Professional Development for the New Learning Ecology of Ubiquitous Computing

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NC 1:1 Learning Technology Initiative

1:1 Feasibility Study
- Create framework for planning a strategic approach to technology-enabled learning in NC public high schools.

1:1 Evaluation
- Examine the extent to which schools implemented the 1:1 initiative strategies, achieved project objectives; impact future technology policy and funding.

1:1 Research
- Create new knowledge about PD and teaching and learning in core content 1:1 classrooms.

1:1 Collaborative (PD)
- Design PD support for middle and high schools that are implementing 1:1 learning technologies.
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Begin with Understanding the Changing Teaching and Learning Environment

John Seeley Brown (1999), defined an ecology as “an open system, dynamic and interdependent, diverse, partially self-organizing, and adaptive” (p. 3).

Barron (2006) defined a learning ecology as the “set of contexts found in physical or virtual spaces that provide opportunities for learning,” (p. 195)

• May include formal, informal, and non-formal settings
• We offer a perspective for a new learning ecology that takes into account the unique contributions of a 1:1 setting
  • a learning-forward environment that takes on organic attributes with evolving interdependence among participants.
Four Conditions for Consideration

1:1 Technologies

New Learning Ecology

Immediate and Constant Access to Information

Self-Directed, Self-Regulated, Curious, & Creative Learners

Teacher as Content Expert, Facilitator, Consultant, Mentor, & Improvisationist

Intensity, Relevance and Personalization of Learning

Spires, Wiebe, Young, Hollebrands & Lee (2009)
A New Learning Ecology Affords…

Access by all responsible adults

Supporting rich virtual and physical learning experiences

Intelligent tutors

All Times of Day

Shared Platform for Learning

All Learning Contexts

Lifelong learning portfolio

Curricular Resources

Centralized formative and summative assessments

Wiebe (2010)
Redefining the Teaching and Learning Context

- Learning taking place over multiple contexts with different groups of “responsible adults”
- The traditional classroom teacher is just one of these adults
- Ubiquitous computing (mobile devices + the cloud) distributes learning resources over time and space
- Curricular and pedagogical supports can be physical or virtual
- Intelligent tutors can supplement human support
Technology that reconfigures the classroom
Matched with powerful software
Simulation Plus Intelligent Support

- Real-world phenomena can now be explored in the physical world, the virtual world or a combination of both
- Simulations will be increasingly interactive
  - Allows for a greater range of “what if” questions
  - Making use of a broad sensory range is still a challenge
- Interactivity reaches a new potential with intelligent interfaces
  - System can “learn” from a students’ work
  - Provides advice based on what it has learned
- **How do teachers now leverage the power of these new tools?**
Formal Context

- Directed by classroom teachers
- Focused learning around a thin core
- Mastery of material by all
- Sounds like the traditional classroom, but…
- Immediate and constant access to information by students and teachers
- No longer master of all information in the classroom
- Personalization of learning through adaptive systems and intelligent tutors
- Rich, data-driven modeling and simulation tools
- Real-time formative assessment
Projects, Clubs and Teams Context

• Directed by classroom teachers or mentors
  • Focus more in a supporting role
• Allows groups of students to extend their core knowledge around complex, deep projects
• Contextualize learning in real-world projects
• May take place in schools, museums, outdoor learning facilities, community centers…
• Allows affinity groups to build off of common passions
• Social networking environments make it easier for affinity groups to communicate with each other and share work
Personal Work Context

- Time to review and develop material pursued in formal and group times
- It includes “homework” as we now know it, but…
- Pursue individual passions
- All (most) of the classroom resources at home
- Continued feedback and support through virtualized support
- Teachers can get a “morning report” on last night’s work
These Contexts Supported by a Common Learning Platform

- Mobile devices connected wirelessly to cloud-based resources
  - Local device focuses on the interface with the student
  - Computing power is remote
- Curricular resources
  - E-textbooks
  - Communication tools
  - Data-driven modeling and simulation
- Life-long learning portfolio
  - Products of student work
  - Assessment by teachers and other responsible adults
- Intelligent support through virtual agents/tutors
  - Agents that support students and others that support teachers
Tools that Support Teaching

• What support do teachers want or need?
• Aggregating data and visualizing it in usable forms
  • Help decide what data is worth looking at
• Support lesson planning
  • Alignment to national, district, school, and personal goals
• Provide intelligent advice
What are the Implications for Teacher Professional Development?

- Four principles of effective professional development (PD)
- Be intensive, ongoing, and connected to practice;
- Focus on student learning and address the teaching of specific curriculum content;
- Align with school improvement priorities and goals;
- Build strong working relationships among teachers

5 Suggestions for the 21st Century Teacher

• Claim your TPACK
• Embrace project-based inquiry
• Acquire the new global skill set
• Develop expertise in performance based assessment
• Participate in professional learning communities and networks

Spires, Wiebe, Young, Hollebrands & Lee (2009)
Got TPACK?

Koehler & Mishra (2008)
Technological Pedagogical Content Knowledge (TPACK)

Koehler & Mishra (2008)
TPACK Across Contexts

- How does ubiquitous computing change the access to information needed for teaching and learning?
- How do you leverage rather than fight against connectivity to the global information data store?
- How do you work with intelligent tools that personalize learning?
- How do you make use of formative assessment tools at your disposal?
- How do you deploy powerful modeling and communication tools?
- How do these tools change the nature of individual and group work?
Project-Based Inquiry
Can it get us to where we need to be in terms of complex thinking?

Consider Ideas & Pose Questions

Share Publish Act

Gather & Analyze Information

Critically Evaluate & Revise

Creatively Synthesize Information

Spires, Wiebe, Young, Hollebrands & Lee (2009)
Project-Based Inquiry on the Common Learning Platform

• How does project-based work distribute across formal, informal and home-based learning contexts?
• How much project work is done individually versus in groups?
• How are professional mentors and other responsible adults brought in to help support this work?
• How do you articulate core conceptual knowledge into real-world contextualized experiences for students?
• How are assessment systems developed and used for project-based work?
Acquiring the New Global Skill Set

• What experiences are students bringing to the classroom that we need to know more about?
  • Which ones are really furthering our goals?
• How do we acquire the experiences of the global workforce?
• Travel - physically or virtually?
• Bringing professionals into the classroom
  • Physically or virtually
• Is the global skill set in the curriculum or acquired by applying it?
Bloom’s Taxonomy

- Evaluation
- Synthesis
- Analysis
- Application
- Comprehension
- Knowledge
- Creating
- Evaluating
- Analyzing
- Applying
- Understanding
- Remembering

Anderson, Krathwohl, et al. (2001)
Any Value in Inverting Revised Bloom's Taxonomy?
Any Value in Inverting Revised Bloom’s Taxonomy?

Spires, et al. (2009)
Expertise in the New Assessment Paradigms

• Formative assessment built around real-time analysis of student work
  • Assessment is not a “separate experience” for the student
  • Assessment that goes to the student and the teacher
  • What level of analysis is being provided by the teacher vs. intelligent agents?
  • How should this assessment inform our practice?

• Summative assessments being built around a new common core
  • This will continue to evolve
  • Continuing struggles with what we value in education
Professional Development in Multiple Contexts

- The same technologies that distribute student learning over time and space do the same for teachers.
- When does it make sense for teachers to physically gather to learn new skills and work together to develop teaching and learning solutions?
- How should PD be distributed over the calendar year?
- How are the new learning contexts modeled in PD?
Online Professional Development

- Anytime, anywhere
- Synchronous and asynchronous
- Teachers have more power to determine what and when to work on PD material
- Can still be done in small groups
Professional Learning Communities

• How will the Common Learning Platform be used by PLCs?
  • How can student portfolios plus formative assessments be utilized?
• What might a teacher portfolio look like on a Common Learning Platform?
• How are PLCs formed and what are their organizational unit?
• When should PLCs be local, regional or global?
The New Learning Ecology

• New technologies have made possible a new Common Learning Platform
• Learning, for students and teachers, is now more than ever distributed over time and place
• How does the new global skill set inform teaching and learning?
• What role will intelligent tutors and agents play in individualized learning and formative assessment?
• How does PD change to meet these challenges?
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