Assessing NETS•T Performance in Teacher Candidates: Exploring the Wayfind Teacher Assessment

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Abstract

To effectively integrate digital technologies in K–12 schools, teachers must be provided with undergraduate experiences that strongly support these integration resources and strategies. The National Educational Technology Standards for Teachers (NETS•T) provide a framework for teacher candidates and inservice teachers to identify their accomplishments in this realm. Using the NETS•T to deliver undergraduate teacher education curriculum, and requiring teacher candidates to document their abilities related to the NETS•T can support meaningful development for the candidates. This study examines the use of the Wayfind Teacher Assessment as a tool for determining the proficiencies of teacher candidates in their final year of preparation in relationship to the NETS•T. (Keywords: assessment, ISTE NETS•T, teacher candidate, technology, Wayfind Teacher Assessment)

The International Society for Technology in Education (ISTE, 2012) asserts that preservice teachers must complete a sequence of experiences that develop an in-depth understanding of how technology can be used as a tool in teaching and learning. In addition, teacher candidates must see technology modeled by faculty in their university classes and in field placements. However, research has found that most faculty lack the skills and knowledge to model technology use and/or teach their students how to effectively infuse technology into the learning environment (Assessment, 1995; Fabry & Higgs, 1997). Colleges of education are faced with the challenge of providing programs that develop both faculty and students as effective technology integrators (Graham, Tripp, & Wentworth, 2009; Simmons & Macchia, 2003).

To facilitate this type of massive transition, faculty members must first catch a vision for the ways that incorporating technologies can enhance and strengthen their teaching (Albion & Ertmer, 2002; Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012; Keengwe, Kidd, & Kyei-Blankson, 2009). The Partnership for 21st Century Skills (P21), in conjunction with the NETS framework, can provide a structure for pursuing 21st century teacher education. These beliefs, coupled with a sense of self-efficacy, can encourage instructors to dedicate the time and energy required to revise their courses (Snider, 2002; Thomas, 2011). These revisions result in increased modeling of technology integration strategies (Francis-Pelton, Farragher, & Riecken, 2000) and the provision of opportunities for students to use various technologies to increase their learning (Vannatta & Beyerback, 2001). Strong support structures are necessary to accomplish this metamorphosis (Dusick, 1998), and supplemental grant funding is surely one method of providing resources to ensure success. However, once these initiatives are implemented, what measures might be used to determine teacher candidate competencies as 21st century educators?

For the past decade, Bowling Green State University (BGSU) has implemented an extensive program to infuse teacher education with technology experiences that ensure that our teacher candidates are equipped to effectively model and integrate computer technologies in their future PK–12 classrooms. As the largest producer of PK–12 teachers in this Midwestern state, BGSU graduates nearly 700 teacher candidates each year. These teacher candidates complete programs in early childhood (EC), middle childhood (MC), adolescent/young adult (AYA), special education (SE), or other specialty program areas, including world language, music, art, physical education, business, and technology education. While these programs address their own unique goals and standards, all students complete similar coursework in the arts and sciences (general preparation) and educational foundations (professional preparation), culminating in their methods courses and student teaching in their final year (Morey, Bezuk, & Chiero, 1997).

Funded through the United States Department of Education's Preparing Tomorrow's Teachers to Use Technology (PT3) initiative (http://www.pt3.org), Project PICT (Preservice Infusion of Computer Technology) sought to restructure our teacher education programs by integrating technology at every level of a teacher candidate's preparation: general education curriculum, teacher education curriculum, and PK–12 field experiences. Project PICT implemented numerous activities to increase the technology experiences for teacher candidates throughout their university education. To facilitate technology use among freshman/sophomore teacher candidates, PICT provided mini-grants to arts and sciences faculty for the development of technology-

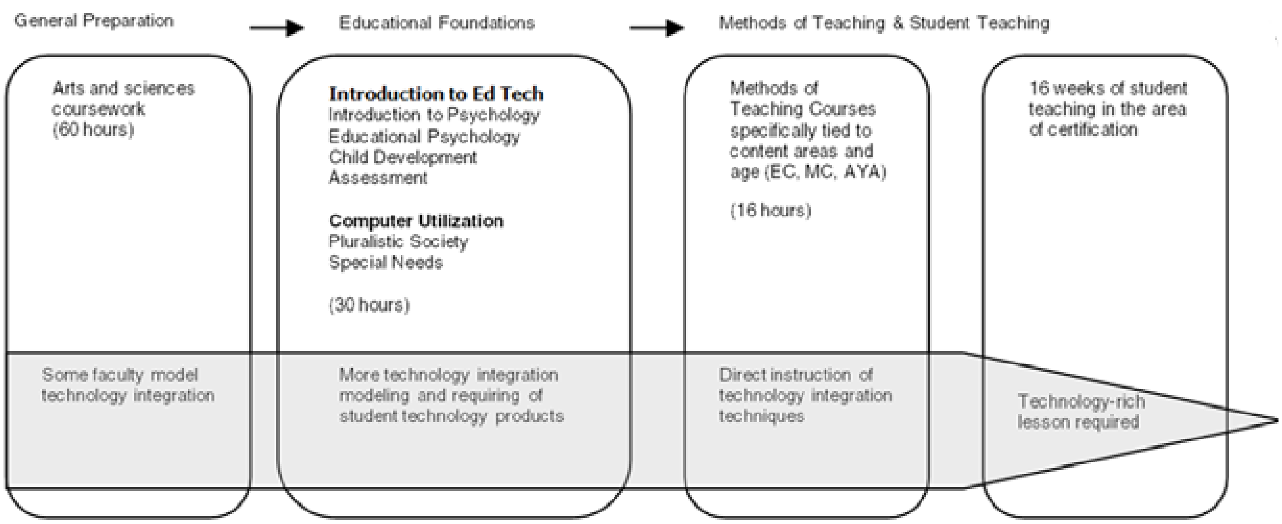

Figure 1. BGSU's overall teacher preparation program (synthesis of commonalities for all degree programs).

rich curriculum. Technology infusion in teacher education curriculum was encouraged through multiple strategies: program curriculum grants, extensive faculty training on technology applications and pedagogy, partnerships with K–12 schools, and increased technology equipment and support. Finally, providing technology-rich field experiences for both methods and student teaching was supported through university/school partnerships, extensive K–12 teacher (clinical faculty) training on technology applications and pedagogy, and increased technology equipment and support in the field. Figure 1 illustrates the progression of coursework and teacher candidate technology experiences that began during this time.

While PICT resulted in significant increases in technology proficiency and integration among participating faculty, K–12 teachers, and teacher candidates, the classroom technology faculty desired to better assess how well BGSU's graduates were accomplishing the NETS•T. To that end, they chose to adopt the Wayfind Teacher Assessment (WTA) as an indicator of teacher candidate achievement.

The following section discusses the broader context of performance assessment and accountability in PK–16 education. After this brief overview, we present the use of the WTA, delineating its place and function within the teacher education programs, the administration and scoring process, and the results of its use to date.

Performance Assessment and Technology

In the United States, as well as other nations, educational institutions are being carefully scrutinized. Evidence of student progress is expected to be documented and distributed (Engstrom, 2005; Meyer, et. al, 2008; Reeves, 2002; Whittaker & Young, 2002). The interest in accountability and continuous improvement has affected assessment processes in PK–16 education, increasing the use of standardized tests as well as performance assessments (Bartlett, 2002; Brown, 2000; Gettinger, 2001; Kimball & Cone, 2002; McManus, 2005; Persichitte & Herring, 2002; Sieber, 2009).

Performance assessments are characterized by focus on student products or artifacts that demonstrate certain skills or achievements that cannot be easily measured through traditional standardized tests. Portfolio assessment, and more specifically, electronic portfolio development, has grown out of a need for students to collect and organize multiple performance assessment products (Pereira, et al., 2009; Holt, Claxton, & McAllister, 2001; Matthew-DeNatale, 2009; Quatroche, Duarte, & Huffman-Joley, 2002). BGSU's teacher education programs, as a part of meeting accreditation standards through the National Council for the Accreditation of Teacher Education (NCATE), have been developing and/or identifying key assessments (performance assessments) that provide evidence of teacher candidate competency throughout the core curricula. When the need for classroom technology integration skills among teacher candidates was identified, locating a performance assessment to allow students to demonstrate their skills in this area seemed a reasonable solution. This assessment would then become a part of the key assessment documents that students would compile, in an electronic portfolio format, to document their professional development.

Teachers and administrators, both in K–12 environments and academia, have been interested in instruments that would meaningfully document the NETS•T. Atomic Learning developed the 21st Century Skills Teacher Assessment (Richards, 2012) using a 40-item test. George Mason University provides a NETS•T certification program that includes multiple assessments (Smith, 2012). In general, however, most assessments of teacher candidates' or inservice teachers' abilities regarding the NETS•T have been conducted using a variety of self-reported survey data. To date, actual performance-based assessments have been scarce.

Methods

Instrument: The Wayfind Teacher Assessment

The Wayfind Teacher Assessment (Learning.com, 2012) is an online, validated instrument measuring technology literacy in relation to proficiency levels of the NETS•T. The assessment consists of 60 items, grouped in two sections, and a separate survey section for demographic and self-reporting information. The items contain multiple-choice and dynamic digital performance responses, evenly divided across indicators for each of the five NETS•T. Currently, the cost per teacher for the WTA is $10.

Subscale scores are reported using a scale score of 100–500 and represent proficiency of the five NETS•T:

1. Facilitate and inspire student learning and creativity
2. Design and develop digital age learning experiences and assessments
3. Model digital age work and learning
4. Promote and model digital citizenship and responsibility
5. Engage in professional growth and leadership

A composite score is also calculated using the same 100–500 point scale. Proficiency categories are determined using the following ranges (see Figure 2):

- Below 200: Below Basic
- 201–300: Basic
- 301–400: Proficient
- 401–500: Advanced

Because the WTA is conducted online through Learning.com, each assessment is unique, with items of varying difficulty. Learning.com calculates subscale and composite scores using Item Response Theory (Learning.com, 2011).

Procedures

The WTA was initially developed for use by school districts to identify K–12 teachers proficiencies in technology integration to better meet professional development needs. However, because the teacher candidates at BGSU were about to graduate and begin teaching in K–12 schools, it was determined that this instrument might be useful in documenting their level of K–12 technology expertise. As the WTA is a completely online assessment and contains components measuring technology skills, it was possible that the instrument could also be an indicator of teacher candidate technology skills in simply the administration and participation of the assessment, as well.

The lead faculty member for the classroom technology courses for the undergraduate teacher education majors worked with Learning.com to establish a "district" account. This lead faculty member was designated as the assessment administrator for the university's account. All participating teacher candidates registered within this system as teachers, using a data file containing all names, ID numbers, and usernames. A generic first-time password was established, and users were told to create their own unique passwords during their first login. Teacher candidates were given a 1-week period in which to complete the three sections of the WTA (two sections of items related to the NETS•T and one section including demographic and self-report data). After this time period, the assessment administrator logged into the system and extracted the PDF files presenting individual student reports. These files were given to the course instructors for distribution to the teacher candidates. In addition, the assessment administrator downloaded a raw data file containing student individual responses to the various WTA assessment and survey items and subscale and composite scores. One negative aspect of the WTA is that item data cannot be traced to item content or subscale calculation, so the researchers only used subscale and composite scores for analysis.

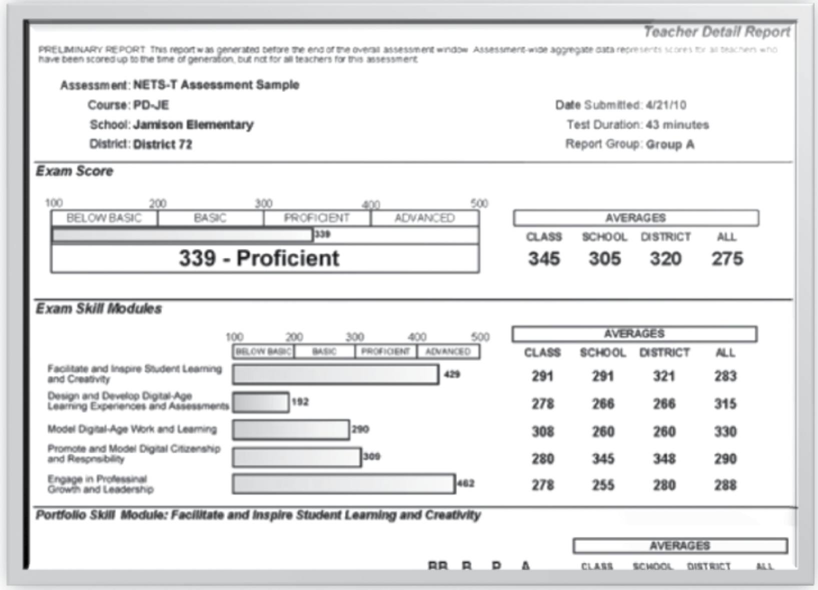

Figure 2. Sample of Wayfind Teacher Assessment Report.

Research Questions

Because we were skeptical of how well an instrument such as the WTA could accurately reflect a teacher's accomplishments of the NETS•T, this study addresses the following questions:

- What level of NETS•T proficiency, indicated by the WTA, did the teacher candidates possess?
- How did teacher candidates view the WTA instrument? Did they find it a reasonable indicator of their actual mastery of the NETS•T standards?

Table 1. Descriptive Statistics for Teacher Candidates WTA Scores (*N* = 194)

NETS•T Standard	Mean	Range
Student learning and creativity	340.2	175–450
Digital age learning experiences and assessments	357.0	120–500
Digital age work and learning	341.	100–450
Digital citizenship and responsibility	327.4	175–500
Professional growth and leadership	345.2	160–450
Total Exam Score	354.6	157–430

Participants

Teacher candidates enrolled in the final semester of their teacher education programs were asked to take the WTA as a part of their classroom technology coursework. The decision was made to require all junior/senior-level undergraduate teacher candidates to take the WTA and reflect on those results as a part of their final technology course. Thus, 194 teacher candidates participated in this first iteration of the WTA.

The WTA was taken during the first weeks of classes, and no specific preparations were provided. The WTA is administered in a secure online interface, and students were provided with secure login codes to access the assessment. Once completed, individual student reports were distributed to each teacher candidate, and they were then asked to write reflections related to their results.

Data Analysis

We used subscale and composite scores for data analysis. For the first research question, we calculated descriptive statistics for subscale and composite scores.

Once we shared individual results with students, we asked them to reflect on their NETS•T proficiencies, as indicated by the WTA, and determine whether they believed the instrument accurately reflected their expertise. We analyzed these responses for strands and themes to address the second research question. We employed a synthesis of student response data, student WTA score analysis, and faculty experience to determine the current value of implementing the WTA as an indicator of teacher candidate accomplishment of the NETS•T.

Results

Preliminary descriptive analysis of the 194 teacher candidates who took the WTA in the fall of 2011 indicates that, overall, these candidates are prepared to enter the teaching force proficient in the NETS•T. Table 1 presents a summary of these findings.

The mean scores, overall, did fall within the proficient range per the WTA scale, with digital citizenship and responsibility (DCR) as the lowest at 327.4. Examining the DCR category to determine if this is more difficult to assess in the WTA format, or, if the teacher candidates do have less knowledge and skills in this area is necessary. While the mean scores indicate proficiency in all indicators, further analysis of the various proficiency levels reveals that a small population of students struggle to achieve at the most basic level (see Table 2). Technology faculty members worked to provide additional interventions for these students who had basic and below basic scores from the WTA. They implemented more directed differentiations for the 10 students who either scored basic or below basic in *every* standard category or had a below basic score in *at least one* standard category. In this way, the WTA has been a useful tool in providing differentiated instruction for the junior/senior-year technology course. The Discussion section of this article provides specific details of these instructional strategies. We will gather data once students begin their student teaching to ascertain their comfort and use of technologies in the classroom at that time, in an effort to determine the effectiveness of the interventions provided.

As a part of their work related to the NETS•T, technology course instructors asked students to reflect on the scores they received from the WTA, and these reflections were very compelling. We examined the narrative reflections, catalogued key ideas, and grouped them into thematic units. The frequently documented themes within the reflections included:

- **Alignment:** The WTA accurately represented, in the teacher candidates' view, their NETS•T proficiencies and skills.
- **Commitment:** Taking the WTA emphasized the importance of the NETS•T and an overall sense of teacher responsibility to be more than competent in digital technology integration in their classrooms.
- **Surprise:** Teacher candidates were amazed that their NETS•T abilities could be fairly accurately assessed with a 1- to 2-hour online process.

These reflections did seem to support teacher candidates' beliefs that the WTA results aligned with their perceptions of individual strengths and weaknesses regarding the NETS•T. Those receiving a Basic rating conceded that they were weak in classroom technology skills. One student commented:

> In reviewing my results on my Wayfind Assessment, I see I rank under a basic level, which is where I anticipated being. The main focus of technology used to be just Microsoft Office but now it's expanded to include Podcasts, blogs, Wikis, Google docs/sites and all-touch tools, like SmartBoards and I-pads. The latter half of that statement certainly includes things I am not very familiar with at all, so I'm thankful for the opportunity to be able to better fulfill the National Educational Technology Standards and realize it will have to be a career-long effort.

Another student wrote:

> I always felt that I was someone who knew technology well and even practices and uses much of

the technology for fun and enjoyment. However, after taking this assessment I have realized my knowledge is very undeveloped. I know much about the most common things used such as the Internet and even Microsoft Office. But when it comes to some of the online resources, I haven't even heard of some of these things such as the interactive online posters. This was rather disheartening to me. I have always prided myself on knowing technology and knowing it well. So after reflecting on this I have definitely come to the conclusion that I am going to need to broaden the technology that I know and use in my everyday life.

Even students scoring in the Advanced category confirmed that the WTA was a good indicator of their abilities, though they thought it could be extended to provide even more detail. One teacher candidate expressed:

I thought the WayFind survey was extremely interesting and informative. When I was first reading about the assignment I thought how can there be a "true" survey on technology by asking multiple-choice questions. Thus, I was surprised as well as intrigued by the survey offering questions that made you click on the right answer as if you were actually using that piece of software. I believe that the validity of the survey was very high as the questions did a good job of testing what topic they were focused on. I thought that the survey was on the short side. I know you do not want to make it too long to avoid people getting bored or frustrated but I feel that if it was longer it would be able to more accurately assess the person's knowledge in technology.

Discussion

All in all, the WTA seemed to support students' self-reflection and professional development by providing relevant quantification of their abilities to meet the NETS•T. Teacher candidates, for the most part, scored at a proficient level, indicating that they were prepared to enter the teaching force with the knowledge, skills, and dispositions identified in the NETS•T. BGSU's teacher education faculty members believe that these data validate the effectiveness of the last decade of curricular reform and faculty development in the area of digital technologies for teaching and learning.

Table 2. Teacher Candidates Identified for Interventions Scoring at B or BB Levels ($N = 194$)

NETS•T Standard	Basic	Below Basic
Student learning and creativity	35	3
Digital age learning experiences and assessments	23	4
Digital age work and learning	52	1
Digital citizenship and responsibility	37	2
Professional growth and leadership	35	5
Basic on all standards	9	
Below basic on at least one standard	10	

Using the instrument as a pre-assessment in the final undergraduate course in classroom technology also assisted faculty in differentiating instruction for students, supporting their growth as technology integrating teachers. The WTA provided classroom technology faculty with performance assessment data that could be used to identify students with particular issues related to using digital technologies effectively in the classroom. These teacher candidates had the opportunity to develop their own individualized professional development plans to increase their proficiencies, and course instructors were able to integrate these activities throughout the semester. The following sections delineate specific strategies used to achieve this type of differentiation related to the various NETS•T standards.

Facilitate and Inspire Student Learning and Creativity (NETS•T 1)

Teacher candidates scoring at the basic or below basic level on the WTA in this first area of the NETS•T received examples of teaching and learning scenarios that demonstrated a powerful combination of authentic learning activities and appropriate digital technology integration. Collaborative groups of students analyzed these scenarios, noting details regarding real-world issues or authentic problems addressed, collaborative practices used to promote student engagement and retention, and evidence of collaborative knowledge construction. We then asked these teacher candidates to brainstorm additional strategies that would encourage student inventiveness related to academic content goals, and to create a wiki page of ideas and resources related to this goal.

Design and Develop Digital Age Learning Experiences and Assessments (NETS•T 2)

To build on the analysis activities described in the previous section that the teacher candidates completed, those candidates worked to strengthen their abilities in the area of designing and developing digital age learning experiences by crafting specific artifacts focused on their targeted age group and content area for K–12 instruction. For example, middle school math educators began with previously developed lessons or units and expanded them to include relevant digital technology tools and resources that would support student learning and creativity. Associated with these lessons were strategies for formative and summative assessments, accomplished with various digital technology resources.

Model Digital Age Work and Learning (NETS•T 3)

Teacher candidates working to improve their abilities in modeling digital age work and learning crafted digital collections of exemplars demonstrating their expertise in incorporating digital tools to perform tasks related to the professional work of teaching. They created videos of their teaching using technologies such as the interactive whiteboard, digital cameras, mobile technologies, wikis, blogs, dynamic databases, and content-specific K–12 Web resources. In addition to video vignettes, they also included a digital portfolio highlighting self-created resources. A class Web site featuring collaborative and interactive tools was a key element of this collection.

Promote and Model Digital Citizenship and Responsibility (NETS•T 4)

Teacher candidates focused on improving their abilities to promote and model digital citizenship and responsibility interacted with each other and those around the world in a professional social networking environment (the ISTE Community Ning, www.iste-community.org). Within this structure, teacher candidates dialogued with teaching professionals from around the world about issues of fair use, digital equity, copyright, and intellectual property. An exploration of Creative Commons licensing was a part of this exploration. Teacher candidates also crafted a sample social networking experience for their students using tools such as Edmodo or Schoology.

Engage in Professional Growth and Leadership (NETS•T 5)

Finally, teacher candidates noting a need for growth in the area of engaging in professional growth and leadership constructed a professional development plan for their individual professional growth extending 2 years past their graduation date. These candidates explored options for professional development, including membership in professional organizations, webinars, online tutorials, teacher professional networking sites, and local school resources. Online conversations with technology integrating K–12 teachers through the ISTE Community Ning were also a part of this group's experiences.

Conclusion

Ultimately, the WTA is one piece of an assessment and feedback system in a very complex enterprise—21st century teacher preparation. However, the implementation of this instrument has provided valuable evidence related to candidate accomplishment in the area of the NETS•T. Results from the WTA have encouraged teacher candidates to reflect critically on their knowledge, skills, and dispositions in the field of classroom technologies. The detailed student reports from the WTA have also provided a springboard for differentiation within junior/senior-level classroom technology courses at BGSU, supporting individualized student instruction and support. These realities demonstrate the value of the WTA as a part of 21st century teacher candidate evaluation and development.

Author Note

Savilla Banister has been in PK–20 education for more than 30 years. She has worked in underserved urban K–12 schools to make an impact on the digital divide by assisting in grant projects and working side by side with teachers and students as they integrate digital technologies in their classrooms. She is currently an associate professor of classroom technology at Bowling Green State University, where she strives to inspire teacher candidates to develop their technological pedagogical content knowledge and effectively use digital technologies to make a difference in teaching and learning. She also serves as a curriculum specialist in the visual and performing arts for Learning and Leading with Technology, ISTE's member magazine. Please address correspondence regarding this article to Savilla Bannister, Associate Professor, School of Teaching and Learning, ED 365, Bowling Green State University, Bowling Green, Ohio 43403. E-mail: sbanist@bgsu.edu

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