The Impact of Experiencing Proficiency-Based Learning (PBL) on Preservice Teacher Perspectives on PBL, Assessment, and Grading

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Abstract

This study investigates the impact of a proficiency-based learning (PBL) experience on preservice teacher (PST) perspectives on PBL, assessment, and grading. The findings reveal several salient advantages and disadvantages of PBL from the student perspective and demonstrate that experiencing PBL can impact PST perspectives on assessment and grading. The vast majority of students who experienced PBL reported a deeper appreciation for the importance of assessment, with many students sharing expanded understandings of what qualifies as

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assessment, the value of formative assessment, and the benefits of assessment for students. Student responses also reveal some problematic assumptions and beliefs about assessment and grading that are at odds with the principles of PBL, some of which persist even after experiencing PBL. We draw on these findings to offer implications for research and preservice teacher education.

Introduction

Proficiency-based learning (PBL) has received significant attention in recent years as a growing number of schools and districts across the United States embrace PBL in an effort to improve learning outcomes for all students (Le et al., 2014). For many, PBL is seen as a means to address numerous flaws in the traditional education system, including, for example, the reliance on extrinsic motivation, valuing of efficiency over effectiveness, and the reinforcement of fixed mind-sets (Sturgis, 2016). Although PBL systems can take many forms, they are typically learner centered and designed to empower the learner in the assessment process through practices that support, rather than simply evaluate, learning. In PBL, students are asked to take an active role in pursuing proficiency through carefully designed assessments, high-quality targeted feedback, reflection, and multiple opportunities to demonstrate learning. PBL is intended to share power and promote equity for all learners, including those who may take longer to demonstrate proficiency. The learner-centered emphasis of PBL is a significant shift away from dominant assessment practices, however, and as such, it challenges students and teachers to critically reexamine their role in the teaching and learning process (Haynes et al., 2016). Likewise, teacher preparation institutions are called to critically examine how they are preparing future teachers to work in PBL environments.

Investigating methods for preparing preservice teachers for PBL is a timely issue that is of particular relevance to the authors' local context. Preservice teachers in the state of Vermont are learning to teach in the midst of an unprecedented policy and practice shift marked by the passage of Vt. Stat. Ann. Tit. 77 in 2013. With the goal of enhancing postsecondary success, Act 77 legislation mandates that all students in schools serving Grades 7–12 have personalized learning plans that include flexible pathways to graduation. To enable these flexible pathways to graduation while still addressing the same learning outcomes, the legislation also requires that beginning in 2020, all Vermont students meet graduation requirements through a proficiency-based system. As schools respond to this new policy, preservice teachers who are learning to teach in Vermont are engaging in field placements in which teachers are rapidly transitioning toward PBL. At the same time, these same preservice teachers are taking teacher preparation courses in which they are learning about assessment both explicitly, through the content of their courses (first-order teaching), and implicitly, through the assessment practices of their university professors (second-order teaching). Teacher education courses that do not use PBL may be reinforcing traditional modes of assessment and may thus

serve to undermine student learning through an "apprenticeship of observation" (Lortie, 1975) in assessment practices that are not in line with the learner-centered and equity-focused practices that define PBL.

Conversely, second-order teaching has been shown to be a powerful tool for teacher learning (Murray & Male, 2005), which is why it is recommended that teacher educators be mindful of using the teaching practices they are teaching about (Goos & Moni, 2001). For this reason, the authors of this study are teacher educators who are committed to modeling PBL in our preservice teacher classrooms as a critical step toward preparing future teachers to use PBL. In addition, because the assessment literacy of preservice teachers has been shown to be generally weak (Siegel & Wissehr, 2011; Volante & Fazio, 2007), we envision that engaging students in PBL will deepen student thinking about the purposes of assessment in general. With these goals in mind, this study investigated in what ways, if any, PST perspectives regarding PBL, assessment, and their future grading policies change after experiencing PBL in a teacher education course.

Literature Review

Defining Proficiency-Based Learning

Increased interest in PBL has led to a proliferation of resources with the approach being defined and put into practice in various ways (Worthen & Pace, 2014). Notably, in the current literature, proficiency-based, competency-based, and standards-based describe similar initiatives that are relatively interchangeable in that they share the view that reenvisioning assessment in schools is imperative because "the traditional system isn't working for many students—and is never going to work for all students" (Sturgis, 2016, p. 6). In this article, we use the term *proficiency-based learning* for two reasons: (a) it is the term used in our state's education legislation and in schools across our state and (b) it is the term used in the Great Schools Partnership (GSP; n.d.-a) resources, which we used to inform our classroom approaches due to their relevance to our statewide PBL initiatives.

In seeking to define PBL, it is important to understand that PBL is a collection of research-based assessment and grading principles, many of which are not exclusive to PBL (GSP, n.d.-b). Rather than viewing PBL as a new and thus unfamiliar approach to learning and assessment, it is more accurate and perhaps more helpful to view PBL as an articulation of high-impact assessment practices that can work synergistically to improve student outcomes. It is also not surprising, therefore, that PBL is often idiosyncratic across sites as teachers, schools, and districts seek to implement PBL in ways that are responsive to their unique contexts.

In an effort to offer practical and philosophical clarity regarding PBL, the Great Schools Partnership (n.d.-c) created "Ten Principles of Proficiency-Based Learning" that "describe the common features found in the most effective proficiency-based systems" (para. 2). In this study, we focus on five of these principles:

1. Formative assessments measure learning progress during the instructional process, and formative assessment results are used to inform instructional adjustments, teaching practices, and academic support.

2. Summative assessments evaluate learning achievement, and summative assessment results record a student's level of proficiency at a specific point in time.

3. Academic grades communicate learning progress and achievement to students and families, and grades are used to facilitate and improve the learning process.

4. Students are given multiple opportunities to improve their work when they fail to meet expected standards.

5.Students can demonstrate learning progress and achievement in multiple ways through differentiated assessments, personalized-learning options, or alternative learning pathways.

With a focus on transparency for learners and opportunities to demonstrate growth through cycles of feedback and revision, these principles are rooted in a philosophy of assessment and grading that aims to support learning rather than simply measure it. In other words, PBL assessment practices are designed to support an approach to assessment *for* learning, rather than simply assessment *of* learning. Formative assessment is viewed as a tool for learning for both the student and the teacher, which in turn informs future teaching and learning. These practices are based on decades of empirical research into the characteristics of high-quality assessment and feedback (GSP, n.d.-b), affirming the positive relationship between the quality of formative assessment and student learning (Andrade & Cizek, 2010; Ruiz-Primo & Furtak, 2004; Shute, 2008).

Despite the empirical research base for these assessment practices, the approach to assessment in PBL described herein represents a paradigm shift for educators and school communities because it proposes a learner-centered approach to assessment aimed at improving learning outcomes for all students. As such, these practices serve to disrupt the compensation and ranking and sorting function assessment and grading have long served in our educational system (Andrade et al., 2012). Separating habits of work from measures of academic knowledge and skills, for example, is a move intended to promote equity in grading by separating student learning from student behaviors. In PBL, a student who is often absent and struggles to turn work in on time but is still able to demonstrate proficiency on assessments would still be marked proficient on learning objectives. This practice differs from the dominant system of A–F grading, which may conflate habits of work with student learning outcomes in ways that result in a grade that is a "hodgepodge of attitude, effort, and achievement" (Brookhart, 1991, p. 36). In so doing, traditional grading practices may privilege some students over others through grades that more accurately reflect a student's ability to navigate the social processes of school than the student's academic achievement (Pollio & Hochbein, 2015). Conversely, by focusing more on supporting students in developing proficiency and less on rewarding and

punishing students for specific work habits, PBL aims to focus on student learning. In this way, PBL is in keeping with the following assertion by Guskey and Bailey (2010) regarding the goal of education: "The goal is to develop and nurture talent, not simply to discriminate, select and sort it" (p. 20). Using PBL in preservice classrooms thus presents a rich opportunity to model these research-based and learner-centered assessment practices while students are concurrently examining their own beliefs about the role that assessment plays in teaching and learning.

We know very little about how PSTs experience PBL. As PSTs are examining and re-forming their own ideas about assessment, it is critical to understand how they are experiencing assessment themselves and what they interpret to be the advantages and disadvantages of different systems.

The paradigm shift required for PBL, however, has also been associated with a set of implementation challenges that have slowed the adoption of PBL across school systems (Peters et al., 2017). These challenges include a lack of support by community members and families, concerns about postsecondary outcomes, teacher resistance, and logistical obstacles associated with shifting assessment and reporting systems (Clough & Kruse, 2010; Guskey & Jung, 2013; Peters & Buckmiller, 2014). Grading practices have also been shown to be varied and deeply personal, resulting in significant challenges in even discussing changes to long-standing grading practices (Feldman, 2019). Using PBL in the preservice classroom may serve to proactively surface and address some of these implementation challenges prior to PSTs entering the field. In this way, using PBL in teacher education can be viewed as a potential mechanism to prepare PSTs to implement PBL in their future classrooms.

The Need for Preservice Teacher Assessment Literacy

Assessment literacy refers to understanding the basics of sound assessment practices (Stiggins, 1991). Assessment literate educators understand assessment methods that yield reliable information about student learning, can effectively communicate assessment results, and understand how to involve students as full partners in assessment (Stiggins, 2000). The standardized testing movement that has dominated assessment discourse in recent years, however, has served to separate "those who test from those who teach" and, in so doing, has undermined the important assessment role of teachers in the learning process (Stiggins, 2014, p. 68). An unfortunate by-product of this cultural shift has been a decrease in resources and opportunities for teachers to learn about effective assessment practices (Huang & He, 2016). It is perhaps not surprising, therefore, that preservice teachers' assessment literacy has been shown to be weak in general (Siegel & Wissehr, 2011; Volante & Fazio, 2007). This has resulted in calls for teacher educators to model dynamic assessment systems that serve two purposes: (a) to help preservice teachers develop a deeper understanding of the utility of various approaches to assessment

(Allen & Flippo, 2002) and (b) to disrupt the apprenticeship of observation that positions preservice teachers "to replicate more traditional, unexamined assessment practices" (Graham, 2005, p. 619). Parallel to these efforts, recent attention has been given to the need to research PST assessment beliefs, knowledge, and practices. To this end, Hill et al. (2010) have offered several timely lines of inquiry, one of which challenges researchers to inquire into "the beliefs and conceptions of assessment that student teachers have at entry to, and as a result of, teacher education" (p. 19). By examining PST perspectives on assessment both before and after experiencing PBL, this study aimed to inform this important line of inquiry.

Proficiency-Based Learning in Teacher Education

The teacher education classroom is a dynamic opportunity for teacher learning as preservice teachers have the opportunity to learn both *about* effective teaching practices and *through* the effective teaching practices that their professors are ideally modeling (Goos & Moni, 2001; Murray & Male, 2005). It follows, therefore, that if the aim is to prepare teachers to use PBL in their future classrooms, they must have opportunities to learn not only *about* PBL but also *through* PBL. In addition, because PSTs are navigating the dual roles of prospective teacher and current student, we believe that the teacher education classroom is a unique opportunity to bridge PST thinking about the value of assessment not only for teachers but also for students. Providing opportunities for PSTs to learn from teaching in this way is in strong alignment with Darling-Hammond's (2012) assertion that powerful programs must prepare "teachers who can learn *from* teaching, as well as learning *for* teaching" (p. 11). By modeling PBL in the teacher education classroom, PSTs are afforded an opportunity to learn *from* the assessment practices they are experiencing in ways that have applications *for* their future teaching.

Despite the compelling need to model PBL in teacher education, there is a dearth of resources for teacher educators on this subject (Kalnin, 2014). What does exist is focused primarily on its use in student teaching, which has been found to improve the clarity of learning expectations (Tang et al., 2007) and enhance student professionalism and student learning (Montecinos et al., 2010). This study is part of a line of inquiry that we have thus designed to address the lack of emphasis on PBL in preservice teacher education in current educational literature. Our approach is informed by the findings of our first study, in which we looked closely at the experiences of six PSTs in the same classroom (Smith et al., 2017). We found that PSTs reported several affordances associated with PBL, one of which was a heightened "awareness of progress and process." This finding has particular relevance to this study because it suggests that in experiencing PBL, PSTs can become increasingly aware of the assessment processes that are being used to measure their progress. With this in mind, this study further investigates this idea with a larger sample and a deeper look at what PSTs learn about assessment through experiencing PBL.

This study aimed to investigate the impact of experiencing PBL on the preservice teachers' perceptions of PBL as well as their perspectives on assessment and grading and is driven by the following research questions:

1. What do PSTs perceive to be the primary advantages and disadvantages of PBL after experiencing a PBL system?

2. In what ways, if any, do the perspectives of PSTs regarding assessment in the classroom change after experiencing a PBL system?

3. In what ways, if any, does experiencing PBL impact PST thinking regarding their future grading policies?

Method

Context and Participants

This study took place in a mid-sized university in the Northeast region of the United States. Our participants included 72 preservice teachers pursuing an initial teaching license in elementary (n = 15), middle-level (n = 12), or secondary education (n = 44). These PSTs were enrolled in one of four different teacher education courses: (a) elementary children's literature, (b) middle-level early adolescent development, (c) secondary educational technology, or (d) secondary literacy. All four of these courses were required as part of the PSTs' respective major requirements. Each of the teacher educators for these courses was implementing PBL guided by the "Ten Principles of Proficiency-Based Learning" (GSP, n.d.-c) and was involved in a parallel collaborative inquiry group focused on PBL in teacher education.

For the purpose of this study, we selected 5 of the 10 principles as the focus of our work. These principles were selected on the basis that they were (a) most critically aligned with the focus of our study on preservice teacher perspectives on assessment and grading policies and (b) most likely to be less familiar to our preservice teachers and thus more likely to disrupt their prevailing conceptions of assessment and grading. The implementation of the PBL approach varied somewhat across courses; however, all of the instructors maintained a focus on implementing the five selected principles. Appendix A provides a brief summary of how each of these principles was enacted in each of the courses. Although each of the teacher educators used PBL, it was not the focus of any of these courses, and as such, PBL approaches to assessment or grading were not explicitly taught. As is customary in teacher education, however, the assessment and grading policies were described as part of the review of course syllabi, PSTs were reminded to check their feedback regularly, and clarifying questions regarding feedback and grading were addressed as they arose naturally throughout the semester.

Data Collection

Data collection for this study consisted of a pre- and postsurvey in which PSTs

responded to questions related to their experiences with PBL and their thoughts on assessment and grading prior to and after they experienced PBL (see Appendix B). Presurveys were administered on the first day of class by the professor prior to any instruction. Postsurveys were administered on the last day of class by one of the researchers who was not teaching the course. To address validity concerns, surveys were anonymous, and participants were informed that their responses would not be viewed by the researchers until after grades had been posted.

Data Analysis

To analyze our data, we began by summarizing Likert scale responses using descriptive statistics, which was then used to provide summary data regarding the overall trends in PST perceptions in the pre- and postsurvey. We then analyzed the qualitative responses to questions associated with each research question (see Table 1) using three qualitative inquiry activities: (a) data condensation, (b) data display, and (c) conclusion drawing/verification (Miles et al., 2014). To condense the data, we inductively coded the responses to pre and postsurvey questions and created a data display of coded excerpts organized by code. For our first and second research questions, we also created a data display in which coded excerpts for pre/post responses were displayed alongside one another for each participant. We then created a third column in which we identified any shift in the responses of participants from pre to post, coded the resulting shifts, and created a final data display that organized PST pre and post responses based on these codes. These data displays were then used to identify dominant themes in student responses and shifts

Table 1
Survey Items Related to Each Research Question

Research question	*Survey items used for qualitative analysis*
1. What do students perceive to be the primary advantages and disadvantages of PBL after experiencing a PBL system?	• Postsurvey Questions 16 and 18 • Comparison of pre/post open-ended responses for Questions 10 and 11
2. In what ways, if any, do the perspectives of preservice teachers regarding assessment in the classroom change after experiencing a PBL system?	• Comparison of pre/post open-ended responses for Questions 5, 7, 8, 9, and 15
3. In what ways, if any, does experiencing PBL impact preservice teacher thinking regarding their future grading policies?	• Postsurvey Question 14

in responses, ultimately drawing conclusions in relation to our research questions. Quotes were selected for inclusion in the findings on the basis that they illustrated a dominant theme in the data. In addition, we also examined the qualitative responses of subgroups of PSTs who responded differently from the majority of the sample to specific Likert questions to see if there were themes in their open-ended responses that might explain their responses. We then integrated any themes in subgroup responses that could be used to better understand their perspectives into the writing of the findings, where relevant.

Results

Likert Scale Responses

Our analysis of the pre- and postsurvey responses on the Likert scales shows that following a course using PBL, overall, PSTs came to view A–F grading as less important and assessment as more important in the classroom. PSTs also reported that they had given greater thought to their grading policy as a result of experiencing PBL. In addition, the majority of PSTs responded in the postsurvey that they preferred PBL to A–F grading (see Table 2).

PST Perceptions of Advantages and Disadvantages of PBL After Experiencing It

Our analysis of PSTs' open-ended responses revealed several dominant themes in PST perceptions of advantages and disadvantages of PBL. While many PSTs identified merits of A–F grading in their presurvey responses, many of those same PSTs shared new concerns about A–F grading in their postsurvey responses.

Table 2
Results From the Likert Scale Questions

Question	*Presurvey mean (SD)*	*Postsurvey mean (SD)*
To what extent do you think that assigning A–F or percentage grades to student work is important in the classroom? (1 = not important at all; 5 = extremely important)	4.17 (0.66)	4.43 (0.64)
To what extent do you think assessment is important in the classroom? (1 = not important at all; 5 = extremely important)	3.29 (0.84)	2.91 (0.94)
To what extent do you agree with the following statement: The proficiency-based learning system is better than traditional A-F grading systems? (1 = strongly disagree; 5 = strongly agree)	n/a	3.74 (0.85)

Perceived Advantages of PBL

After experiencing PBL, PSTs reported several key advantages associated with the system. These advantages included (a) an increased focus on learning rather than grades, resulting in less pressure; (b) improved clarity and accuracy of the assessment process; (c) an emphasis on growth through revision; and (d) opportunities for personalization. Each of these is explored in the following sections.

An Increased Focus on Learning Rather Than Grades, Resulting in Less Pressure. PST responses showed that many felt that PBL encourages PSTs to focus on learning, rather than grades, which in turn reduces pressure associated with their performance. Reduced pressure, stress, and anxiety were frequently mentioned across responses. One PST stated, for example, that in PBL, PSTs are "more focused on what they learned, not about what their grade will be." and another PST shared the impression that "students are also more excited about their learning when the thought of a grade isn't looming over them. It takes off a lot of pressure." Additionally, a few PSTs reported that it was easier to focus on learning in PBL because it "doesn't compare students to one another" and instead encourages students to be "in collaboration with each other and not competition." In contrast, PSTs reported that from their perspective, A–F grading encourages a focus on grades rather than learning, ramping up pressure. A few PSTs went so far as to describe A–F grading as "degrading" and "harmful" due to the pressure students experience as they pursue high grades.

Improved Clarity and Accuracy of the Assessment Process. Many PSTs shared an appreciation for the clarity and accuracy within PBL. With regard to clarity, PSTs shared that striving for proficiency in specific learning goals rather than striving for good grades on assignments allowed them to "clearly see the link between the work [they had] done in class and how [they were] being assessed." Additionally, they reported that in the PBL format, the instructor gave them "more specific feedback" in relation to learning goals, which allowed PSTs to "clearly see where they stand and what specific parts of the course they need to work on." In turn, PSTs were then able to "focus on their particular skills and improving these specific skills." For many PSTs, this was in contrast to A–F grading, which they reported felt oversimplified. PSTs were especially concerned that A–F grading tended not to be holistic, relying on few metrics of success rather than many, and did not provide students with enough detailed feedback regarding specific skills, thus oversimplifying both their performance and their feedback. To illustrate this point, one PST stated, "It is hard to simplify the extensive concept of comprehension into a single letter grade as the components of learning and understanding are complex and multifaceted," while another PST reflected that "It's important to give students feedback about their performance and progress towards meeting goals[, and] assigning a grade may not be the best way to do so."

With regard to accuracy, PSTs appreciated that the focus on learning goals in PBL helps teachers see "that students are actually learning" because the focus on assessing specific skills means that students "actually need to know the concepts." One PST summed this sentiment up nicely: "I think it takes stress away from beating the system in learning and places a larger emphasis on actually knowing the content." In contrast, PST responses revealed concerns with regard to the accuracy of A–F grading because, due to the previously described oversimplification, they worried that A–F grading may mask or exaggerate proficiency through approaches like weighting systems, grading on a curve, and calculating grades based on a student's average performance on a variety of skills. The following quote from a PST illustrates this concern:

> A–F system can actually prove harmful to students because it can often pass students when really they don't fully understand the content seeing as an A and a C can average out to a B which is a passing grade but in reality a student understands one part really well but still needs help progressing in another part.

Room for Growth and Improvement Through Revision. A common theme in perceived advantages of PBL was the sense that the assessment process felt nonpunitive because opportunities to revise and demonstrate growth were built into the system. One PST stated, for example, that "it focuses more heavily on making sure a student understands everything in the end and doesn't penalize them as heavily if at first they don't understand the content but grow to understand it better." Opportunities to revise led PSTs to believe that PBL "embraces process rather than results-based motivation" and as such gives PSTs an "opportunity to reach full potential." Many PSTs who appreciated the focus on revision also noted that this amplified the focus on learning. One PST, for example, simply stated that an advantage of PBL is that "you can try again (it's actually about learning)." Several PSTs also noted that the opportunity to revise "facilitates more communication between teachers and students regarding work" as they strive for proficiency, which in turn can help "students learn to self-advocate" when they are confused and in need of support.

Opportunities for Personalization. The final theme in perceived advantages of the PBL system was an appreciation for the ways in which PBL allows PSTs to demonstrate their learning in multiple ways, often through choice. PSTs shared, for example, that PBL "allows for more creativity" by allowing "students to demonstrate knowledge in multiple ways, which accounts for the different ways in which individuals engage with material." One PST reflected, "Throughout my education, when I have received A–F grades on assignments, tests, and papers, it has felt like I wasn't getting any choice in how I was being assessed" but that PBL allowed the PST a chance to "prove their abilities."

Disadvantages of PBL

The themes in PST-identified disadvantages of PBL include (a) the learning curve for teachers and schools; (b) the learning curve for PSTs regarding an unfamiliar system; (c) perceived increased workload for teachers; and (d) concerns regarding work ethic, leniency, and rewards.

The Learning Curve for Teachers and Schools. PST responses demonstrated that they were aware of several ways in which the innovative nature of PBL was challenging the status quo of grading in our American educational system and that this change from the norm was likely to present implementation challenges for K–12 schools, teachers, and students. For example, PSTs astutely noted that because our prevailing system is driven by the grade point average (GPA) system, schools transitioning to PBL would have to figure out ways to assign grades to student work or find other ways to circumnavigate the role that the GPA system currently plays in college admissions. In addition, several PSTs pointed out that a move toward PBL is a significant change in paradigm that would require professional development for teachers and significant scaffolding for students.

The Learning Curve for Students Regarding an Unfamiliar System. PST responses raised concerns about the learning curve that students would experience as they become familiar with PBL, which they felt could add to student stress because they would need to learn how to navigate a new grading system in addition to required course learning. Their responses also allowed us to gain greater insight into three challenges they themselves experienced in the unfamiliar system of PBL. First, some PSTs shared that the assessment and grading process felt "not as concrete" as the A–F system because proficiency felt "up to interpretation." Similarly, a few PSTs reported that they felt as though the A–F grading system was more "concrete and understandable for students." One PST asserted, for example, that "the A–F or percentage grading styles are very concrete whereas proficiency-based grading is more subjective," suggesting that the A–F grading system is less likely to be impacted by teacher bias, presumably because it relies on calculations like percentages. The second challenge was associated with the path to demonstrating proficiency. A few PSTs shared that because they often had creative liberty in how they wished to demonstrate proficiency, the path to proficiency felt less prescriptive and that, for some PSTs, this freedom and need to take initiative felt challenging. Relatedly, PSTs also noted that their progress throughout the course was feedback dependent because they were given proficiency scores and narrative feedback after each evaluation to be applied toward future work. Because the nature of the feedback they received was unfamiliar (provided by learning objective rather than by assignment), this at times also led to some confusion. Last, a few PSTs noted that because assessment and feedback were ongoing and revision was encouraged, it was difficult for PSTs to know their levels of proficiency and final grades until the end of the course.

Increased Workload for Teachers. On a practical level, PST responses indicated that though they recognized the affordances of PBL, they were also sensitive to the amount of work associated with a system that values revision, feedback, and performance-based assessment. PSTs shared, for example, the perception that PBL "takes more time for teachers" because "reteaching can be a lot of extra work for teachers" and "proficiency-based assessments can take more time for teachers to review than traditional assessments." This perception was in contrast with the perception shared by a few PSTs that A–F grading is "succinct" and "easy," both of which were perceived to benefit the teacher (because calculating grades and providing feedback would be easier) and the student (because interpreting grades and feedback would be easier). One PST summarized this perspective as follows:

> An A–F grading system allows for teachers, students, and families to view a succinct representation of the progress a learner has achieved for a given period of time relative to the grading scale which it was applied to. These systems are generally well understood or expected by students, are generally easier to construct for teachers, and allow for simpler computation of student population progress.

Similarly, some PSTs reported that A–F grading is advantageous because it offers a "universal scale" that is used across schools in the United States and as such is more likely to be "familiar to PSTs" and thus more universally understood.

Concerns Regarding Work Ethic, Leniency, and Rewards. The emphasis in PBL on multiple opportunities to demonstrate learning raised some specific concerns for PSTs regarding teacher leniency and student work ethic. Some PSTs shared, for example, that they worried that students might take advantage of the revision policy and not do their best work. Conversely, some PSTs felt it was unfair that students who showed proficiency at the last minute could receive the same grade as someone who showed it on their first try, as is illustrated in the following PST quote regarding disadvantages of PBL: "I could end up with the same grade as a person who has not tried at all in class but throws together something at the end." In addition, PSTs also shared concerns that the emphasis on proficiency over letter grades meant that PSTs were not adequately "rewarded" for exemplary work, presumably because proficiency does not carry the same weight as an A or A+. One PST asserted, for example, "Students need to be recognized for being exemplary. I would not feel inspired to work hard to simply be 'proficient.'" These comments point to the perception that, for better or worse, PBL can serve to disrupt the rewarding function that is a part of the prevailing A–F grading system.

Shifting Perspectives on the Role of Assessment in Teaching After Experiencing PBL

In comparing PST responses to the pre- and postsurveys, we identified three dominant themes in relation to shifting perspectives on the role of assessment in the classroom. Each of these themes is explored in the following sections.

Greater Appreciation for the Importance of Formative Assessment

An analysis of PST pre- and postsurvey responses revealed that after experiencing PBL, many PSTs had gained greater appreciation for the specific role of formative assessment in tracing student progress and informing teaching. Presurvey PST responses indicated that many PSTs had concerns that there can be "too much assessment" and that assessment was important but not the "be all end all." After experiencing PBL, however, many PSTs shared that they had come to appreciate the importance of formative assessment in particular due to its focus on progress and growth. One PST, for example, shared the following presurvey response: "While assessment is necessary to give the teacher insight on the class's learning progress, I do not think that every minute of every day should be spent preparing to be assessed." In contrast, however, this PST shared the following thinking about assessment on the postsurvey: "Formative assessment is especially important because it allows a teacher to check in with students. An entire class could be behind and the teacher wouldn't know unless they assess the class." These remarkably different pre- and postsurvey responses illustrate a shift in perception of the importance of assessment—formative assessment, in particular—in the classroom.

Additionally, while the role of formative assessment in informing teaching was infrequently mentioned in presurvey responses, many PSTs who viewed assessment as more important on the postsurvey explicitly identified informing teaching as an important reason to assess. For example, one PST shared the following reflection on the postsurvey:

> At first I thought, eh, why would you need to assess everything. But going through this semester I learned it is not just making sure we have grades for the class, but it is about making sure the student knows and understands the context. It is a way to make sure that I am doing my job as well in the most efficient way possible for all of my students.

PST responses also suggested that experiencing PBL was particularly instrumental in helping them gain a deeper appreciation for the value of formative assessment in the learning process. One PST, for example, shared, "By using proficiency-based learning, I think it changed my thinking about assessment and how assessment should be based on progress and room for growth, rather than just a letter grade."

Expanded Definition of What Counts as Assessment

PST responses indicated that after experiencing PBL, they had developed an expanded definition of what counts as assessment. Presurvey PST responses revealed that PSTs were equating the term *assessment* with tests, particularly formal high-stakes tests. Because of this, many PSTs shared concerns that assessment could be inaccurate, especially if measured exclusively through tests. For example, one PST shared the following thoughts about assessment on the presurvey:

> I think there are a lot of ways to assess a student, but the traditional test is generally not an accurate representation of a student's knowledge. Memorizing facts and filling in bubbles is a lot less meaningful than writing a paper on something or doing a project in my opinion. I would remember a project versus a test question AND enjoy it more.

In contrast, PSTs who, on the postsurvey, rated assessment as more important referenced a range of assessment types in their postsurvey responses, including those that are formative, authentic, and designed to embrace student creativity and voice. After experiencing PBL, PST responses stated, for example, that "assessment, whether formative, summative, diagnostic, etc. is one of the most important tools we as teachers have to use in the classroom to inform our practice," and that they felt that PBL made it possible to use "more creative projects and less boring and useless tests." Along these same lines, a few PSTs asserted that assessments should "give students a voice," suggesting that students should have agency in deciding how they would like to demonstrate their learning.

A close look at the responses of the subgroup of PSTs who rated assessment as less important on the postsurvey offered some insight into their reasoning. Their follow-up responses showed that they continued to interpret the term *assessment* to mean testing, especially standardized testing, and had concerns about the validity and worthiness of testing for student learning. For these PSTs, it appears that engaging in PBL may have deepened their concern regarding "traditional" assessment but that engaging in PBL did not shift their views about what qualified as "assessment." In other words, they rated assessment as less important because PBL made them realize that traditional forms of assessment may be inadequate.

New Appreciation for the Benefit of Assessment and Feedback for Students

Whereas many PST responses spoke of the role of assessment in monitoring student progress, few presurvey responses referenced the benefits of assessment for students. In the postsurvey, however, many PSTs identified assessment as an important reflective tool for students, stating, for example, that assessments could give students an opportunity to "reflect on their learning" and "look at their work and see what they've learned and where they can still improve." For this reason, many PSTs underscored the value of assessment feedback for students, identifying characteristics of feedback that are especially useful to students, such as "quick, relevant, personalized" and "strengths-oriented—how to use the skills they do have to build on skills they don't have yet." Experiencing PBL thus appears to have helped PSTs understand that, far from simply being a way to grade students, assessment can be a learning experience for students. One PST summed up this realization as follows: "Assessments are the most useful when students can learn from them."

PST Reflections on Their Future Grading Policies

Analysis of PST open-ended responses revealed that the vast majority of PSTs felt that they were just at the beginning of their exploration and learning about grading policies and as such did not feel that they had done enough thinking about the specificities. Many PSTs suggested that they felt this would not become concrete for them until they entered into their student teaching internships and/or first years of teaching. Many PSTs did report, however, that experiencing PBL made them think critically about the various aspects of grading policies. One PST, for example, shared the following reflection:

> Since being introduced to proficiency-based learning, rubric design, and changes in educational systems, I have thought extensively about practical implications for grading which I'll need to utilize in the classroom. Without working systems of assessments, I will not know where my students are in relation to the learning objectives I set.

In addition, several PSTs stated that experiencing PBL caused them to consider new questions about their future grading policies, such as "What would I grade on? And how could I do so fairly?" while others shared that they had begun to question the validity of the dominant A–F system altogether by sharing reflections such as this one: "I've been questioning a lot of what I thought I knew about education, including grading policy. I'm not sure the traditional A–F system is the best anymore." Though the question did not prompt them to do so, many PSTs also shared their emerging thinking about how they hoped to grade students. The vast majority of these PSTs stated that they wanted to create a grading policy in their own classrooms that included a "mix of PBL and letter grades," suggesting that they were envisioning ways to experiment with PBL within the constraints of the dominant A–F system.

Discussion and Implications

This study informs the emerging body of literature on PBL in teacher education, specifically as it concerns the impact of PBL on PST perspectives on PBL, assessment, and grading. In sum, the findings of this study suggest that PBL offers a fruitful context for PSTs to deepen their understanding of assessment and the importance of formative assessment for teachers *and* students. PST perceptions also reveal some interesting beliefs and assumptions about assessment, some of which persisted even after experiencing PBL. However, some limitations to these findings should be noted. First, because the findings were derived solely from PST survey responses, we did not have opportunities to ask follow-up questions and thus may not have adequate context to correctly interpret all responses. Second, because the surveys took place in the teacher education classrooms within which the PSTs experienced PBL, it is also possible that students felt compelled to share responses that viewed PBL more favorably. For future studies investigating similar

research questions, we therefore recommend the use of focus groups and interviews to further investigate PST perspectives.

In the sections that follow, we discuss the results and offer some implications for teacher education and future research.

Teacher Educators Aiming to Use PBL Should Seek to Implement PBL in Ways That Strategically Amplify PST-Identified Advantages and Address Disadvantages

The findings of this study offer further clarity with regard to the primary advantages and disadvantages of PBL from the PST perspective, which we hope will be used to inform the work of teacher educators who aim to model PBL in their own teaching. Notably, many of the PST-identified advantages and disadvantages in this study resonate in meaningful ways with the experiences of PSTs in our previous study (Smith et al., 2017). Informed by these common findings across studies, our recommendation is that teacher educators who implement PBL in their courses give special attention to (a) providing meaningful and multiple opportunities for growth through revision, (b) giving special attention to the clarity and accuracy of their assessment process, (c) developing ways to support PSTs in navigating the transition to PBL, and (d) modeling how to use PBL in ways that are sustainable.

Experiencing PBL Broadens PST Understanding of the Role of Assessment in the Classroom

The findings of this study support the argument that experiencing PBL offers an opportunity for PSTs to deepen their understanding of the role of assessment in the classroom. In particular, many of the PSTs in this study developed an expanded view of what qualifies as assessment and a deepened appreciation for the value of formative assessment for both teachers *and* students. In this way, experiencing an unfamiliar approach to assessment appears to have heightened PST awareness of the important numerous roles that assessment plays in teaching. The finding that after experiencing PBL, PSTs were more aware of the benefits of assessment for students is especially compelling because it suggests that something about experiencing PBL made the student benefits visible in ways that prior assessment and grading experiences had not. We posit that the dual roles of PSTs as students and prospective teachers, the unfamiliarity of PBL, and the focus on clarity in the assessment process worked synergistically to create a context in which PSTs were thinking about the value of assessment alongside their course learning. We recommend, therefore, that teacher educators consider how they might create similar contexts in their education courses regardless of whether they are using PBL specifically. Further inquiry into teacher practices that can be used to support PST reflection on assessment practices they are experiencing would be especially useful in informing this work. Future studies that also include control groups that are not experiencing

PBL as well as follow-up interviews would also serve to more clearly identify the extent to which shifts in PST perceptions are a result of PBL as opposed to other intervening variables.

PST Responses Demonstrate Some Problematic Assumptions and Beliefs About Assessment

Some of the PST open-ended responses discussed in our findings point to some problematic assumptions regarding the purpose of assessment and grading. These warrant discussion because they speak to PST "beliefs and conceptions of assessment" (Hill et al., 2010, p. 19), which Hill et al. have identified as a critical area of inquiry for teacher education. The shifting PST perceptions about assessment, for example, suggest that prior to experiencing PBL, many PSTs had limited views of what counts as assessment (primarily summative tests) and did not consider the value of assessment for students. Given that most of our PSTs went through the K–12 system at the peak of the No Child Left Behind era, we posit that their tendency to associate assessment with testing may be a by-product of high-stakes standardized testing, resulting in a definition of assessment that is largely evaluative and test-centric.

There is also evidence in our findings that PSTs may have internalized two beliefs about assessment and grading that are not in keeping with the principles of PBL: (a) that assessments and grades should reward and punish students based on work habits and learning speed and (b) that assessments and grades should rank and sort students to help determine who is exemplary. This is evident in PST concerns about teacher leniency and work habits as well as the sentiment that proficiency does not adequately reward and identify who is exemplary. These beliefs are not in keeping with the principles of PBL, especially as it concerns the goal of developing equitable systems of grading that view habits of work as separate from academic learning and do not serve to rank and order students. We recommend, therefore, further research aimed at surfacing PST assumptions and beliefs, examining their origins, and investigating ways to address those that may be incompatible with the goal of equitably assessing student learning.

More Than Modeling Is Needed to Directly Address Problematic Assumptions and Beliefs About Assessment

Although many PSTs in this study shifted their thinking about assessment from pre- to postsurvey, it is worth noting that this was not the case for all PSTs. One illustrative example is evident in the subgroup of PSTs who decreased their rating of the importance of assessment because the analysis of their open-ended responses demonstrated that this shift was due to their continued perception that assessment referred exclusively to testing. As such, experiencing PBL was not adequate enough to address this misconception for all PSTs. In this way, our findings demonstrate

that second-order teaching alone may not be enough to move the needle on shifting PST beliefs about the purpose of assessment and grading. Given this observation, we recommend that in addition to modeling effective learner-centered assessment practices, teacher education programs must also (a) explicitly teach about the various forms and purposes of learner-centered assessments, (b) engage PSTs in critically examining the validity and utility of assessment practices like high-stakes testing, and (c) intentionally surface and address common misconceptions, such as the one described earlier.

Comparing Specific Assessment Practices May Be More Useful Than Comparing A–F Grading and PBL

Analyzing our data for this study has helped us reach the conclusion that viewing A–F grading and PBL as categorically different in some ways oversimplifies and misrepresents the nuances of PBL and the numerous ways teachers may implement its associated principles. It is possible, for example, for a teacher who is reporting A–F grades to use many PBL principles in the classroom, while a teacher may be reporting using PBL but assessing in ways that lack transparency for students. Ultimately, the quality of an assessment and grading policy is evident in the specific way that teachers implement assessment and grading practices. As such, rather than presenting A–F grading and PBL as distinctly separate approaches, we posit that it may be more useful to consider the pros and cons of specific characteristics of assessment and grading approaches. Doing so may also serve to surface PST assumptions and beliefs in a manner that would allow teacher educators to challenge and push PST thinking with evidence-based arguments.

Teacher Educators Need to Support PSTs in Questioning the Status Quo

PST concerns regarding the learning curve associated with shifting to PBL serve as an illustrative reminder that challenging the status quo is accompanied by numerous challenges, one of which is the extra work that may initially be required of those who seek to deviate from the familiar. This challenge is compounded by the fact that PSTs have been socialized into the dominant grading system through their own K–12 experiences, which is evident in the identification by PSTs of disadvantages associated with PBL that are not unique to PBL. For example, the PST perception that assessment in PBL is less "concrete" and "up to interpretation" suggests that PSTs may not be aware of the extent to which all higher-order assessment requires a level of subjective interpretation and that A–F grading does not preclude teacher bias. Some PSTs seem to have astutely noticed this challenge of subjectivity, yet they appear to have associated it with PBL specifically. We attribute this in part to the tendency to question what is new and accept what is familiar, a tendency that is also apparent in PSTs identifying the A–F system as advantageous because it

is "familiar" and "understandable." The issue, therefore, is that while PSTs were apt to critically examine the practices they were experiencing in PBL, this did not necessarily require them to similarly question the status quo of the dominant system of grading. Because we did not explicitly teach about PBL or critique the dominant grading system, PSTs were left to draw their own conclusions about the issues in the prevailing system. It is likely, therefore, that these conclusions overlooked those issues that they have not experienced personally.

Our recommendation is thus that teacher educators devise strategies to illustrate problematic issues in the dominant grading system, particularly as it pertains to the impact of specific assessment and grading practices on students from historically marginalized groups. Critically examining example grading policies and assessments that represent the status quo alongside the PBL system, for example, might help surface issues in the dominant system in ways that critically reflecting on PBL experiences might not. We also recommend problematizing the notion that familiarity is equally important to accuracy and effectiveness, underscoring that when the evidence is clear that students can benefit from shifts in teaching practice, the ethical imperative to change practice outweighs the challenge associated with changing the status quo.

We also recognize that although PBL is touted as a potential means to promote equity, this study did not center issues of social identity, equity, privilege, and oppression in relation to assessment and grading. Our findings do not demonstrate significant PST learning regarding these topics and PBL, which is perhaps not surprising given that these issues were not centered in our instruction. The absence of this learning, however, illustrates that modeling PBL in teacher education does not inherently bring issues of equity to the forefront. Therefore, as it concerns the potential for PBL to address structural inequity, we believe that experiencing PBL in teacher education coursework is insufficient. To address structural inequity in assessment and grading, we recommend that teacher educators explicitly surface hegemonic norms and assumptions that undergird assessment and grading policies and how these norms may impact specific social groups. Pairing PBL experiences with critical self-reflection, for example, might deepen PST understanding about the equity pitfalls associated with grading and assessment. Moreover, as it concerns equity and social justice, we wonder what PBL would like if it were designed to be culturally responsive. If equity is indeed the aim of PBL, we recommend future studies that focus on the intersection of PBL and culturally sustaining pedagogy (Ladson-Billings, 2014; Paris, 2012) and its associated outcomes for specific students.

Conclusion

This study sheds light on salient advantages and disadvantages of PBL from the PST perspective, which can be used to inform ongoing efforts to model PBL in teacher education and prepare PSTs to use PBL. In addition, the findings of

this study demonstrate that experiencing PBL can impact PST perspectives on assessment and grading. The vast majority of PSTs who experienced PBL gained a deeper appreciation for the importance of assessment, with many PSTs sharing expanded understandings of what qualifies as assessment, the value of formative assessment, and the benefits of assessment for students. PST responses also reveal some problematic assumptions and beliefs about assessment and grading that are at odds with the principles of PBL, some of which persist even after experiencing PBL. This study thus affirms the influential role that teacher educator modeling can play in impacting PST perspectives on assessment, while also underscoring that second-order teaching alone is not enough to address all assumptions and beliefs about assessment. Teacher educators who aim to prepare PSTs to use PBL, therefore, must consider how to provide PSTs with opportunities not only to experience PBL but also to question their own assumptions and beliefs about the purpose of assessment and grading in education.

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Appendix A

Summary of Our Proficiency-Based Approaches

Course (program)	*Criterion-referenced proficiency based assessment*	*Formative assessments measure learning progress and inform teaching*	*Multiple opportunities to improve work*	*Multiple ways to demonstrate learning*	*Academic grades communicate learning progress and achievement*
Children's Literature (elementary education) and Early Adolescent Development (middle-level education)	• Course learning targets that were derived from relevant teaching standards were clearly listed in syllabus and on assignments. • Relationship between assessments and learning targets was described in syllabus.	• Formative assessment feedback was provided on each learning target using descriptive feedback and proficiency scores (e.g., exceeds, meets). • Formative assessment data were used to develop mini-lessons connected	• Students were able to demonstrate growth on future assignments tied to the same learning targets. • Students were able to revise and resubmit work up until the end of the semester.	• Multiple assignments were associated with each learning target. • Students could propose alternative ways to demonstrate proficiency using evidence from other classes and/or field experiences.	• All students received end-of-semester summative proficiency scores (e.g., exceeds, meets) on each learning target. • Final grades, while letter grades due to higher education transcript requirements, were determined based on the

—continued on next page—

	• Learning targets were used as the structure for assessment rubrics and feedback.	to learning targets. • Individual conferences for students near the end of the semester were held.			extent to which students were proficient in course learning targets (not based on percentages or points).
Educational Technology in the Secondary Education Classroom (secondary education) and Reading in Secondary Schools (secondary education)	• Course learning targets that were derived from relevant teaching standards were clearly listed in syllabus. • Assessment domains were indicated on syllabus. • Relationship between course modules and assessments was indicated on syllabus, allowing students to see how work completed would be able to be used as evidence of learning against standards with a sample matrix provided to students as a model.	• Formative assessment feedback was provided as students completed design work for modules, as work was being completed, and once work was completed. • Feedback activities, including a range of protocols, were used during the semester to allow for peer-to-peer feedback. • Feedback was provided on the end-of-semester evidence of learning report. • Individual conferences for students near the end of the semester were held.	• Students were able to revise work throughout the semester. • Most modules included multiple pieces, allowing students to complete projects and show growth over the course of the semester. • Following the submission of their evidence of learning report, students were able to address feedback and resubmit after revising one or more of the modules.	• Students were able to pull evidence of learning from any of the modules worked on during the semester to demonstrate learning against the standards. • Students were given the option to complete and use additional work, a module of their own design, to demonstrate learning.	• Students received a narrative report after they completed an end-of-semester report of learning where they managed an analysis of their learning against the standards, pointing to evidence from their modules. • Final grades, while letter grades due to higher education transcript requirements, were based on the extent to which students were proficient in meeting course learning targets as articulated on the syllabus.

Appendix B
Pre/Post Survey Prompts

1. What class are you in?

2. Who is your professor?

3. Select the current semester.

4. What is your first and last name?

5. The term *assessment* refers to the wide variety of methods that educators use to evaluate, measure, and document the academic readiness, learning progress, and skill acquisition of students. Examples of assessments included informal checks for understanding, quizzes, tests, projects, etc. Why do we assess students? In other words, what purpose do you think assessment serves in the classroom?

6. To what extent do you think that assessment is important in the classroom?
   a. Extremely important
   b. Moderately important
   c. Neutral
   d. Low importance.
   e. Not important at all

7. Briefly explain your answer to #6.

8. What characteristics of assessments are most helpful to students?

9. What characteristics of assessments are most helpful to teachers?

10. Why are grades assigned to student work? In other words, what purpose does the A–F grading system or percentage grading system serve in the classroom?

11. To what extent do you think that assigning A–F or percentage grades to student work is important in the classroom?
   a. Extremely important
   b. Moderately important
   c. Neutral
   d. Low importance
   e. Not important at all

12. Briefly explain your answer to #11.

13. At this point in your teacher learning, how much thought have you given to the grading policy of your future classroom?
   a. A lot
   b. Quite a bit
   c. A little
   d. None

14. Briefly explain your answer to #13.

15. In what ways, if any, did your thinking about assessment change through your experience with proficiency-based learning in this course?

16. Based on your experience in this course, list (a) 2 advantages and (b) 2 disadvantages of the proficiency-based learning system.

17. To what extent do you agree with the following statement: The proficiency-based learning system is better than traditional A-F grading systems?

a. Strongly agree
b. Agree
c. Neither agree nor disagree
d. Disagree
e. Strongly disagree

18. Briefly explain your answer to #17.

19. To what extent have you had other experiences with proficiency-based assessment outside this course?

a. A lot
b. Quite a bit
c. A little
d. None