value of quality instruction.

5.6.2 Types of Feedback to Provide

Instructors can use both the *Characteristics of Instructional Feedback* and *Feedback Categorization for Mastery and Effective Teaching & Learning* to inform their feedback practices. Instructors can evaluate their own feedback style and examine the areas of feedback that is most often provided. Seeing what characteristics are not often utilized will provide areas that can be added to their practices.

Appealing to students' needs, instructors should provide feedback that can be used as a source of information where students can easily identify where they went wrong (and where they succeeded) and how to fix it (or not). Additionally, instructors can provide motivational comments to encourage student effort in meeting goals and objectives. For students to go beyond the challenge, badge, or assignment at hand, it is imperative that instructors provide feedback specifically aiding in the development of self-regulation and transfer expertise. Opportunities where students can self-reflect and think deeper about the content, and how they arrived at the learning goals, will greater prepare students for future teaching. Using Mastery Learning approaches along with Digital Badge systems creates a space for instructors to facilitate discussion within the

assessment space. Educators can look towards instructor facilitator research for guidance on how to navigate this space. Ertmer and Koehler (2014) write,

> According to Hmelo-Silver and Barrows (2006), the role of a discussion facilitator is to create affordances for productive discourse, typically through the use of questioning techniques that promote deeper thinking. To elaborate, Hmelo-Silver and Barrows (citing Schoenfeld) described how a teacher used a 'reflective toss' strategy, within a problem entered discussion, to help students clarify and monitor their thinking and consider a variety of views. This technique involves the teacher acknowledging a student statement but then throwing the responsibility for elaboration back to the student (p. 630).

One such way instructors can cultivate self-regulatory learning skills is through student-selected tasks. "Allowing students to choose the pathways they will follow to achieve learning goals is necessary for self-regulated learning and an increased sense of self-efficacy. The practice of allowing students to choose instructional activities that are aligned with their unique learning styles, academic strengths, and interests further contributes to learner self-efficacy" (Bangert, 2004, p.221). Digital Badges provide opportunities for students to meet competencies through exploration of a variety of tasks. For example, in this study students chose three out of thirty Web 2.0 applications to explore. Students were able to explore their own interests and learning styles, all the while applying learning to their unique content areas.

In thinking about how students can promote skill and knowledge transfer, instructors should focus on broad-sweeping concepts rather than specific details (Pokorny & Pickford, 2010) in order to make a lasting impact. Instructors need to examine how

their course fits within the larger teacher education program and the timeline within their program. Courses that fall at the beginning of a students' career may elicit feedback that focuses on the transfer of skills and knowledge related to future program courses and requirements. Future coursework can continue to build on skills and knowledge developed within current course instruction. While a course that falls at the end of a student's preservice teacher training should provide feedback items that emphasize practical classroom application and professional development.

In closely examining their own feedback practices, instructors can begin to identify gaps in their feedback practices, and then look for ways to provide feedback that not only meets the needs of their students, but also aids in developing higher-order skills.

5.6.3 Feedback Management and Organization

Any educator will tell you that assessing students and providing feedback takes time. Introducing Mastery Learning approaches will inevitably increase this already taxing task. Learning how to appropriately manage and organize feedback practices can help educators more effectively implement these learning approaches.

5.6.3.1 Digital Badge Platforms and Coursework Organization

Implementing Mastery Learning approaches into course curricula can be a daunting task, but leveraging technology can greatly aid instructors. Using a Digital Badge platform can provide instructors with ways to manage student work, as well as providing students and interested stakeholders with valuable course information. One such platform known for its robustness (Randall et al., 2013; C. V. Wright & O'Shea,

2014) and utilized in this study is *Passport*. Newby, Wright, Besser, and Beese (in press) further describe the uniqueness of this system,

> *Passport* has been designed to facilitate mastery progression through scaffolded tasks with auxiliary embedded digital content, in the context of a semi-gamified user interface which draws on a visually-prominent "badge" metaphor, culminating in certification via a portable, transparent, information-rich digital badge (p. 3).

In order to successfully implement Mastery Learning approaches, systems need to have the ability for students to resubmit course work. Additionally, the platform needs to be easily accessible for both students and instructors. Yang and Carless (2013) emphasize that the nature of course tasks should match feedback practices:

> Integrated multi-stage assignments generally facilitate timely comments and student uptake of feedback. An assignment divided into two or more phases permits iterative feedback cycles which facilitate engagement with feedback and the prospects of improvement from one task to the other (p. 291).

Consistent with Yang and Carless (2013), in this study badge assignments were presented in multiple challenges building on content as students progressed. Through this process students and instructors had multiple opportunities to take part in the feedback cycle. Utilizing Digital Badge systems can greatly enhance Mastery Learning practices.

5.6.3.2 Frequency of Feedback

When, how frequent, and how much feedback to provide students can be challenging to navigate. Frequent and prompt feedback has been shown to increase such

skills as self-efficacy (Schunk, 1983) and self-regulation (Nicol & Macfarlane-Dick, 2006), and is a component of good instruction (Chickering & Gamson, 1987, 1989). Furthermore, utilizing Digital Badge systems provides instructors with opportunities to potentially offer scaffolding comparative to face-to-face interaction through the possibility of immediate feedback. Being able to address student concerns and direct learning digitally within a short timeframe is beneficial to overall learning and understanding.

However, providing feedback to every student submission may not be necessary. For example, Skylar provided written feedback for only about half of all student submissions, but focused on higher-level feedback categories, whereas Avery provided feedback on virtually all student submissions, but focused more heavily on lower-level feedback categories. Knowing when to provide feedback is an essential element to managing the potentially large volume of student submissions.

> By knowing ahead of time what you want students to gain from the case, what the key affordances of the case are, as well as where students tend to get hung up, you can be better prepared to intervene, as needed, to keep students on track (Ertmer and Stepich, 2002 as cited in Ertmer & Koehler, 2014, p. 631).

One suggestion for instructors would be to examine course assignments and corresponding goals and objectives. Providing feedback that aids and guides students in meeting these goals and objectives can focus feedback practice. Likewise, providing feedback statements related to the transfer of skills and knowledge may be reserved for the culminating badge challenge. Additionally, instructors might create a hierarchy of skills and tasks related to course goals, and objectives. Students can then build on their

learning and understanding of core concepts, with feedback being provided by instructors at key intervals rather than continuously throughout the task. Overall, it is not the quantity of feedback that is important, but rather the quality of the feedback being provided.

5.6.3.3 Using Students

Allowing students to share in the assessment and feedback process will not only lessen the load of the instructor, but also is extremely beneficial to preservice teachers. Deep learning is promoted through students working through self- and peer- feedback (Boud & Feletti, 1998; Falchikov & Goldfinch, 2000). Likewise, by modeling and training preservice teachers on how to give effective feedback, it is more likely they will understand the "broad nature of effective feedback" (Pokorny & Pickford, 2010, p. 27).

Strategies instructors can use to train students in effective feedback practices should include peer-assessment approaches. Feedback related to lower-level categories (e.g. outcome, motivational, clarification) can be provided by student peers. Introducing prerequisite tasks to greater challenges and badges not only provides ways for students to develop their assessment skills, but to strengthen their learning and understanding with foundational content as well. Moreover, feedback provided by instructors can then focus on higher-level categories where first-hand knowledge surrounding teaching and professional development can be used to aid in the transfer of knowledge. Not only can peer- and self-reflection be utilized as a teaching mechanism, collaborative skills such as co-construction of knowledge, negotiation, positive interdependence, and individual accountability are strengthened.

5.6.4 The Value of a Good Facilitating Instructor

The role of a good instructor is vital (Chickering & Gamson, 1987; Ertmer & Koehler, 2014), and critically examining an instructors' own feedback practices for effectiveness is critical to the student learning process (Orsmond et al., 2005). Higher Education instructors are unique in that they may have very little knowledge or experience in teaching before they begin instructing college courses. Very few have gone through teacher education programs—even those that teach preservice teachers. Providing feedback to students is a skill that needs to be developed, and this is not only true for students but for instructors as well. Frequently in many college courses graduate students are teaching courses with little guidance, mentorship, or content knowledge; yet they are to be seen as experts at both supporting coursework and developing future educators. Within this study the focus was on what the instructors were doing and how they gave feedback and it is interesting to note the inconsistencies among the instructors. While courses were not compared, each instructor not only portrayed a distinct feedback style but also focused on different criteria when giving feedback. While differences in style are acceptable, differences in criteria are not. This means that students in the same class are being held to different standards, which could lead to considerable differences in their learning outcomes. To combat some these problems, mentorship and training are key.

5.6.4.1 Instructor Mentorship and Training

Similar to utilizing students in the feedback process in order to promote feedback practice development, novice instructors can participate in similar strategies. Within

many large scale courses in higher education there is often a variety of experience and tenure among the teaching assistants. Supervising instructors should begin by pinpointing those that exhibit not only strong feedback practices, but also exemplary instructional strategies and a firm understanding of course content and materials. These individuals may be obvious choices for mentorship. Additionally, one should note that while an individual might demonstrate exemplary instructional skills, it is also imperative that they demonstrate leadership and managerial abilities to serve as an effective mentor. Ideally mentors and mentees should team teach for a period of time until the novice instructor has developed enough skills where they can be successful in navigating the complexities of teaching and student management on their own.

In some instances, courses are stretched thin and mentorship is not a viable solution. In these instances instructors can develop a hierarchy within course assignments according to the assessment abilities of the instructors. For example, a senior instructor with teaching experience may focus on assignments where students have to put theory into practice, whereas a novice instructor might assess more simple skill-based assignments (while this was not reflected in this study, it may be a viable option).

In order to create consistency among various laboratory, discussion, or recitation sections within the same course, rubrics are a viable solution. Rubrics developed by either supervising instructors or senior teaching assistants can be provided to novice instructors to help guide their assessment practices. Rubrics should be detailed, explicit, and informative so as not to leave room for much variation among sections. As instructors become more proficient with administering feedback, these scaffolds will fade. Additionally, developing common feedback statements might be of value in order

to not only provide guidance but to streamline the process of providing feedback. Again, supervising instructors or senior teaching assistants might create common phrases to use when students do not meet challenge goals or objectives.

As instructors begin to navigate the process of providing student feedback, and critically examining their own practices, the "Best Practices" presented in this chapter may aid in navigating the potential challenges instructors of preservice teachers experience, and also in developing viable solutions.

5.7 Suggestions for Future Research

Future research in six main areas may prove to be beneficial next steps in examining Digital Badges, Feedback Practices, and Mastery Learning approaches. The first suggestion is to investigate how motivation is negatively affected within Mastery Learning. Specifically, investigating how many resubmissions are optimal for learning and understanding, as well as when motivation is critically impaired and how student's overall confidence is impacted.

A second suggestion for future research is to examine student achievement over time. As students work through various activities over the course of a semester, exploring students' feedback needs and how those needs change over time in relation to achievement would provide greater insights into the complexities of feedback throughout a typical semester. Exploring how feedback was altered overtime in relation to student achievement might help instructors pinpoint critical points for feedback intervention.

A third suggestion focuses on the time management skills of students. One interesting student response indicated a need to prioritize coursework from traditional

contexts over Mastery learning coursework. Fluid deadlines and multiple submissions perhaps created a false sense of security with time management. Further investigating how differences in course structures effect time management, student achievement, and motivation may provide useful strategies for students as well as for course designers.

A fourth research suggestion focuses on the instructor. Instructor interviews would help to provide a more holistic view of the values instructors hold regarding feedback styles, practices, and processes. Additionally, investigating roles within both Mastery Learning approaches and traditional contexts could offer greater insight into this common educator practice.

A fifth suggestion is to explore the decision making process students go through when working within a Mastery Learning instructional approach. An in-depth exploration following how students receive, internalize, and then apply feedback repeatedly would indicate the nuances of feedback students value for learning, as well as skills needed for transfer.

Lastly, examining the differences and similarities of feedback within a Mastery Learning context compared to a traditional context can potentially provide insight into the nature of this learning approach within higher education. Examining how feedback may or may not need to change to meet the needs of the course structure would add to the body of literature surrounding Mastery Learning.

5.8 Summary and Conclusion

The purpose of this study was to examine the role feedback plays within the instructional process, and how students are using feedback to inform their course work

within Digital Badge contexts. The specific problem is the challenge of incorporating Digital Badges and Mastery Learning approaches within traditional higher education learning contexts. A critical component of Mastery Learning is the role of instructional feedback. Instructors need to be able to not only display characteristics of a good instructor, but understand the functions (Balzer et al., 1989; Butler & Winne, 1995) and dimensions (Yang & Carless, 2013) of feedback, and then be able to deliver effective feedback (Nicol & Macfarlane-Dick, 2006). The main conclusion of the research is that feedback consists of various characteristics focusing on general low-level categories, to higher-level categories that allow preservice teachers to develop essential skills for teaching and learning.

Chapter 5 concludes the study. The findings included six major thematic groups concerning the ways in which instructors provide feedback: Outcome feedback, Motivation and Interaction, Clarification, Opportunities to Further Knowledge, Decreasing Gaps in Knowledge, and Promotes Learning and Cognitive Development. Three major thematic groups illustrate feedback from the students' perspective: Importance and Nature of Feedback, Authority over Knowledge and Learning, and Learning for Mastery. The recommendations based on the study findings presented a set of "Best Practices" including: Types of Feedback to Provide, Feedback Management and Organization, and The Value of a Good Facilitating Instructor; together, they aim at helping educators navigate the potential challenges they may experience when implementing Digital Badge systems and Mastery Learning approaches.

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APPENDICES

Appendix A Passport Digital Badge System

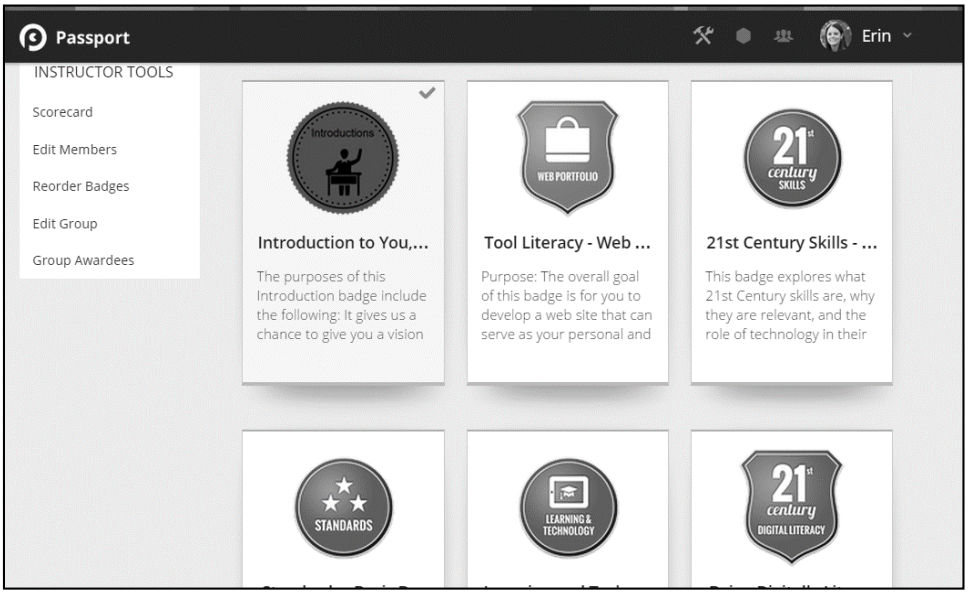

Figure A 1. Passport group view – Badges available to complete

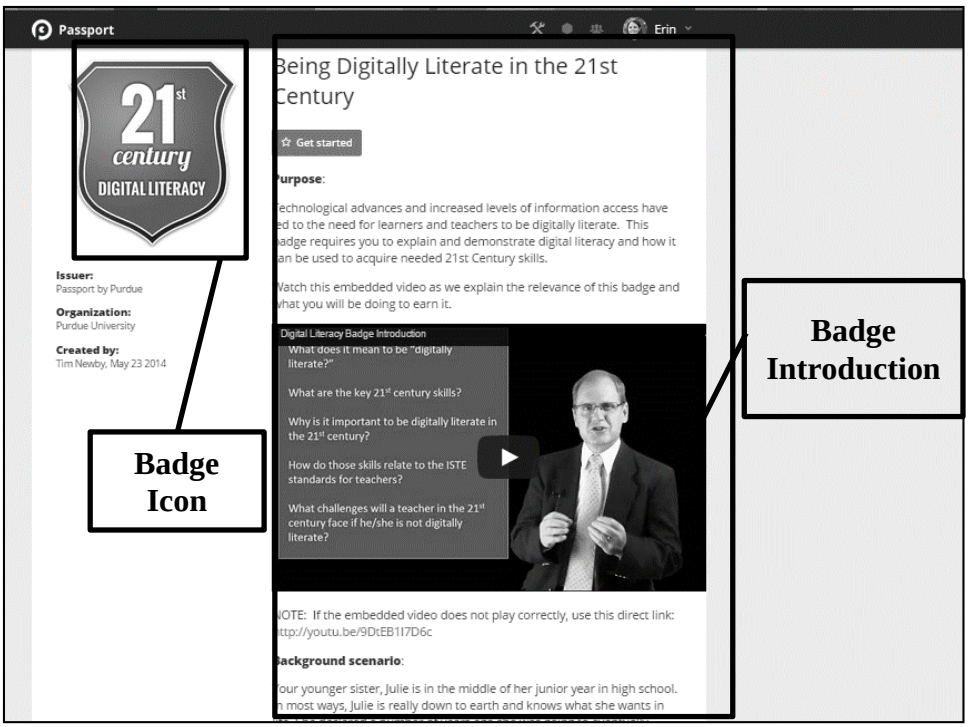

Figure A 2. Passport badge view – Getting started

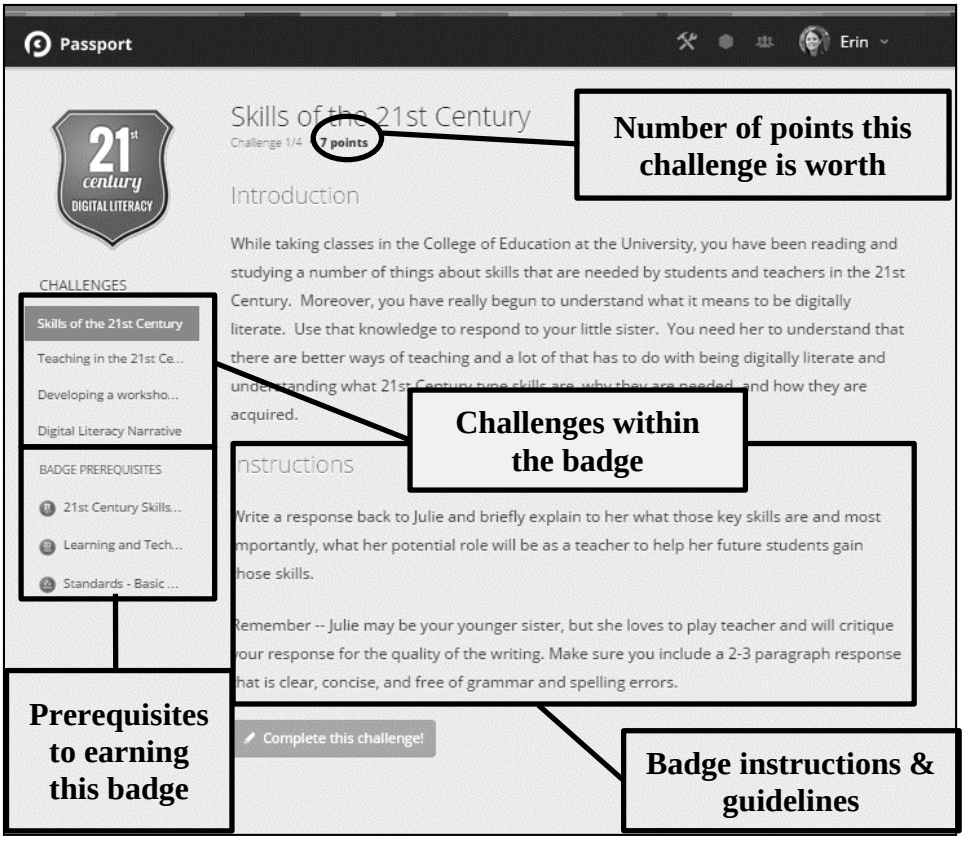

Figure A 3. Passport challenge view

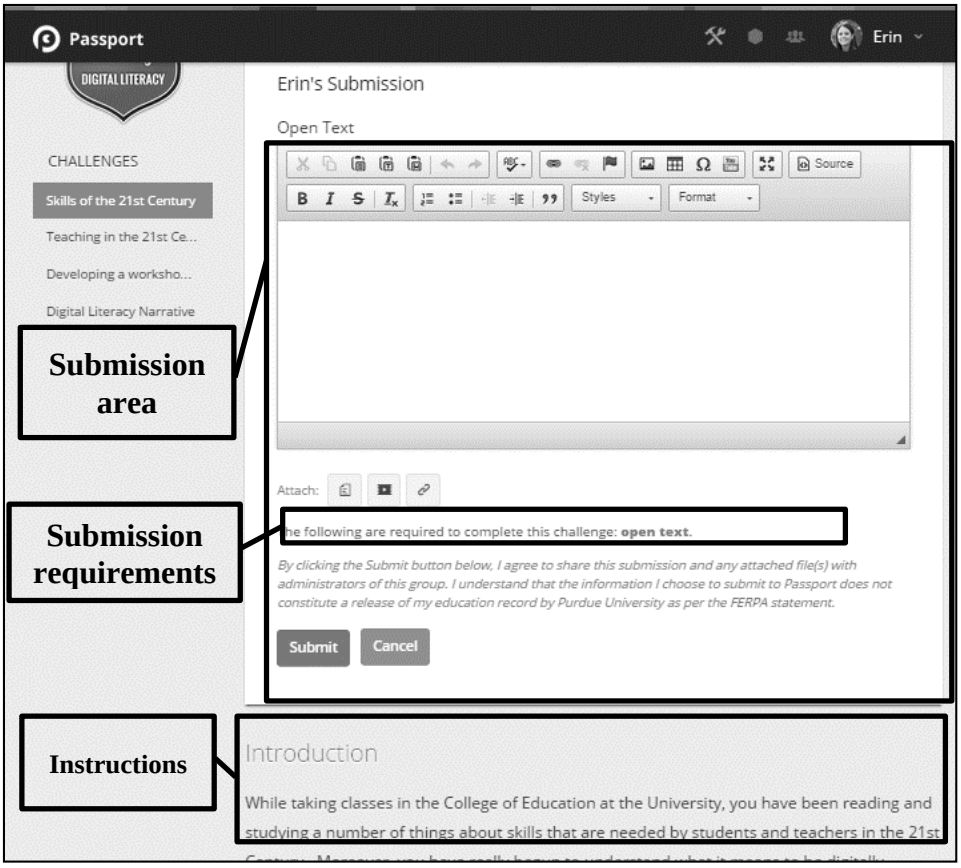

Figure A 4. Passport student submission

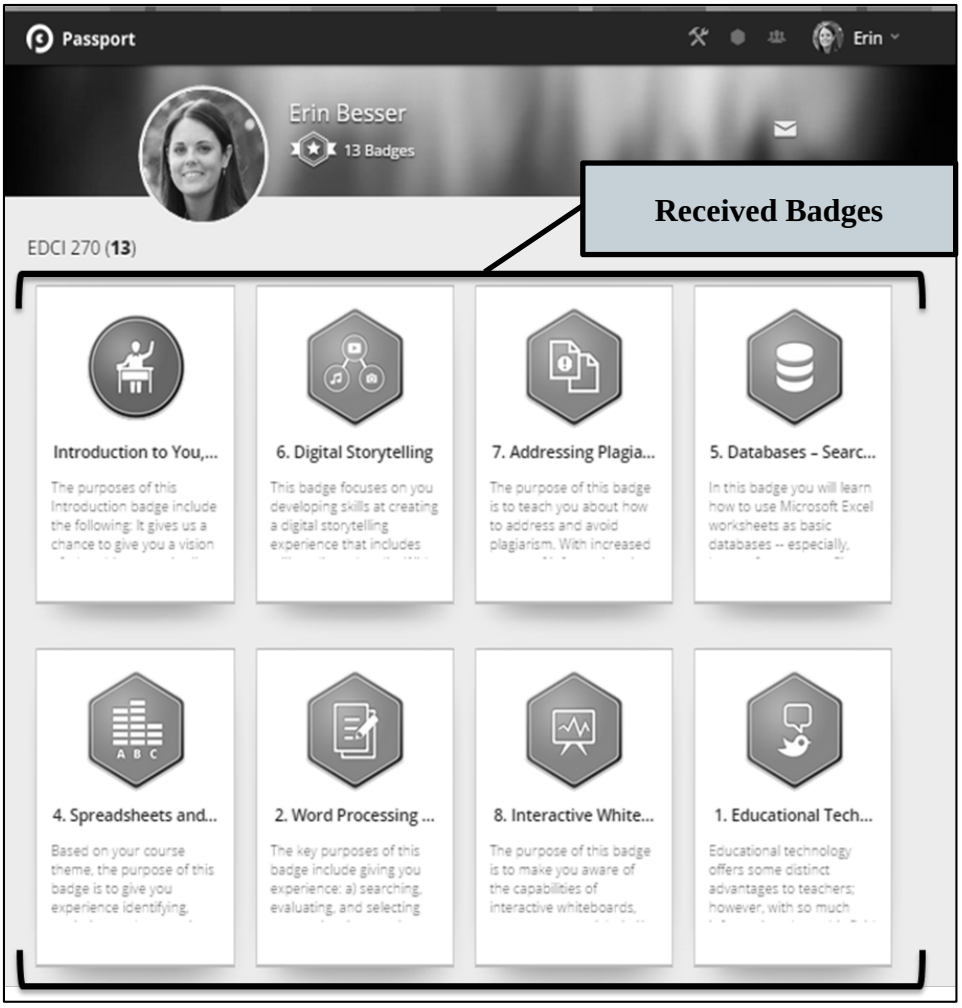

Figure A 5. Passport user's public profile

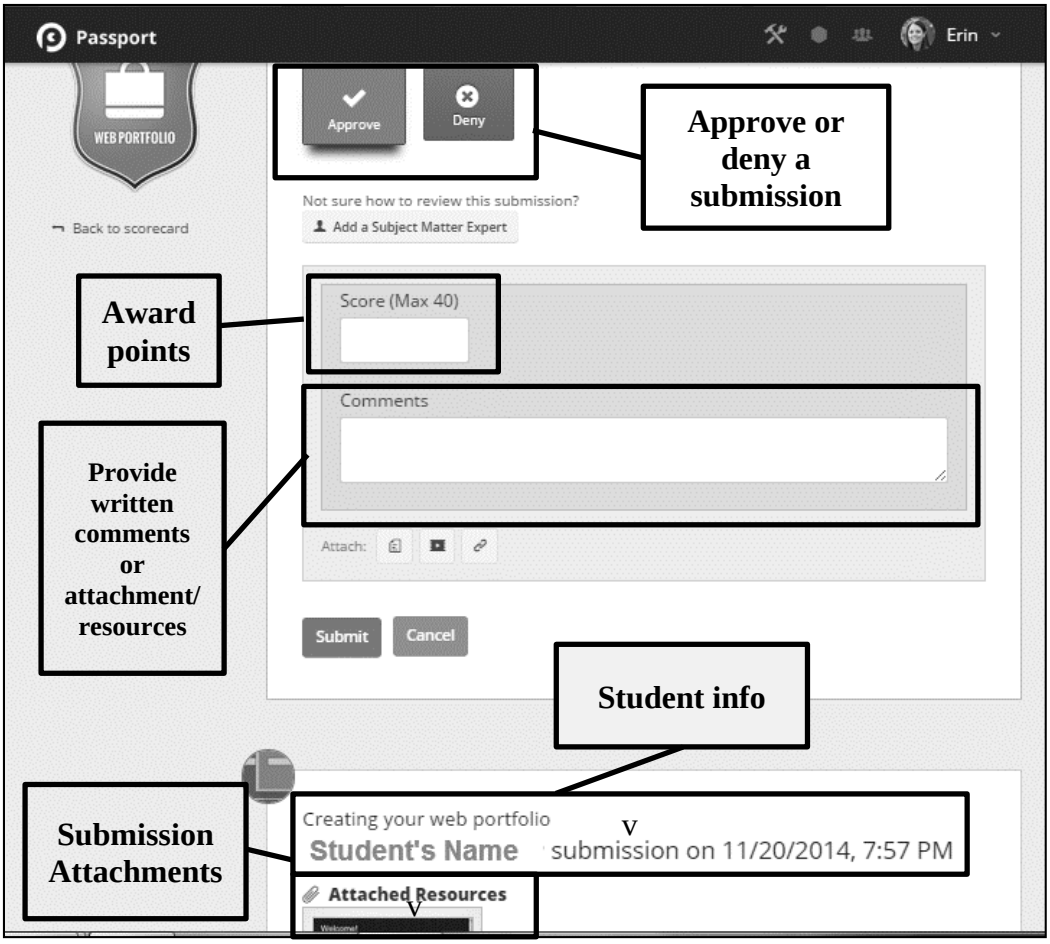

Figure A 6. Passport instructor feedback and assessment

Appendix B Course Schedule

JANUARY		
Week	What to be working on	Deadlines
1 1/14	• Intro Badge • Web Portfolio Badge	
2 1/19	• Basic Badge: 21st Century Skills • Basic Badge: Standards • Basic Badge: Learning and Technology • **Being Digitally Literate in the 21st Century**	
3 1/26	• Basic Badge: Info Literacy • Basic Badge: Copyright and Creative Commons • Basic Badge: Plagiarism • Information Literacy: Accessing Scholarly Information	Feedback deadline: • Being Digitally Literate
FEBRUARY		
4 2/2	• E-board Badge in class • Basic Badge: Video Production • MS Office Production Badge	Feedback deadline: • Information Literacy
5 2/9	• E-board Badge in class • MS Office Production Badge 1 • MS Office Production Badge 2 • Basic Badge: Video Production • **Basic Badge: Writing Lesson Objectives** • Basic Badge: Instructional Activities • Basic Badge: Instructional Methods and Instructional Media	

6 2/16	• Basic Badge: Tool Literacy - Computer Software and Web Applications • **Web 2.0 Badge 1** • **Web 2.0 Badge 2** • **Web 2.0 Badge 3**	Feedback deadline: • E-board • MS Office
7 2/23	• Web 2.0 Badge 1 • Web 2.0 Badge 2 • Web 2.0 Badge 3	
MARCH		
8 3/2	• Basic Badge: Distance Education and Online Learning • Basic Badge: Assistive Technology • Basic Badge: Issues: Legal, Ethical, Equity, and Security	Feedback deadline: • Web 2.0
9 3/9	• Tool Literacy • Basic Badge: Tech Integration	
SPRING BREAK		3/18/15 11:59 PM - Last chance to turn in: Intro badge; all Basic Badges from weeks 1-8; Being Digitally Literate in the 21st Century; Information Literacy; E-board; Office Production Badge; Web 2.0 (1, 2 & 3)
10 3/23	• Tool Literacy • Basic Badge: Planning Cards • Basic Badge: Evaluating Instruction	
11 3/30	• Tool Literacy • Individualized Instruction Badge	• Meet with your TA for a brainstorming meeting
APRIL		
12 4/6	• Individualized Instruction Badge	
13 4/13	• Individualized Instruction Badge	• Peer Review
14 4/20	• Individualized Instruction Badge	

15 4/27	• Individualized Instruction Badge	Last chance to turn in: All Basic Badges from weeks 9-15; Individualized Instruction Badge; Web Portfolio Badge
MAY		
16 5/4	FINALS	

Appendix C Student Survey

When questions refer to completing and submitting a Digital Badge, think specifically about the following badges: **Digital Literacy, Objectives**, and **all three chosen Web 2.0 tools**.

1. Upon receiving written feedback from your TA, how did you approach and use that feedback? List the steps you took from when you first submitted a badge to when you resubmitted a badge for a second time.
2. After completing and receiving a badge, did you ever revisit previous feedback? If yes, in what ways and for what purposes?
3. Did you ever store your feedback externally from *Passport*? If so, where? What types of feedback did you save and why?
4. In thinking about the process of submitting a badge and resubmitting (possibly several times), what were your thoughts about this process (initial vs. how these may have changed)?
5. How did this process affect your motivation during badge completion? In what ways was motivation effected both positively and negatively?
6. How did the feedback you received on the Digital Literacy badge inform and assist you in preparation and in completion of the in-class quizzes?
7. Describe the interactions you shared with your TA (within *Passport*) while you worked through the badge process. Did those interactions change over time? If so, how?

8. In thinking about the feedback process, what kinds of feedback did you find **most** helpful? What format was most helpful or in what format would you have preferred?
9. In thinking about the feedback process, what kinds of feedback did you find **least** helpful? Could that feedback be enhanced through a different format (e.g. audio or video)?
10. In thinking about the badges you have completed in which ones were receiving feedback most important to you? Why?
11. In general, how important is receiving feedback on assignments? What is the most important feature of that feedback?

Appendix D Assignment Feedback Coding Schema

Table D 1. Assignment Feedback Coding Schema

Categories	Indicators-Codes		Citation	Description	Examples
Outcome Feedback	Negative Corrective	FB-NegCor	Guskey, 2007; Balzer et al., 1989; Butler & Winne, 1995	Simple, indicates results about performance, no information regarding the task.	"Incorrect", "Follow the instructions", "poorly executed", "You did not include part b of the assignment"
	Positive Corrective	FB-PosCor	Balzer et al., 1989; Butler & Winne, 1995	Simple, indicates results about performance, no information regarding the task.	"Correct", "Well done", "Good job", "Thank you"
Clarification	Clarify task performance	FB-TaskClarity	Balzer et al., 1989; Butler & Winne, 1995; Nicol & Macfarlane-Dick, 2006	Feedback helps to clarify what good performance is and communicates the criteria, and expectations of the task, and may refer student back to task.	"Remember the video you were to watch on 21st century skills? If you had referenced the points made in that video, you would have understood 21st century skills better" "Consider reviewing the objectives on page 1. Use these objectives to guide your essay writing."

Table D 1 Continued

			FB-Technical	Feedback specifically helping students resolve and clarify technical issues.	"You forgot to include the link to your video. This needs to be done in addition to your summary."
	Delivers specific corrective information	FB-Specific-Corr	Nicol & Macfarlane-Dick, 2006	Feedback should explicitly inform students about the quality of their learning outcomes, and helps them troubleshoot and self-correct.	"'The students will learn (*avoid using words like learn- instead try 'identify'*) about animal habitats'"
			FB-Grammar-Minor Errors	Specific edits related to grammar, minor errors, and formatting issues.	"On line two you have several grammatical errors. Make sure to fix those before resubmitting"
Decreasing Gaps in Knowledge	Closes gap in learning	FB-Gap	Balzer et al., 1989; Butler & Winne, 1995; Nicol & Macfarlane-Dick, 2006	Feedback delivers important information regarding desired learning, perceived learning, and affords opportunities to decrease that gap.	"In this task you should have defined the topic and provide examples- you only defined the key words."

Table D 1 Continued

		FB-GapPo	Balzer et al., 1989; Butler & Winne, 1995; Nicol & Macfarlane-Dick, 2006	Information regarding gaps in achievement is given but is also matched with a positive statement.	"In the assignment you did a nice job describing the learners' abilities, but forgot to include information about the learning context."
	Delivers high quality information confirming learning and understanding	ML-Confirm	Nicol & Macfarlane-Dick, 2006	Positive statements confirming learning with specific information regarding the outcomes of the task. May restate students work.	"You've done a nice job identifying the key characteristics of student assessment. Specifically when you stated, XYZ."
	Reference to learning goals/objectives	ML-Goals	Bloom, 1971a	Instructor refers back to the overarching goals or objectives of the lesson (not the actual task criteria).	"In this challenge you are working to plan and develop an effective lesson. Think about the planning stages and how that might help you to write this lesson."
Motivation & Interaction	Social-Affective & Encourages positive motivational beliefs	FB-Soc-Aff-Mot	Nicol & Macfarlane-Dick, 2006; Yang & Carless, 2013	Feedback should provide opportunities to increase students' motivation and self-efficacy, and promotes student-instructor relationship. Including emojis.	"I know you have struggled with this assignment, congrats on a job well done!" "Well done! I can see that you have done a nice job clearly explaining the topic and providing detailed examples."

Table D 1 Continued

	Encourages teacher and peer dialogue	FB-Dialogue	Nicol & Macfarlane-Dick, 2006	Teacher- student and peer-student interactions are promoted with feedback.	"I see that you are not understanding the topic. What is specifically causing you confusion? Let's meet to discuss this."
	Organizational	FB-Novel	Yang & Carless, 2013	Using novel methods of providing feedback (e.g. audio, video)	N/A
	Helps inform teaching	FB-Inform	Nicol & Macfarlane-Dick, 2006	The process of providing feedback and observing how students apply that feedback gives instructors valuable information regarding their teaching and learning methods and strategies.	"Thank you for sharing your frustrations. Next time I will try to provide more visuals"
Opportunities to further knowledge	Extension Activity	ML-ExAct	Guskey, 2007	Instructor provides student with an activity to extend their thinking.	"Here is a site that walks you through how to write objectives. Go through this activity to help you master the process."

Table D 1 Continued

	Extension Resource	ML-ExResource	Guskey, 2007	Instructor provides resources that extend the instructional task. The student may have mastered initial content, but is provided with ways to go beyond the initial task and increase learning.	"Consider using Bloom's Taxonomy to develop your objectives into higher level thinking skills"
Promotes overall learning and cognitive development	Facilitates self-assessment (reflection) and promotes self-regulated learning	FB-Reflect	Nicol & Macfarlane-Dick, 2006	Feedback gives students opportunities to self-assess or reflect, often in the form of prompts.	"How might this task be used in your future profession? What skills are transferred?"
	Aids in transfer	FB-Transfer	Yang & Carless, 2013	Promotes professional development and success in future position.	"Learning how to write objectives well now will help you as a practicing teacher."

Appendix E Student Survey Coding Schema

Table E.1. Student Survey Coding Schema

Themes	Subthemes	Categories	Codes	Description
Importance & nature of feedback	Importance of FB	Important	Important	Students indicate FB is important.
		Not Important	Not Important	Students indicate FB is NOT important.
	Important Feature of FB	Corrections	Corrections	Students indicated that the most important feature of FB is when TAs provides clear instructions with details, explanations, hints, and examples.
		Accessibility	Accessibility	Students indicated that the most important feature of FB is that it needs to be accessible and easily retrievable.
		Opportunity for resubmission	Opportunity for resubmission	Students indicated that the most important feature of FB is the opportunity for resubmission.
		Improve Quality	Quality	Students indicated that the most important feature of FB is when the TAs provide suggestions regarding how to improve the overall quality of content.
		Confirm Learning & Understanding	Confirm understanding	Students indicated that the most important feature of FB is when TAs confirm student understanding, give examples related to application (e.g. future teaching), and extending thoughts surrounding content.
	When is feedback most crucial	Type of assignment	Web 2.0	Students indicate that FB is most important with regards to the Web 2.0 badge.
			Objectives	Students indicate that FB is most important with regards to the Objective badge.

Table E 1 Continued

			Digital Literacy	Students indicate that FB is most important with regards to the Digital Literacy badge.
		Assistance needed	Corrections Required	Students indicate that FB is most important when corrections or resubmission is required.
			Unknown content	Students indicate that FB is most important when the content is new or unknown.
			Struggled with- need help	Students indicate that FB is most important when the student is struggling with the content, task, or needs additional help/guidance.
			Complex – steps	Students indicate that FB is most important when the task requires many steps or the content is complex in nature.
		Important Content	Content related to other courses or important content	Students indicate that FB is most important with content that is related to other courses and key content (specifically related to future teaching).
		Directly related to grade	Worth the most points	Students indicate that FB is most important on badges that have the most points (i.e. effects grade).
		Quiz prep	No	Students did not use FB for quiz prep.
			Referenced Badge Content	Students referenced badge content or other course materials to prepare for quizzes.
			Feel prepared	Students indicate that they felt more prepared after referencing their FB.
			Clear up misconceptions	Students indicated that the TAs were able to clear up misconceptions regarding badge content and this in turn helped them better prepare for quizzes.

Table E 1 Continued

	Helpful Feedback	Corrections	Corrections	The most helpful types of FB are when TAs provides clear instructions with details, explanations, hints, and examples.
		Improve Quality	Quality	The most helpful types of FB are when TAs provide suggestions regarding how to improve the overall quality of content.
		Confirm Learning & Understanding	Confirm understanding	The most helpful types of FB are when TAs confirm student understanding, give examples related to application (e.g. future teaching), and extending thoughts surrounding content.
	Format	Desired Format of FB	F2F	Students indicate the most helpful FB is done face-to-face.
			Email	Students indicate the most helpful FB is completed through email.
			Within *Passport*	Students indicate the most helpful FB is done within *Passport*.
			Short	Students indicate the most helpful FB is short or bulleted.
			Screencast	Students indicate the most helpful FB is when screencast software is used.
			On badge documents	Students indicate the most helpful FB is written directly on student's badge submission documents.
	Least helpful Feedback	Unclear	No details – vague – general – unclear – why points are lost – Reference back to content	The least helpful types of FB are ones that provide no details, are vague, general, or unclear. Additionally, not explaining why points are lost or referencing students back to the badge content.

Table E 1 Continued

		Only correctives	Only correctives	The least helpful types of FB are ones that only provide correctives (e.g. “good job”).
		Grammar/ Spelling	Grammar	The least helpful types of FB are ones that correct spelling, grammar, or syntax mistakes.
		Only negative	Only negative	The least helpful types of FB are ones that provide only negative comments.
		No suggestions	No suggestions	The least helpful types of FB are ones that provide no suggestions (instructions) or ways to improve.
		All good	Everything is good	Students do not indicate any type of FB that is least helpful. They indicate that all feedback is good.
	FB enhanced through a different format	No	No	Students indicate that ‘least helpful’ FB is would not be enhanced through another format.
		Screencast - Video	Screencast - Video	Students indicate that ‘least helpful’ FB would be enhanced through screencasts and/or videos.
		Audio	Audio	Students indicate that ‘least helpful’ FB would be enhanced through audio recordings.
Authority over learning	Teacher-centered	TAs are the holder of knowledge	Did what my TA said	Students make corrections regarding the suggestions of the TA, and indicating fixing this content only.
			TA is helping make my work better	Indicate positive statements regarding TAs helping them improve their assignments and aided in their learning in providing FB that was helpful, informative, meaningful, clear, and/or constructive.
	Interactions	Affective	Encouraging – Personal messages	Students indicated their TAs were encouraging, provided personal messages, or increased their moods and/or attitudes.

Table E 1 Continued

			Digital Badge System	*Passport*	Students indicated that all interactions regarding FB took place within the Digital Badge system.
			Clarification	Emails – F2F	Students indicated they sought out clarification through email and F2F interactions. Additionally, they mention that this is often for timeliness.
		Interactions over time	Interaction did not change over time	No	Interactions among TAs and students did not change over time.
			Less help was needed over time	Less help needed	Students indicate they need less help (FB) from TAs over time.
			More effective FB	More effective- comfort	Students indicate that FB became more effective over time, and/or they became more comfortable asking/receiving FB.
	Student-centered		Ownership of learning	Clarifying - Questioning	Students seek out the advice of the TA to clarify feedback and to ask questions regarding submissions requirements and corrections.
				Reference badge	Students refer back to the required materials before making changes to their assignments.
				Reevaluating own work	Students reevaluate their own work before making changes.
		External Storing	No	No	Students indicate they did not store FB externally. They also may have not known how to do so or find it unnecessary.
			Yes	Yes	Students store FB externally.
		Revisit	No	No	Students do not revisit previous feedback or indicated that they do not know how to do so.

Table E 1 Continued

		Learning at the next level	Yes	Confirming Understanding	Students indicate revisiting FB for purposes of confirming learning.
				Continue or Avoid	Indicate a validation of strengths and/or what to continue doing OR as a way to avoid repeated mistakes.
				Apply	Students use FB to apply to other coursework or similar tasks.
Learning for Mastery	Thoughts on Resubmit & Motivation	Negative	FB Varied		Students indicate FB varied with each submissions (e.g. new items were indicated the second time that weren't addressed the first time).
			Denied Submission		Students indicate a decline in enthusiasm/motivation with each denied submission.
			Time management		Students indicate the lack of time management skills or desire to spend the time required for mastery of content.
			Minor Errors		Students indicate a negative opinion on being required to change minor errors, including grammar specifically having a negative impact on motivation.
		Positive	Increased Learning		Students indicate they increased their learning and understanding of content through the resubmission process.
			Understood expectations		Students better understood the expectations of not only the specific challenge/badge, but also coursework and TA expectations.

Table E 1 Continued

			Gained Confidence	Students indicate they gained confidence in themselves and learning outcomes.
			Early - grades	Students indicate they received higher scores and/or grades because of the resubmission process specifically having a positive impact on motivation.
		FB Deadline	FB Deadline	Students indicate how the FB deadlines effect their motivation, course progress, received FB, etc.
	Score/Grade	Score/Grade	Score - grade	Students indicate how Mastery Learning effects their course grades and scores within badges.
	General thoughts on Mastery Learning	Positive ML	Positive ML	Students indicate overall positive comments towards the Mastery Learning (resubmission) process and being provided FB.

Appendix F Number of codes per challenge: Integrating Web 2.0 applications as a teaching and learning tool – Skylar

Table F 1. Number of codes per challenge: Integrating Web 2.0 applications as a teaching and learning tool – Skylar

	FB- Technical	FB-Dialogue	FB-Gap	FB- GapPos	FB-Inform	FB-NegCor	FB-Novel	FB-PosCor	FB-Reflect	FB-Soc-Aff-Mot	Emojis	FB-Specific-Corr	Grammar - MinorErrors	FB-TaskClarity	Reference to grade deadlines	FB-Transfer	ML- Confirm	ML_ExResource	ML-ExAct	ML-Goals	No evaluation completed
Web 2.0	14	4	44	20	1	69	0	211	25	17	30	1	0	44	0	1	36	3	0	3	103
Audacity	1	0	2	1	0	1	0	2	1	0	1	1	0	1	0	0	3	0	0	0	4
Integrating Audacity as a teaching-learning tool	0	0	2	1	0	0	0	2	1	0	0	1	0	1	0	0	2	0	0	0	2
Using Audacity	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	2
Audioboo	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1
Integrating Audioboo as a teaching-learning tool	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0
Using Audioboo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Table F 1 Continued

Blogger	1	0	2	0	0	2	0	0	1	0	1	0	0	2	0	0	1	0	0	0	1
Integrating Blogger as a teaching-learning tool	0	0	2	0	0	2	0	0	1	0	0	0	0	2	0	0	1	0	0	0	0
Using Blogger	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Creately	0	0	3	1	0	13	0	14	4	1	0	0	0	4	0	0	1	1	0	0	11
Integrating Creately as a teaching-learning tool	0	0	3	1	0	13	0	14	4	1	0	0	0	4	0	0	1	1	0	0	2
Using Creately	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Diigo	0	0	5	2	0	4	0	15	0	0	1	0	0	3	0	0	2	1	0	1	5
Integrating Diigo as a teaching-learning tool	0	0	3	2	0	4	0	9	0	0	1	0	0	2	0	0	1	1	0	1	1
Using Diigo	0	0	2	0	0	0	0	6	0	0	0	0	0	1	0	0	1	0	0	0	4
Dipity	0	0	0	0	0	0	0	9	1	0	2	0	0	1	0	0	1	0	0	0	3
Integrating Diigo as a teaching-learning tool	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
using Dipity	0	0	0	0	0	0	0	9	0	0	2	0	0	1	0	0	1	0	0	0	1
Evernote	1	1	4	1	0	6	0	30	4	3	5	0	0	7	0	0	4	0	0	1	9
Integrating Evernote as a teaching-learning tool	0	0	4	1	0	6	0	28	4	1	3	0	0	7	0	0	3	0	0	0	3
Using Evernote	1	1	0	0	0	0	0	2	0	2	2	0	0	0	0	0	1	0	0	1	6

Table F 1 Continued

Jing	0	2	6	4	1	2	0	33	4	2	5	0	0	4	0	0	5	0	0	0	8
Integrating Jing as a teaching-learning tool	0	0	5	3	0	2	0	30	4	0	3	0	0	4	0	0	5	0	0	0	1
Using Jing	0	2	1	1	1	0	0	3	0	2	2	0	0	0	0	0	0	0	0	0	7
Mendeley	0	0	0	0	0	1	0	0	0	2	1	0	0	0	0	0	1	0	0	0	0
Integrating Mendeley as a teaching-learning tool	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Using Mendeley	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	1	0	0	0	0
Mindmeister	1	0	1	1	0	1	0	1	0	1	1	0	0	1	0	0	0	0	0	0	11
Integrating Mindmeister as a teaching-learning tool	0	0	1	1	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	4
Using Mindmeister	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	7
Padlet	0	0	1	0	0	1	0	6	1	0	0	0	0	1	0	0	2	0	0	0	3
Integrating Padlet as a teaching-learning tool	0	0	1	0	0	1	0	6	1	0	0	0	0	1	0	0	0	0	0	0	2
Using Padlet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1
Poll Everywhere	5	1	5	3	0	10	0	40	4	4	2	0	0	9	0	0	5	1	0	0	15
Integrating Poll Everywhere as a teaching-learning tool	1	0	5	3	0	9	0	40	4	2	0	0	0	9	0	0	4	1	0	0	3
Using Poll Everywhere	4	1	0	0	0	1	0	0	0	2	2	0	0	0	0	0	1	0	0	0	12

Table F 1 Continued

Popplet	0	0	2	2	0	0	0	7	0	1	0	0	0	1	0	1	2	0	0	0	3
Integrating Popplet as a teaching-learning tool	0	0	2	2	0	0	0	7	0	0	0	0	0	1	0	1	1	0	0	0	1
Using Popplet	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	2
Prezi	5	0	11	3	0	22	0	51	4	2	10	0	0	9	0	0	5	0	0	1	21
Integrating Prezi as a teaching-learning tool	0	0	11	3	0	22	0	49	4	2	7	0	0	9	0	0	5	0	0	1	5
Using Prezi	5				0	0	0	0	0	0	2	0	0	3	0	0	0	0	0	0	0	0	16
Slideshare	0				0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	1	0	0	0	5
Integrating Slideshare as a teaching-learning tool	0				0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
Using Slideshare	0				0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	3
Soundcloud	0				0	2	2	0	5	0	1	1	0	1	0	0	1	0	0	2	0	0	0	3
Integrating SoundCloud as a teaching-learning tool	0				0	1	1	0	5	0	1	0	0	1	0	0	1	0	0	2	0	0	0	1
Using SoundCloud	0				0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
Wikispaces	0				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Integrating Wikispaces as a teaching-learning tool	0				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Using Wikispaces	0				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix G Number of codes per challenge: Integrating Web 2.0 applications as a teaching and learning tool – Avery

Table G 1. Number of codes per challenge: Integrating Web 2.0 applications as a teaching and learning tool – Avery

	FB- Technical	FB-Dialogue	FB-Gap	FB- GapPos	FB-Inform	FB-NegCor	FB-Novel	FB-PosCor	FB-Reflect	FB-Soc-Aff-Mot	Emojis	FB-Specific-Corr	Grammar - MinorErrors	FB-TaskClarity	Reference to grade deadlines	FB-Transfer	ML- Confirm	ML_ExResource	ML-ExAct	ML-Goals	No evaluation completed
Web 2.0	14	1	19	18	0	0	5	0	3	27	0	8	61	58	4	43	133	5	0	1	1
Audacity	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	4	0	0	0	0
Integrating Audacity as a teaching-learning tool	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0
Using Audacity	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0
Audioboo	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0
Integrating Audioboo as a teaching-learning tool	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Using Audioboo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0

Table G 1 Continued

Blogger	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	0	5	0	0	0	0
Integrating Blogger as a teaching-learning tool	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	3	0	0	0	0
Using Blogger	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0
Creately	7	0	7	7	0	0	0	0	1	10	0	4	10	14	1	4	14	0	0	0	0
Integrating Creately as a teaching-learning tool	0	0	2	2	0	0	0	0	0	2	0	0	9	5	0	1	9	0	0	0	0
Using Creately	7	0	5	5	0	0	0	0	1	8	0	4	1	9	1	3	5	0	0	0	0
Diigo	0	0	1	1	0	0	0	0	0	2	0	0	4	4	0	3	4	0	0	0	1
Integrating Diigo as a teaching-learning tool	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Using Diigo	0	0	1	1	0	0	0	0	0	2	0	0	4	4	0	3	4	0	0	0	1
Dipity	0	0	0	0	0	0	1	0	0	0	0	0	4	3	0	4	6	1	0	0	0
Integrating Diigo as a teaching-learning tool	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	0	5	0	0	0	0
using Dipity	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	4	1	1	0	0	0
Evernote	0	0	0	0	0	0	1	0	0	1	0	0	2	5	0	11	14	1	0	0	0
Integrating Evernote as a teaching-learning tool	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	2	6	0	0	0	0
Using Evernote	0	0	0	0	0	0	1	0	0	1	0	0	0	2	0	9	8	1	0	0	0
Jing	0	1	1	1	0	0	0	0	0	0	0	0	2	4	0	9	14	0	0	0	0

Table G 1 Continued

Integrating Jing as a teaching-learning tool	0	0	1	1	0	0	0	0	0	0	0	0	2	2	0	2	5	0	0	0	0
Using Jing	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	7	9	0	0	0	0
Mendeley	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0
Integrating Mendeley as a teaching-learning tool	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0
Using Mendeley	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Mindmeister	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	3	0	0	0	0
Integrating Mindmeister as a teaching-learning tool	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Using Mindmeister	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	2	0	0	0	0
Padlet	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Integrating Padlet as a teaching-learning tool	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Using Padlet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poll Everywhere	1	0	1	0	0	0	0	0	0	0	0	1	6	8	0	6	11	0	0	0	0
Integrating Poll Everywhere as a teaching-learning tool	0	0	0	0	0	0	0	0	0	0	0	0	6	2	0	0	9	0	0	0	0
Using Poll Everywhere	1	0	1	0	0	0	0	0	0	0	0	1	0	6	0	6	2	0	0	0	0
Popplet	0	0	1	1	0	0	0	0	0	4	0	0	1	1	0	2	6	0	0	0	0
Integrating Popplet as a teaching-learning tool	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	3	0	0	0	0
Using Popplet	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	2	3	0	0	0	0

Table G 1 Continued

Prezi	3	0	7	7	0	0	0	0	2	6	0	2	15	12	3	0	26	0	0	0	0
Integrating Prezi as a teaching-learning tool	0	0	3	3	0	0	0	0	2	1	0	1	10	5	1	0	13	0	0	0	0
Using Prezi	3	0	4	4	0	0	0	0	0	5	0	1	5	7	2	0	13	0	0	0	0
Slideshare	1	0	0	0	0	0	3	0	0	0	0	0	9	2	0	0	14	3	0	0	0
Integrating Slideshare as a teaching-learning tool	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	7	0	0	0	0
Using Slideshare	1	0	0	0	0	0	3	0	0	0	0	0	5	2	0	0	7	3	0	0	0
Soundcloud	1	0	1	1	0	0	0	0	0	2	0	1	1	2	0	0	6	0	0	1	0
Integrating SoundCloud as a teaching-learning tool	0	0	1	1	0	0	0	0	0	0	0	0	1	2	0	0	3	0	0	0	0
Using SoundCloud	1	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	3	0	0	1	0
Wikispaces	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0
Integrating Wikispaces as a teaching-learning tool	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Using Wikispaces	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0

VITA

VITA

Erin D. Besser

Doctoral Candidate
Learning Design & Technology
Department of Curriculum & Instruction
Purdue University

EDUCATION AND CREDENTIALS

Ph.D.
Purdue University
West Lafayette, IN
Chair: Dr. Timothy J. Newby
Committee members: Dr. Jennifer C. Richardson, Dr. Sunnie L. Watson, & Dr. Wayne E. Wright

Dissertation Title: Exploring the Role of Feedback and its Impact within a Digital Badge System from Instructor and Student Perspectives: A Case Study of Preservice Teacher Education
2016
Master of Arts in Educational Technology
Azusa Pacific University
Azusa, CA
2008
Bachelor of Arts in Liberal Studies (Blended Multiple Subject Program)
California State University, Sacramento
Sacramento, CA
2004
California Clear Multiple Subject Credential with supplementary authorizations in SDAIE/ELD, Art, and Computer Applications
California State University, Sacramento
Sacramento, CA
December 2004 – Present

PROFESSIONAL HIGHLIGHTS

- Area of specialization: elementary education, technology integration
- Teaching: K-6 elementary school experience
- EDCI 270 Learning Community Instructor, Fall 2011, 2012, 2013, 2014 & 2015
- EDCI 270 Mentor TA, Spring 2012, Fall 2013, & Fall 2014
- EDCI 270 Lead TA, Summer 2013- present

RESEARCH EXPERIENCE

Research Project Member, Purdue University, Department of Learning Design and Technology, Guiding Preservice Teacher's Critical Thinking about Effective Technology Integration
Spring 2015 – Present

- Gathered academic resources and various literature
- Participated in collaboration leading to a manuscript
- Worked with other participating doctoral students and faculty adviser

Research Project Member, Purdue University, Department of Learning Design and Technology, Instructors' Perceptions of Instructor Presence in Online Learning Environments
Spring 2015 – Present

- Gathered academic resources, organized data, and conducted interviews
- Completed qualitative data collection and analysis
- Participated in collaboration leading to a drafted conference proposal and a drafted manuscript
- Worked with faculty lead researcher and other participating doctoral students

Research Project Member, Purdue University, Department of Learning Design and Technology, Conceptualizing and Investigating Instructor Presence in Online Learning Environments
Spring 2014 – Spring 2015

- Gathered academic resources, organized data, and conducted interviews
- Completed qualitative data collection and analysis
- Experience using Nvivo10
- Participated in collaboration leading to a drafted conference proposal and a drafted manuscript currently under review
- Worked with faculty lead researcher and other participating doctoral students

Research Project Instructor, Purdue University, Department of Learning Design and Technology, Supporting Oral Narrative Development of Preschool English Language Learners by Using Multimedia Stories: A Qualitative Case Study
Fall 2013 – Spring 2014

- Developed classroom activities
- Implemented classroom activities through teaching to PK students
- Interacted with both ELL students and parents
- Worked with other participating doctoral students

Research Project Member, Purdue University, Military Family Research Institute, Dept. of Learning Design & Technology
Helping Military families make sense of information
Fall 2012 – Summer 2013

- Gathered academic resources, organized data, and conducted interviews
- Developed presentation materials and activities (documents and media)
- Co-facilitated MFRI workshop
- Worked with faculty advisor and other participating doctoral students

Research Project Member, Purdue University, IMPACT Classroom, Dept. of Learning Design & Technology
Investigating the "Flipped Classroom" Experience
Fall 2012 – Present

- Completed literature reviews, gathered academic resources, and organized data
- Worked with faculty advisor and other participating doctoral students

Research Assistant, Purdue University, PERSIST, Dept. of Learning Design & Technology
Teacher scaffolding through technology integration
Fall 2011 – Summer 2012

- Developed classroom activities
- Observed classroom implementation, including using qualitative research methods
- Worked with faculty advisor and other participating doctoral students
- Manuscript development and submission

TEACHING AND RELATED EXPERIENCE

Higher Education Experience

Head Teaching Assistant, Purdue University, Department of Curriculum & Instruction
Fall 2013 – present
EDCI 27000: "Introduction to Educational Technology and Computing"

- Maintain Blackboard Learn & Canvas courses
- Hire & supervise undergraduate teaching assistants
- Provide mentorship to new teaching assistants
- Organize & Manage course grade book
- Work with faculty advisor and other participating doctoral students

Teaching Assistant, Purdue University, Department of Curriculum & Instruction
Fall 2011 – present
EDCI 27000: "Introduction to Educational Technology and Computing"

- Evaluated Students
- Delivered course instruction using a variety of multimedia and Web 2.0 tools
- Developed course website and provided resources for students *(erin270.weebly.com)*
- Developed course materials
- IMPACT course (Flipped Classroom) TA
- Proficient experience using digital badge software (Passport)
- Proficient experience using various LMS software (Blackboard, Canvas)
- Worked with faculty advisor and other participating doctoral students
- Learning Community TA, Fall 2011. 2012, 2013, & 2014
- Mentor TA, Spring 2012, Fall 2013, & Fall 2014

Guest Lecturer, Purdue University, Department of Curriculum & Instruction
Fall 2013 – Present (once per semester)
EDCI 27000: "Introduction to Educational Technology and Computing"

- Topics included classroom case study facilitation on topics relating to technology integration, preservice and in service teacher development, and instructional strategies for the K-12 classroom.

Guest Lecturer, Purdue University, Department of Curriculum & Instruction
Fall 2015
EDCI 62800: "Curriculum And Instruction Doctoral Seminar I"

- Topics included dissertation research strategies for planning, completing, and defending your dissertation. Additional topics included working with mentors and faculty, and planning for research and teaching experiences in graduate school.

Instructional Design Consultant and Trainer, University of California-Davis, University Extension: The Northern Training Academy
2014

- Developed and presented a training on Mobile applications and Web 2.0 tools for classroom instruction and professional use
- Consulted on various course curriculum regarding the integration of technology with the area of professional development within Social Work
- Adapted and integrated technology into course curriculum entitled, *Ethics in Social Work*
- Trained employees on Qualtrics software
- Developed and transferred existing evaluation measures to Qualtrics software
- Worked closely with staff and academy director

Co-Instructor, Purdue University, Department of Curriculum & Instruction
Fall 2013
EDCI 67200: "Advanced practices in Learning Systems Design"

- Evaluated Students
- Worked in Blackboard online platform
- Facilitated discussion and reviewed course materials using a variety of Web 2.0 tools
- Worked with faculty co-instructor

Guest Lecturer, Purdue University, Department of Curriculum & Instruction
Fall 2013
EDCI 67200: "Advanced practices in Learning Systems Design"

- Classroom facilitation on instructional design challenges within k-12 learning environments

Teaching Assistant, Purdue University, Dept. of Curriculum, & Instruction
Summer 2013
EDCI 59300: Introductory Secondary Transition to Teaching Seminar

- Developed presentation materials and activities (documents and media)
- Facilitated 'Introductory to Technology in the Classroom' workshop
- Worked with faculty advisor

Teaching Assistant, Purdue University, Dept. of Curriculum & Instruction
Summer 2013
EDCI 59400: Concluding Secondary Transition to Teaching Seminar

- Evaluated Students
- Delivered course instruction using a variety of multimedia and Web 2.0 tools
- Facilitated "just in time" course assistance

Co-Instructor, Purdue University, Department of Curriculum & Instruction
Summer 2012
EDCI 51300: "Foundations of Learning Design & Technology"

- Evaluated Students
- Worked in Blackboard online platform
- Facilitated discussion and reviewed course materials using a variety of Web 2.0 tools
- Worked with faculty co-instructor

K-12 Experience
Classroom Teacher
2005 – 2008
J.C. Crumpton Elementary School, Monterey Peninsula School District, Marina CA. 2nd grade
Calabasas, Elementary School, Pajaro Valley Unified School District, Watsonville, CA. 6th grade
Mueller Charter School**,** Chula Vista Elementary School District, Chula Vista, CA. K-6th Art

PUBLICATIONS

Richardson, J. C., Koehler, A. A., **Besser, E. D.**, Caskurlu, S., Lim, J., & Mueller, C. M. (2015). Conceptualizing and investigating instructor presence in online learning environments. *The International Review of Research in Open and Distributed Learning*, 16(3).

Newby, T., Wright, C., **Besser, E.**, & Beese, E. (in press). Passport to creating and issuing digital instructional badges. In D. Ifenthaler, N. Bellin-Mularski, & D. Mah (Eds.), *Foundations of Digital Badges and Micro-Credentials: Demonstrating and Recognizing Knowledge and Competencies.*

Richardson, J.C., **Besser, E.D.**, Koehler, A.A., Lim, J. & Strait, M.I. (in press). Instructors' perceptions of instructor presence in online courses. *International Review of Research in Open and Distance Learning.*

Cheng, L., Yang, S., **Besser, E.D.** & Garcia De Hurtado, B. (in press). Vocabulary instruction and dialogic reading: Using electronic storybooks with preschool ELLs. *SAGE Research Methods Cases*.

Koehler, A.A., Newby, T.J. & **Besser, E.D.** (under review). In the eye of the beholder: Using student narratives to explore memorable teachers. *Teaching and Teacher Education*.

PRESENTATIONS

Newby, T.J., **Besser, E.D.**, Beese, E.B., & Wright, C.V. (November, 2015). *Passport to Creating and Issuing Digital Badges in Teacher Education.* Accepted paper for presentation at Association for Educational Communication and Technology (AECT), Indianapolis, IN.

Beese, E.B., **Besser, E.D.**, & Koehler, A.A. (November, 2015). *Guiding Preservice Teachers' Critical Thinking about Effective Technology Integration: Synthesizing a List of Critical Questions from the Literature.* Accepted paper for presentation at Association for Educational Communication and Technology (AECT), Indianapolis, IN.

Richardson, J. C., Koehler, A. A., **Besser, E. D.**, Caskurlu, S., Lim, J., & Mueller, C. M. (November, 2015). *Conceptualizing and Investigating Instructor Presence in Online Learning Environments*. Accepted paper for presentation at Association for Educational Communication and Technology (AECT), Indianapolis, IN

Besser, E.D. (November, 2013). *Exploring Preservice Teacher's "Bring Your Own Device" experiences and knowledge transfer in Instructional Design*. Unpublished paper presented at Association for Educational Communication and Technology (AECT), Anaheim, CA.

Yu, J.H., Newby, T.J., Koehler, A.A. & **Besser, E.D.** (November, 2013). *Enhancing Pre-service Teachers' Engagement in a Technology-supported Flipped Classroom*. Unpublished paper presented at Association for Educational Communication and Technology (AECT), Anaheim, CA.

Kim, M.C., Kim, W., & **Besser, E.D.** (April, 2013). *Integrated Use of Simulations in the Science Classroom: Key Factors for Student Learning*. Unpublished paper presented at American Educational Research Association (AERA), San Francisco, CA.

Kim, M.C., Kim, W., & **Besser, E.D.** (November, 2012). *Eighth graders' classroom use of simulations: Impact of guidance on science learning*. Unpublished paper presented at Association for Educational Communication and Technology (AECT), Louisville, KY.

AWARDS AND GRANTS

Dean's Doctoral Scholarship
Purdue University
College of Education
2015

Outstanding Graduate Teaching Award Winner – Department of Curr. and Instruction
Purdue University
2015

Outstanding Graduate Teaching Award Winner – College of Education
Purdue University
2015

Teaching Academy Graduate Teaching Award Winner
Purdue University
Teaching Academy & Office of the Provost, University level award
2015

DeBruicker Graduate Scholarship in Educational Technology
Purdue University
College of Education
Department of Curriculum and Instruction: Learning Design & Technology
2015
Graduate Student Summer Research Grant (PRF)
Purdue University
College of Education
Summer funding support
June- July 2015
Learning Community Advocate Award Nominee
Purdue University
Learning Communities
2014-2015
Outstanding Graduate Teaching Award Nominee
Purdue University
College of Education
Department of Curriculum and Instruction
2012 - 2016
Graduate Student Summer Research Grant (PRF)
Purdue University
College of Education
Summer funding support
June- July 2014
Dean's Graduate Student Travel Support Award
Purdue University
College of Education
October 2012, 2013, 2014, 2015

LEADERSHIP & SERVICE

Academic Journal Reviewer, TechTrends, Springer Publishing
August 2015 – Present
Graduate Student Representative, College of Education, Curriculum & Instruction Grad Committee
August 2014 – Present
Learning Community TA, College of Education, Department of Curriculum & Instruction, TEACH Elementary, and Secondary Learning Communities
August 2011 – Present
Mentor TA, College of Education, Department of Curriculum & Instruction, EDCI 270
Spring 2012, Fall 2013, & Fall 2014
Treasurer, Purdue Association of Learning Design & Technology (PALDT)
August 2013 – May 2014

PROFESSIONAL AFFILIATIONS

Member of American Educational Research Association (AERA)
2014 – Present
Member of Association for Educational Communication and Technology (AECT)
2012 – Present
Member of Purdue Association of Learning Design and Technology (PALDT)
2011 – Present