A Professional Development School Technology Integration & Research Plan

Neal Shambaugh, Ph.D.
West Virginia University, USA

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EXECUTIVE SUMMARY

Technology diffusion in public schools has varied in scale from local and state initiatives to large-scale governmental-funded programs. Teachers' use of technology, however, remains limited and still focuses on the tools rather than on learning outcomes and teaching processes. Teacher education programs face a similar challenge in having pre-service teachers integrate technology and model best practice for teachers in public schools. One model for teacher education is viewing public schools and the university-based teacher education program as **Professional Development Schools** (PDS) where pre-service teachers and host teachers learn alongside each other in actual teaching including technology use. In this case a mature PDS model (20 years old) is described and how technology has been implemented across the teacher education program and within the PDS-network member schools. This case poses for the reader two questions: (1) How can technology diffusion occur in a PDS model addressing the different agendas of university, school, and state? (2) How can a technology integration plan also include program evaluation and/or research features so that the plan is formally and systematically studied?

ORGANIZATION BACKGROUND

***Historical Summary*.** The overall mission of the teacher education program, referred to here as the Program, is a partnership designed to simultaneously renew teaching, learning, and the professional development of both prospective and practicing educators in 30 state public schools and a university. This commitment began in 1987 when the university joined the Holmes Group and embraced their advocacy for a new structuring using the Professional Development School in which P-12 school and university faculty engage in joint work to transform teaching, learning, schooling, and teacher education (Holmes Group, 1986, 1990).

A foundation provided financial support in 1989, and the first set of Professional Development Schools was selected in 1990. Concurrently, an education college in a university moved from a traditional four-year program to a five-year program, in which prospective teachers earned a bachelor's degree in a discipline and a master's in education. The curriculum was redesigned and entrance requirements were raised. By 1992 a comprehensive curriculum and assessment plan for the Program was developed. Additional PDSs were selected in 1994, 1997, 2002, and 2008. A total of 30 PDSs in five counties now provide elementary, middle, and high school settings in which teacher candidates (e.g., preservice teachers) spend substantial time collaborating with school and university faculty to discover how to meet the learning needs of all stakeholders. The first class graduated from the Program in 2000 and graduates teach within and beyond state borders.

By 2008 the Program, along with the other school/university partnerships in the state, advocated for and obtained an annual line item in the budget of the state legislature. This unique arrangement in the USA

provided support for research, learning, and outreach that strengthened the partnership and the relationships between the schools and their communities. In addition to the state-level funding for PDS work, the five counties in the state that housed PDSs contributed funding to the Program. This funding supports professional development initiatives that feature collaboration between school and university faculty. In addition to this professional development support, the counties support the governance group meetings of the PDS teacher education coordinators.

Program Overview. The program is a five-year, dual-degree program in which students simultaneously pursue a Bachelor's degree in a content specialization and a Master of Arts in Education. In Years 1 and 2 undergraduates volunteer to spend 60 hours in an approved educational setting and experience schools. Students enter the program in Year 3 of their undergraduate program and begin six sequenced clinical experiences known as **practica**. Year 3 students spend 2 hours/week in a PDS. Year 4 students spend 5 hours/week in the Fall semester and 14 hours/week in the Spring semester. Year 5 students, now graduate students, spend their entire Fall semester engaged in full-time teaching responsibilities in a PDS. During their final Spring semester, these fifth year students spend 135 hours engaged in their own professional development and assist in the professional development of their school's faculties.

Mission and Strategic Plan. The mission statement of the school-university partnership is as follows: *"We are a community of inquiry where both school and university-based professionals collaborate to benefit the learning of all."* To enact the mission of simultaneous renewal of school and university, the Program revisited and revised their strategic plan in 2007 to guide the Program's short-term and long-term work. The document identified ten goals related to professional development, partnership, dissemination, and teacher preparation. These goals are itemized below.

Professional Development Goals
Goal 1: Develop, implement, and disseminate strategies for embedded professional development.
Goal 2: Develop structures and relationships that support the Program's professional development agenda with local, state, and national goals and the development of professional development that capitalizes on existing resources and expertise within the Program.

Partnership Goals
Goal 3: Increase the leadership potential of the Program.
Goal 4: Strengthen collaboration between and among partners and stakeholders.
Goal 5: Work towards sustainability.

Dissemination Goals
Goal 6: Market the Program.
Goal 7: Establish a coherent and strategically focused research and dissemination agenda.

Teacher Preparation Goals
Goal 8: Increase the capacity of the Program to meet needs for program graduates.
Goal 9: Increase the capacity of the Program to meet the needs of PK-12 students.
Goal 10: Grow the Program in both the public school and university settings.

Organizational Structure. Each **PDS** includes a committee composed of educators interested in the Program. A PDS professional development coordinator serves as a teacher leader who organizes the work within the school. This work includes providing leadership to the steering committee, and facilitating professional development, use of funds, faculty involvement, collaboration with the university, and attending Program coordinating meetings. A Teacher Education Coordinator manages the clinical placements, teacher candidate assessment, and documentation of teacher candidate work. Each school principal facilitates faculty involvement and shared decision-making. In combination, the university liaison, Professional Development Coordinator (PDC), Teacher Education Coordinator (TEC), and

principal of each school work in tandem to strengthen the school-based component of the Program. Meanwhile, across the Program, an Executive Committee brings together each school's liaison, PDC, TEC, and Principal to strengthen theory-to-practice connections targeting both school improvement and teacher education. Each group meets regularly throughout the academic year. In combination, this PDS organizational structure creates a mechanism for distributed and Program leadership.

The Program is housed in a college of education. A Program Coordinator oversees the work of the Program in both the university and clinical settings. As the content specialties for the students are housed in the university's College of Arts and Sciences, periodic meetings are held between faculty of the two Colleges and the PDSs. In addition, issues facing teacher education across the College are discussed in the Professional Education Council (PEC). A student group also provides organized input into Program decision-making. Decision-making for the program rests primarily with the participants of the Program, which include the joint involvement of public school teachers and administrators and university faculty. Localized PDS decision-making is key to the success of the development of teacher candidates, experienced teachers, and teacher educators.

Coordination of faculty who contribute to the Program is accomplished through a committee composed of liaisons, who may be course instructors and/or work with one or more PDSs and other faculty teaching in the Program. Typical activities for liaisons include mentoring of students' action research projects, teaching observations, and portfolio reviews. Liaisons also serve as brokers of services to professional development schools around their professional development needs, "critical friends" as PDSs engage in school renewal, and, in some cases, providers of professional development. The PDSs also serve as a space for the liaisons own ongoing professional growth as they observe, teach, and research. In addition, many of the program courses are developed through the use of course teams, which may include PDS faculty.

Program Sequence. Students spend approximately 1,100 hours in a PDS during their third, fourth, and fifth years in the program (see Figure 1). During their practica experiences, teacher candidates' assignments are related to their future certification and professional development plans. Mentor teachers provide opportunities for teaching and working with students, as well as written feedback to students during and at the end of each **practica** semester. During their fifth year in our program, students spend the fall semester as full-time interns in their PDS and during the spring semester they choose graduate level electives and design a personal plan for their continuing professional development. As these learning experiences are integrated across the five years, teacher candidates earn both a bachelor's and master's degree at the end of year five. Graduating students provide feedback on the quality of experiences they had in the PDS and working with mentor teachers.

Figure 1. Five Year Program and Clinical Experiences.

Program Component	Time Frame	Clinical Experiences
Volunteer Experience	Years 1 & 2	60 hours in an education setting
Juniors	Year 3	2 hrs/week in a PDS engaged in teaching/learning activities
Seniors	Year 4	7 hrs/week fall; 12 hrs/week spring in PDS engaged in teaching/learning activities
Graduate-Internship	Year 5	Entire fall semester engaged in full teaching responsibilities in a PDS
Graduate-Professional Development Semester	Year 5	Spring semester: 135 hours of professional service in PDS

Figure 2 identifies clinical experiences and courses for each of the five years of the program across both fall and spring semesters. The specific courses vary depending on the student's specializations and degrees.

Figure 2. Clinical and Courses.

	Fall	Spring
Year 1 Volunteer Experience 30 hr	**Elementary & Secondary** EDUC 100: *Education Colloquium*	Volunteer Experience (continued)
Year 2 Volunteer Experience 30 hr	SPED 304: Special Ed. in Contemp. Society	**Elementary & Secondary** EDUC 200: *Professional Inquiry*
Year 3 Juniors	EDUC 311: *Practicum I* (2 hours/wk) **Elementary & Secondary** EDUC 301: *Learning I*	EDUC 312: *Practicum II* (2 hours/wk) **Elementary & Secondary** EDUC 400: *Instructional Design & Evaluation* **Elementary Only** EDUC 460: *Foundations of Language and Literacy* **Secondary Only** C&I 425: *Approaches to Teaching Literature*
Year 4 Seniors	EDUC 410: *Practicum III* (7 hours/wk) **Elementary & Secondary** SPED 360: Differentiated Instruction RDNG 422: Reading in the Content Area **Elementary Only** EDUC 414: *Promoting Creative Expression in Elementary Classrooms* EDUC 430: *Math Methods for Elementary Teachers* EDUC 461: *Promoting Literacy Connections* **Secondary Only** C&I 424: *Approaches to Teaching Language* ENGL 309: *Approaches to Teaching Composition* or C&I 434: *Teaching Math in Sec. School* or C&I 444: *Secondary Science Teaching Methods* or C&I 454: *Sec. Social Studies Methods* or LANG 421: *The Teaching of Foreign Language*	EDUC 411: *Practicum IV* (12 hours/wk) **Elementary & Secondary** EDUC 401: *Managing & Organizing Learning Environments* RDNG 422: Reading in the Content Area **Elementary Only** EDUC 450: *Social Studies Methods for Elementary Teachers* EDUC 440: *Elementary/Early Childhood Science Methods* **Secondary English/Language Arts Only** C&I 324: *Teaching Language Arts in Secondary Schools* C&I 424: *Approaches to Teaching Language* C&I 425: *Approaches to Teaching Literature* ENGL 309: *Approaches to Teaching Composition*
Year 5 Graduates - Internship	EDUC 612: *Professional Internship* (Full-Time) **Elementary & Secondary** EDUC 600: *Teacher As Researcher*	EDUC 687: *Instructional Practicum* (135 contracted hours) **Elementary & Secondary** EDUC 601: *Context of Education* EDUC 602: *Professional Identity: Teacher As Leader* 2 Graduate Electives

***Student Evaluation*.** Student qualifications to enter the Program at Year 3 are reviewed by PDS teachers and university faculty using an Admission Portfolio. Year 3 performance is evaluated by **Practica** evaluations. Student performance of Year 4 students are reviewed using a portfolio, which includes PRAXIS scores (national teaching tests), mentor teacher and practica evaluations, course artifacts, teaching reflections, evidence of instructional technology use and an action research proposal. Student performance of the Year 5 graduate students is also evaluated using an Exit Portfolio, organized by ten characteristics. Year 5 students are also evaluated based on the implementation, documentation (paper), and presentation of an action research project.

Professional Development. The improvement of professional skills is known in the field as **professional development**. Within the joint school-university Program, professional development plans exist for both public schools, preservice teachers, and university faculty.

- State. The state Department of Education requires that each school develop its own 5-year plan identifying priorities for improvement, such as student achievement and new curriculum, as well as professional development priorities that address these areas targeted for improvement. These 5-year plans include specific action steps that are informed by analysis of data related to student learning.

- Public school. Each PDS decides how to spend its Program funds based on teacher candidate, mentor teacher, and P-12 student needs. Other professional development opportunities include networking with faculty in other PDSs through Program-sponsored professional development and grant-supported work, such as a support group for National Board certification, which is a review process for teachers who have had at least three years of continuous full-time employment in schools. Through connections to liaisons, PDS teachers have opportunities to develop their own professional development activities such as site-based courses and study groups on pertinent topics.

- University. University faculty members learn from PDS teachers and teacher candidates through teaching of EDUC courses and working with teachers and teacher candidates as liaisons in public schools. University faculty also participates in the same professional development activities sponsored by the Program. Specific activities include the focus on Special Education, Diversity, Technology and action research.

- Preservice teachers. During the last semester of the five-year program, Year 5 students contribute 135 hours of professional service to their PDSs. These "contracts" are jointly negotiated by the teacher candidate, the school, and the university liaison. Contract work enables the teacher candidate to gain knowledge experience that augments three years of teaching in that PDS, as well as to share what they have learned with the teachers in their PDS.

SETTING THE STAGE: TECHNOLOGY USE IN A TEACHER EDUCATION PROGRAM

Revisiting the Definition of Educational Technology

"Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources" (Januszewski & Molenda, 2007). A technology integration plan is a key document in the development of new teachers in schools. The key challenge in this case is determining a way to synchronize state priorities with a university-public school teacher education program using a Professional Development School Model, and including in the plan specific provisions for ongoing study of how the plan is working.

National Teacher Education & Technology Context

The context to technology use is summarized below by first examining learning outcomes or what students should know. Technology standards are then addressed followed by how different organizations see these technology standards addressed in teacher education.

Learning outcomes. Numerous subject matter organizations have specified what students should be able to know, do, and value. Examples include the National Council of Teachers of Mathematics (NCTM, 2000), which integrate technology through all of their standards, and the National Council of Teachers of English (NCTE, 2008), which acknowledged a new view of literacies in the 21st century. Specifically identified were technology tools, collaborative problem solving, global sharing, online sources, multimedia, and the ethical issues of participating with technology tools and technology-based environments. Social Studies and Science have also acknowledged the abilities to use technology by teachers and students.

The **Common Core** Standards now provide consistency of learning outcomes across the country. Another approach to technology diffusion is in the *relationships* between public schools and teacher education programs, particularly through the use of the Professional Development School (PDS) model. In these

PDS programs, technology use as well as action research, in which school innovation is systematically studied, is supported as a part of regular school activities.

Pulling together these 21st century literacies, knowledge, and skills has been attempted by the Partnership for 21st Century Skills (2004), a group of business organizations and education organizations. The overarching framework for their view of 21st century learning includes core subjects and 21st century themes; learning and innovation skills; information, media, and technology skills, and life and career skills. Supporting these learning outcomes are a set of support systems, including standards and assessments, curriculum and instruction, professional development, and learning environments. Numerous states have adopted this framework, which may provide case readers with a way to look at learning outcomes that addresses both national and state priorities, but also to provide a future-oriented view of what students need to be learning in the 21st century.

Teacher education. Teacher education in the USA is guided by what are known as the **INTASC** principles from the Interstate New Teacher Assessment and Support Consortium. These ten principles include content, development, learning differences, teaching strategies, motivation, communication, planning, assessment, reflection, and community. The Program in this case uses a variation of the INTASC principles having been developed prior to the INTASC versions. For the purpose of this case and the development of a technology integration and research plan, the INTASC principles can be used.

This case study directs readers to develop a technology integration and research plan for teacher education programs that use a Professional Development School model. Organizing principles for PDS models have been developed by the National Association for Professional Development Schools (NAPDS, 2008). In 2008 the organization developed Nine Essentials for any PDS. These essentials address the unique relationships articulated by partnership work. For technology issues, the joint involvement of public school educators and leaders, and university faculty are necessary.

Technology standards in teacher education. The national context for technology integration has involved the International Society for Technology in Education (ISTE ®), the major association for educators (100,000 members) engaged in advancing learning and teaching through the use of technology in PK-12 and teacher education. ISTE is one of several national organizations which developed standards that the National Council for Accreditation of Teacher Education (NCATE) uses to accredit teacher education programs in the United States. The major initiative from ISTE for technology integration has been the National Educational Technology Standards (**NETS**). Developed in 1998, these standards help measure proficiency and set goals for what students (NETS•S, 2007), teachers (NETS•T), and administrators (NETS•A) should know and be able to do with technology in education. Major features of NETS standards involve higher-order thinking skills (problem solving, critical thinking, creative), and student-centered, project-based, and online learning environments.

An alternative but complementary set of technology skills for teacher use in the classroom was laid out by the Milken Exchange on Education Technology (1999). These categories of skills, known as the Professional Competency Continuum: Professional Skills for the Digital Age Classroom, include core technology skills; curriculum, learning and assessment skills; professional practice; and classroom and instructional management. For the purpose of this case, either The Milken list or the NETS competencies can be used as a way of seeing how the Program might address each set. The major rationale for the use of the NETS standards is that they have been adopted by the National Council for the Accreditation of Teacher Education (NCATE) for use in accreditation.

Integration framework. A possible way to integrate the INTASC standards, technology skills, and teachers' developmental stages is the Framework for Schools, Colleges, and Departments of Education Technology Integration (Mehlinger & Powers, 2002). This framework for SCDE units uses the Milken list of professional skills and adds a developmental component, one that acknowledges that teachers pass

through different stages of technology readiness and skill. This component was based on the research conducted by the Apple Classroom of Tomorow (ACOT) and identified five stages that teachers move through: entry, adoption, adaptation, appropriation, and invention. Mechlinger and Powers developed a set of technology integration stages for new teachers as they grow and develop in a teacher education program. Stage 1 (Entry) involve general university courses where content is taught and technology may be used in the teaching. Stage 2 (Adaptation) involve student activity in teacher methods and advanced content courses where technology is addressed as another set of teacher decisions and where technology is used to assist student learning. Stage 2 also may include teaching activities in the college classroom and/or in other educational settings. Stage 3 (Transformation) involves preservice teachers actually teaching in an internship over multiple weeks or months, a time in which they experience teaching over time and how technology might be used given the contextual issues found in public schools.

Leadership. A frequently missing component is addressing the leadership issue, involving teacher leaders as well as administrators, providing roles of advocacy, innovation, and stewardship (Lieberman & Miller, 2004). ISTE's NETS-A for administrators identifies and specifies details on five categories, including visionary leadership, digital-age learning culture, excellence in professional practice, systemic improvement, and digital leadership. A resource to engage in these categories by school leaders is Schrum and Levin (2009), which connects to the NETS-A standards with specific ideas on the standards, new tools and strategies, and structures, including professional development, Professional Learning Communities (PLC), and technology integration specialists.

Existing Technology Integration Plan

Initial meetings for a technology integration plan have been held to discuss competencies for student pre-admission, as well as tool use for students in year 3, 4, and 5. These competencies have been identified in some courses and **practica** across years 3-5. The last formal summary of these occurred in 2006, which is summarized in Figure 3. The technology use in individual courses needs to be reviewed, updated to reflect current technology options, and current NETS-S standards identified.

Figure 3. Year 3, 4, 5 Course Assignments and Assessment Using Technology.

Course	Technology Use
Volunteer Experience	**(pre-admission)**
EDUC 100	Email for class communication Web site evaluations
EDUC 200	Online forms: volunteer application and sponsor forms Word processing: Daily logs, summaries, volunteer paper, digital journals Presentation software Email: class communication Online resources: keyword searches
Year 3	
Learning Theory	Graphic organizers
Special Education	Assistive technologies
Literacy	
Secondary language arts	Databases, Spreadsheets
Instructional design and evaluation	CMS
Year 4	
Elementary math	Databases, Spreadsheets
Elementary science	Databases, Spreadsheets
Elementary social studies	Databases, Spreadsheets, web quests
Secondary language arts	Databases, Spreadsheets
Secondary math	Databases, Spreadsheets
Secondary science	Databases, Spreadsheets
Secondary language arts	Databases, Spreadsheets
Action research	Spreadsheets
Creative expression	Instructional materials, media

Managing learning environments	Gradebook software
Year 5	
Context of education	Chat rooms
Action research	Spreadsheets
Teacher as leader	Chat rooms

Meanwhile, specific technology courses are seminar-delivered and are designed for students in years 3, 4, and 5. Some of the **practica** assignments are connected to university courses. Assignments and assessment for these practica are identified in Figure 4, but need revisiting to reflect current developments in technology use in public schools and matching with current **NETS**-S standards.

Figure 4. Year 3, 4, 5 **Practicum** Assignments and Assessment Using Technology.

Course	Assignments	Assessment	NET-S Standards
EDUC 311 – Practicum I	Email	Host teacher using practicum rubric	3AC
	Technology integration	Online discussion	3AC
	Technology inventory	Instructor using technology inventory rubric	1D, 5A
	Lesson observation	Focused observation rubric	1D
	Video analysis	Online discussion	3A
	Digital Story	Digital Story checklist	3A, 4A
	Clinical experiences	Host teacher using Y3 checklist	1D
EDUC 312 – Practicum II	Digital Story presentation	Digital Story checklist	1AD, 3A
	Publication consent form	Host teacher using practicum rubric	1A, 4C
	Clinical experiences	Host teacher using practicum rubric	1A, 4C
EDUC 410 – Practicum III Tech Integration Course	Online chat	410 faculty using synchronous chat rubric	1D, 2B, 3ABC, 4C
	Wiki	410 faculty using PDS Wiki rubric	1BD, 2A, 3ABCD, 4C
	Clinical experiences	410 faculty + host teacher using practicum rubric	1B, 2ABCD, 4B, 5C
EDUC 400 – Instructional Design & Evaluation	Tied to 410 and clinical experiences	Design lessons using 21st century skills and tools	
EDUC 411 – Practicum IV	Web-based unit	411 faculty using web-based unit checklist	1AB, 2A, 3A, 5AC
	Videotape analysis	411 faculty using videotape analysis rubric	1B, 3A, 5A
	Clinical: videotaping	411 faculty using web-based unit checklist	1B, 5A
	Clinical: parent web site for EDUC 401	Host teacher using practicum rubric	1AB, 3ABC, 5D
	Clinical: sociogram using Inspiration for EDUC 401	Host teacher using practicum rubric	3AC, 4B
	Clinical: technology activity for EDUC 401	Host teacher using practicum rubric	3ABCD, 4B
EDUC 612 Professional Internship	Blog journal	Host teacher using internship rubric	1AB, 3AC, 4B, 5ACD
	Teaching video	612 faculty using teaching video checklist	1B, 3A, 5A
	Full-Time Teaching Clinical	Host teacher, 612 faculty, liaison using intern weekly progress form, observation form, mid-term evaluation, and professional internship rubric	1B, 2ACDE, 3ABCD, 4AB, 5ABD
	Full-time teaching-clinical:	600 faculty and host	1AB, 3AC, 4ABC,

	action research EDUC 600	teacher using action research rubric	5ABCD

Critical Players

College Dean. The Program is one of several teacher education models in the college. The support of the Dean to the PDS five-year, dual-degree program is a top priority.

Department Heads. The major issues involving department heads include (a) ownership of the Program curriculum and student numbers, and (b) support of teacher education activities in faculty workload plans.

College Lab Director. Current and adequate technology infrastructure in the technology center is critical for the support of any of the college's programs and teacher education courses in particular. A major issue in most academic support units is the tension between efficiency and effectiveness. One example is the relative ease of maintenance if all of the lab computers are the same type and model. Another is the view that lab-classrooms should still focus on one computer per student, as opposed to a more constructivist model where student teams work at computer stations. Several classrooms have replaced rows of computers, a feature of traditional computer labs, to learning clusters featuring round tables with laptops and whiteboards.

Public School Teacher Education Coordinators. The teacher education coordinators are responsible for developing preservice teachers in their schools. They become both points-of-contact and "attractors" for criticism whenever new requirements add to the existing school day. As teacher education programs mature, forms and paperwork tend to increase as well. A technology integration plan requires more teacher time to coordinate the plan in the school. The addition of administrative paperwork to document student and teacher accountability in technology use will be resisted.

School Principals and County Superintendents. Both principals and superintendents that make up the schools and counties involved in the Program are, like the college dean, critical players and act as gate-keepers to allowing the Program to place young teachers in their schools, as well as to involve their experienced teachers with the added responsibilities of helping these young teachers but also in developing their own skills. Ongoing initiatives and priorities in the schools can begin to "edge out" the priorities of a teacher education program. The key to involving these critical players is to continually review the benefits of the Program to the schools and looking for ways that priorities of all players are "on the table" and addressed.

State Superintendent. Existing state policies, as well as current initiatives championed by the state superintendent of schools, must also be addressed. The **Common Core Standards** is the major issue faced by most states, which need to publish updated versions. In addition, other long-standing state programs need to be examined for possible inclusion in the technology plan.

CASE DESCRIPTION

Case Objectives

- The goal for this case is to create a new Technology Integration and Research plan for a teacher education program that uses a professional development school (PDS) model.
- The plan needs to address three sets of priorities: the university, public school and state/national.
- This plan should address not only technology use in school-university settings, but a plan to systematically *study, document, and evaluate* the use of technology.

The plan should include the following components listed below, components which involve technology use and a research plan to study and evaluate the plan:

University Technology Use

- Determine what technology tool competencies should be in place prior to entering the Program at Year 3.
- Determine what technology tools/uses should be taught in what year for courses and practica. A schedule should be provided that depicts skill development over time in courses and practica.
- Determine how these skills, competencies, and experiences should be clearly identified in course syllabi or practicum guidelines and which NETS standards (specifying specific numbers 1-6 and letter) are addressed.
- Determine how these skills, competencies, and experiences should be assessed in each course and what products should be archived in an online portfolio.
- Determine technology infrastructure and staffing needed in the College to support courses.
- Determine technology use expertise in the College and specify who could contribute to practicum teaching regarding technology use.
- Identify what professional development goals are being addressed in the Program's strategic plan (listed in introduction). Both technology use and studying that use addresses one or more of these goals.

University - Public School Technology & Research Coordination

- Form a committee involving university faculty and PDS teachers, possibly technology integration specialists from elementary, middle, and high schools, to discuss technology priorities in the Program and in the PDS.
- Identify data points where data can be analyzed for addressing the Program's strategic plan, meeting NET standards, and technology use in Program courses/practica and in the PDS.
- Suggest possible research questions that (a) annually evaluate the plan, and (b) study unique new features.
- Identify an annual report format, which summarizes technology use and issues in the Program.
- Identify dissemination outlets for this annual report.

Public School Technology Use

- Determine technology use expertise within PDSs in the Program and identify candidates who could contribute to course and/or practicum teaching. Develop a database recording these expertise.
- Recommend staffing programs to free up public school teachers for practicum coordination where technology use is addressed.
- Determine use of technology in the PDSs and how tools are being used. Develop a database recording technology use.
- Identify teachers who could join with university faculty on a coordinating committee (see above).
- Include specific ways that school administrators are addressed, including county/district, school administrators, teacher leaders, and technology integration specialists.

State and National Technology Policies

- The plan will need to make connections with existing state priorities that include the state's use of **Common Core** standards that are being developed across content areas.
- These standards will need to be incorporated in instructional lessons and units developed and taught in the Program. Thus, teacher preparation courses and practica must address these standards and document them in their course syllabi.
- Six sets of competencies from the ISTE standards for students should be addressed (**NETS**-S, 2007). These categories include (1) creativity and innovation, (2) communication and collaboration, (3) research and information fluency, (4) critical thinking, problem solving, and decision making, (5) digital citizenship, and (6) technology operation and concepts. The six standard categories are grades PK-2, 3-5, 6-8, and 9-12 and are available from ISTE for referencing in the plan.

CURRENT CHALLENGES FACING THE ORGANIZATION

This section describes some of the current challenges and problems that the Program is facing organized from the perspective of the university, the public school, and the state.

University Faculty Issues

Issues impacting the development of a technology integration plan include (a) workload, (b) ownership, (c) academic autonomy, (d) leadership, the (e) unit of adoption, and the issue of the (f) technology course versus technology across the program.

Workload. The major issue involving university faculty in teacher education programs is negotiating individual faculty workloads, which can vary across professional level (assistant, associate, full professor, clinical appointments) and departmental priorities. Currently, the college unit does not include liaison activities as workload, other than as service activities. One of the issues in the college is deciding to what extent university faculty activity in the public schools "counts" as part of one's negotiated work. Teaching courses in the Program are included in faculty workload negotiations. A potential benefit of a technology-integration plan for faculty members, particularly new, tenure-track faculty, is that a research plan builds in opportunities for research activity and publishing opportunities.

Academic Ownership. A related issue underlying the development of a technology integration plan is who (i.e., department) "owns" the Program in the college unit, and how the Program's curriculum is negotiated. The success of the PDS model underlying the Program has been based on the sharing of governance with the public schools. A recent trend is that the academic unit in the college who officially claims ownership of the program and the student numbers is asserting more control over what is taught (i.e., the curriculum)(see Teitel, 2003). Other academic departments within the college have faculty members who act as liaisons and teach EDUC courses, but in recent years these have been elective courses.

Academic Autonomy. A third issue, usually labeled as "academic autonomy," is that academic faculty members claim as their right to teach courses in a manner they deem appropriate to their discipline. A long-standing goal has been to give all students in the Program consistent offerings in both courses and practica. These preservice teachers report a range of approaches in their courses and dissatisfaction with activities, student workload, and assessment. Practica experiences, as they are found in public schools, will naturally reflect the culture of that school and county. There have been some attempts to develop course teams of faculty members who have agreed upon learning outcomes and have been free to address those outcomes in different ways.

Leadership. Technology is one of three strands of priorities formally identified in the program. Despite the tensions between departments or from constituents in the governance of the Program, technology leadership has been lacking. There have been several reasons for this deficiency, including a non-priority from faculty or departments and the inherent challenges of coordinating technology within a PDS model.

Unit of Adoption. A fifth issue for technology integration is the perspective of who adopts the technology. In the university setting the prevailing unit of adoption has been the individual faculty member and the courses he or she teaches. A contrasting perspective is adopting technology to address the needs of the program rather than the needs of the individual (Imig & Switzer, 1996).

Solo Course vs. System Integration. The easiest but not always the most effective route to technology integration is housing the content and skills in one course, the so-called stand-alone technology course. Such an approach concentrates the instruction on technology, but the teaching frequently lacks a public school teaching context to make the instruction meaningful to preservice teachers. Such an approach frees up other teaching methods instructors modeling its use. The course may be taught by an instructor who is not affiliated with the teacher education program; thus, resulting in "disconnects" in what is taught in the course and what actually happens in the schools. The Program, however, has chosen to address the

technology strand by integrating the content of technology integration across the program in both courses and seminar-delivered **practica**. In this way, the technology topics are addressed developmentally – when students need particular topics and skills, rather than in a stand-alone course that may be too early or too late in a program. The teaching approach, according to Willis and Mehlinger (1996), for stand-alone courses tends to be behavioral where mastery is attempted over the life of the course. However, in systems-wide integration, the above authors report a more constructivist form of teaching where students collaboratively design and teach technology-based lessons in schools. Given the integrative nature of the PDS model, the Program requires even more input from public schools as to technology use within university courses and what is needed in the schools.

Public School Teacher Issues

The issues in public schools that may impact the development of a technology integration plan include (a) inconsistent modeling of technology use, (b) students leading teachers, (c) getting teachers to use technology, and (d) built-in constraints found in today's educational system.

Modeling. One of the issues that prompts a technology integration plan is the differences between what pre-service teachers observe in their university courses in terms of technology as compared to what's used in the public schools. Although technology use is encouraged, not all university instructors have adopted the technology most common in schools. Thus, what preservice teachers learn in the university setting is not used in public schools.

Students Leading Teachers. Recently, public schools have increased their technology use particularly with the influx of laptops and digital whiteboards in the classroom. However, these devices require some degree of service and support from either the manufacturer or the county technology staff. Even more dramatic is the quick adoption of mobile and table devices in the schools, primarily due to their relative low cost and their low maintenance issues. Another factor in the increased use of these devices has been the quick adoption of their use by students prompting teachers to play "catch up" to their students who quickly use these devices in their daily routines. This phenomena can also be seen in the college classroom, as preservice teachers become literate in smartphone use and mobile applications, but still remain less competent than their younger students in media production skills.

Teacher Use. Technology integration is still viewed by most educators as use of technological tools rather than using technology to teach and help their students to learn. There is still a perception that technology is an "add-on" to existing teaching practices and there remains a resistance to changing what has worked well.

Educational System Constraints. A related issue is that the school context severely impacts the degree to which technology integration can take place. These school structure issues include the pressure of students to pass mandated tests and the implication to the school of school-wide testing results. Other issues include the existence of curriculum programs that attempt to keep all students "on the same page," particularly in the area of reading and math. A third issue is the organization of the school day. At the elementary level, mandated reading programs crowd out science and social studies curriculums, while at the secondary level the structure of the school day into x-minute periods limits the degree to which teachers can teach a subject deeply or provide additional time for students to participate in learning activities, such as Project-Based Learning.

State and National Issues

State and national issues impacting a technology integration plan include the (a) adoption of most states to the Common Core standards (Common Core, 2010) and the evolution of the (b) national technology standards (**NETS**-S, 2007).

Common Core Standards. Public schools nationwide are currently dealing with a new set of standards, called the Common Core. Nearly all states have adopted these standards. However, not all content areas have Common Core standards in place. These standards, once they are published, will need to be incorporated in instructional lessons and units developed and taught in the Program.

National Technology Standards. States have also adopted technology competencies as developed by the International Society for Technology in Education (ISTE). The set of technology standards for the public school students are known as **NETS-**S and consist of six categories: (1) creativity and innovation, (2) communication and collaboration, (3) research and information fluency, (4) critical thinking, problem solving, and decision making, (5) digital citizenship, and (6) technology operation and concepts. These standards are identified for preservice teachers in course syllabi. All courses have identified technology features. The six standard categories are grades PK-2, 3-5, 6-8, and 9-12 are available from ISTE for referencing in the plan.

SOLUTIONS AND RECOMMENDATIONS

Below are recommendations on the development of a technology diffusion model across teacher education courses and **practica** activities within schools. These recommendations support the case requirements discussed earlier.

PDS 5-Year Plans. Review each school's 5-year plan, which identify priorities for improvement, such as student achievement and new curriculum, as well as professional development priorities that address these areas targeted for improvement. Identify areas where technology use contribute to student learning. Pay particular attention to specific action steps informed by analysis of data related to student learning.

Professional Development of PDS Faculty. Identify action steps requiring each PDS to decide how to spend its program funds on technology integration. Include steps to formally study how technology use contributes to both student learning and teacher improvement.

Professional Development of University Faculty. Review teacher education courses and have all learning outcomes identify where NETS-S standards are being addressed.

Student Professional Development. All practica courses should be reviewed to include technology topics and to identify areas in teacher education courses and the PDS's 5-year plans to use technology in the schools. Determine how such technology use and skill-building has been accomplished, specifying assessment tools.

ANALYSIS AND DISCUSSION QUESTIONS

Adoption and Diffusion of Instructional Innovations
How might university professors and public school teachers learn from each other when it comes to technology use?

Managing Instructional Design and Development
Who should form a team for developing a technology integration plan and what are the roles for the team members?

Supporting Teachers in Technology Integration
What benefits can teachers, principals, and superintendents receive in the technology integration and research plan?

PK-12 Technology Integration
How might "backward design" (Wiggins & McTighe, 2006) be used to develop a technology integration and research plan?

Design of Learning Environments
How might project-based learning (Boss & Krauss, 2007; Buck Institute, 2003) be a test-bed for technology use?

Evaluation in Instructional Design
How can the plan be evaluated each year?
What research questions might be posed in addition to a yearly program evaluation of the plan?

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KEY TERMS & DEFINITIONS

Common Core: a set of learning standards organized by content area, such as reading and math, that have been adopted by most U. S. states and serve to standardize the standards.

INTASC: From the Interstate New Teacher Assessment and Support Consortium ten principles to guide teacher education programs. These principles include content, development, learning differences, teaching strategies, motivation, communication, planning, assessment, reflection, and community.

NETS: National Educational Technology Standards developed by the International Society for Technology in Education or ISTE. Standards were developed for students (NETS-S), teachers (NETS-T), and administrators (NETS-A).

Practica or practicum: the set of college courses in which the activity occurs in an educational setting, usually a public school.

Professional development: the term used for activities in which educators improve their knowledge, skills, and attitudes.

Professional development school (PDS): A college or public school that formally commits to ongoing improvement of teaching in their schools, including pre-service and professional teachers.

Technology diffusion: the term used for technology integration in the public schools.