The Educator’s Bridge to Technology

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Abstract

This system design is for an effective professional development program in Information Technology for educators in a southern state. Professional development continues to be administered face-to-face and information technology professional development, though needed immediately, still has few unorganized online components in this southern state. States using online professional development are experiencing success (Thomas, 2004). Therefore this system design will describe the Mega Community, Macro Community, and Micro Community of a proposed professional development program for educators in a southern state (The Educator’s Bridge to Technology or TECH Bridge). Inputs, processes, and outputs for each community will be identified as well as the learning theories grounding the professional development program’s design and implementation. Finally, the cybernetics and assessments for the program will be discussed.
Introduction

TECH Bridge will be a professional development program in Information Technology for educators and administrators. The system design for TECH Bridge follows the recommendations of the International Society for Technology in Education (ISTE), the Department of Education’s Technology Plan 2004, and the Southern Regional Accreditation Board (SREB). The ISTE is a nonprofit organization and the largest teacher–based organization in educational technology. The Department of Education’s Technology Plan 2004 is a government report that explores the technological readiness of U.S. students and recommends changes. The SREB is a nonprofit, nonpartisan organization that helps government and education in the southern region of the United States advance education and improve societal conditions (Education, 2004; ISTE, 2008; Thomas, 2004). These Mega Community agency reports are the Mega Community input of TECH Bridge. In TECH Bridge the Mega Community, Macro Community, and Micro Community work together in a data driven research based system to effectively deliver professional development through a distance learning program to teachers and administrators in a school district in a southern state. This will be a pilot program with plans for expanding the program statewide in the near future.

Context

Purpose

The purpose of TECH Bridge is to provide a diverse group of K through 12 educators in a district in one southern state with training in instructional technology expanded knowledge and direct usage experience through an online district program. Therefore, educators will succeed in the integration of instructional technology in the K through 12 classrooms of the district and expansion of the TECH Bridge program to all districts in the state will result.
The Mega Community’s focus was considered first. With the swift evolution of technology, government educational agencies have called upon educational establishments to integrate technology into the classroom. The ISTE has published its Nets for Teachers 2008; these are national technology standards for teachers. These standards along with the recommendations and action steps included in the Department of Education’s technology plan and the SREB standards for online professional development will be used in the system design and by course developers to create an effective system and course designs (Education, 2004; Griffin, 2004; ISTE, 2008). Furthermore, the National Council for Accreditation of Teacher Education’s (NCATE) has new teacher education standards that include technology, requiring that institutions of higher learning that are seeking NCATE accreditation meet these standards. Some state boards of education are already requiring technology assessment for new teacher licensure with certain states requiring technology continuing education for teacher certification renewal (Burke, 2000). This southern state has adopted the technology requirement for both initial licensure and renewal. Therefore, TECH Bridge will focus on certification renewal and providing certified teachers with the technology education necessary for classroom technology integration.

Resources

A variety of resources are necessary for a successful distance training program to ensure that a school district moves towards effective technology integration. Broadband access at all school facilities is already in place and is a requirement for a successful distance program. Computer laptops for instructor and administrator for off campus usage will be made available after an initial needs assessment. The course management system and software package that focuses on the delivery system will be WebCT. This is the software package that focuses on the delivery system of the courses (Simonson, Smaldino, Albright, & Zvacek, 2006). Funding will
come from the E-Rate and NCLB: Enhancing Education through Technology (NCLB: EETT) programs along with state and district funding, state technology integration grants, and District Community Partner donations. The NCLB-Enhanced Education Through Technology is the Enhancing Education Through Technology Act of 2001 (Education, 2001). The E-Rate program is a program provided by the Schools and Libraries Division (SLD) of the Universal Service Administrative Company (USAC). It was established by the Federal Communications Commission (FCC) to meet the telecommunications requirements for schools required by the Telecommunications Act of 1997 (Education, 2007b).

Other resources will be the Internet and instructional technology staff (IT) already working at each school campus with an additional IT staff member added, a professional development team to determine priority courses, and a team of design specialists appointed by the districts Department of Technology. The local Community College’s team of design specialists will serve as consultants to assure quick deployment by contributing already established course design templates. Furthermore, a team of technology resource personnel will aid teachers in the implementation of technology learning in the classroom. Additionally, there will be a Research Based Program Assessment Team that will conduct active research, this component of the design is supported by SREB’s Standards for Online Professional Development (Board, n.d., p.3), and they will be recruited from the State University System to assure impartiality and collaboration with all state educational institutions.

Community

The Macro Community is composed of teachers, administrators, and district staff in the district of a southern state. This population is multicultural with a high Hispanic population of 56% (see figure 1) and of lower to middle income range. Technology familiarity ranges from low
to average. Technology integration in the schools of the district is seen as insufficient by the
district’s technology plan.

Figure 1. The Macro Community population demographics of teachers, administrators, and the
district staff of TECH Bridge.

History

A limited amount of face-to-face professional development has been available through
the district’s Department of Technology, the district’s Teacher Education Center, and through
online delivery classes. These classes were limited in scope, addressed only several areas of
interest, and limited efforts were made to coordinate and motivate educators. Most of the
district’s professional development is still conducted in face-to-face mode during teacher
planning days or through summer programs. Thomas (2004), in an SREB report describes states
using online professional development as experiencing greater success and discusses the reasons
why online appears to work better for education. He elaborates further “States keep doing the
same thing and expecting different (improved) results” (Thomas, 2004, p. 1, ¶ 3.)
Description of the System

Elements and Relationships

The Mega Communities research and output feed into the Macro Community which uses these outputs to align its design of the TECH Bridge Program to meet the Global Societies vision and mission for technology based on the technology supertrend (Cornish, 2004). The Macro Community also receives input from the Micro Community. This input is used for research based evaluation of the program. The Micro Community stakeholders both benefit and influence the output from the Macro Community. Figure 2 shows the stakeholders in each community and the open boundaries emphasizing the flow of communication necessary for TECH Bridge to be developed, initiated, and then evaluated for continuous improvement based on active research.
Figure 2: Elements and relationships between the Mega Community, Macro Community, and Micro Community showing open boundaries.

Specifically, at the Mega Community level output from reports, national certification changes, and studies on technology growth serve as an input for the Macro Community. An example of the output at this level is the role of administrators. Administrators must play a serious role in TECH Bridge. This is supported by a research report studying technology trends.
in the Chicago school system. This report stated that schools need strong leadership to successfully make a positive move towards the integration of technology in the classrooms (Coca & Allensworth, 2007). Therefore administrators will play an active role in TECH Bridge as leaders, participants, motivators, and in assessing and inputting important data into the Research Based Program Assessment Team. This research report went on to specify elements and relationships necessary for successful technology integration which this system design is incorporating by using IT support and a resource support team.

Furthermore, beyond needing basic hardware and software, students and teachers used technology more frequently in schools that had high-quality professional development around technology embedded within a professional community, as well as good human resource support for technology (Coca & Allensworth, 2007, p.2, ¶ 1).

Surveys, comments, and observations from various Micro Community stakeholders will feed input into the Macro Community Departments of which the Research Based Program Assessment Team will categorize and analyze the data and present these to the IT Administrator for dissemination to the District Administration and the Program Designers. All administrative departments and team leaders in the Macro Community and at the State level of the Mega Community will be given the initial data reports for self-analysis and they will follow with their inputs therefore, broadening the input of analysis and ideas.

*Interdependence*

All communities are interdependent as shown by their relationships and open boundaries in Figure 2. The Macro Community will achieve its goal of technology integration by guiding the Macro Community with sound recommendations and research. The Macro Community will produce a successful TECH Bridge Program that will benefit the Micro Community.
stakeholders, the Macro Community objectives, and the Macro Community will receive necessary data from the Micro Community for active research and program evaluation.

Vision

Technology is a fundamental component of every classroom environment it should be seamlessly, invisibly, and effortlessly integrated. The administrators, teachers, and students are global learners in a technology rich society. Technological know-how is harnessed in research-based learning communities where all communicate, analyze, improve, and learn thus creating a powerful engine of adaptation that moves forward with technology.

Mission

TECH Bridge will provide free, high quality professional development courses to district teachers and administrators that will assure that all teachers are highly trained technology users and integrators and the program will foster a community of learning to assure the district teachers continue to effectively learn and assimilate evolving technologies and thus integrate technology into the learning community of their students.

Learning Paths

This system will use synchronous and asynchronous deliver. Synchronous delivery occurs when the instruction is delivered in a different place than the students receive it, but at the same time. Asynchronous instruction occurs both in a different place and at different times so students access it from elsewhere and at their convenience (Simonson, et al., 2006). Synchronous delivery methods along with a limited amount of face-to-face delivery will be used to assess local learning communities as well as to launch the program and initiate awareness and cooperation. The majority of the delivery methods will then be asynchronous with intermittent face-to-face and synchronous deliveries on teacher workdays that are specified by the district as
professional development days. Administrators will be required to attend intermittent synchronous deliveries to brainstorm ideas, gather data from individual schools, and to facilitate marketing input and outputs.

Supporting Learning Theories

Identity of Learning Theories

Bandura’s social cognitive theory of self-efficacy ties a person’s beliefs and conscious mind to the environment and describes the process of human adaptation (Pajares, 2002). This theory requires adaptation to change, which is required in this system design. According to Bandura, people do not just react, humans interact, self-reflect, self-regulate as they adapt. Campeau, Higgins, and Huff (1999), have applied Bandura’s social cognitive theory to human reactions to computing technology and they have come up with a technology acceptance model that is based on the view of beliefs about technology. These beliefs are based on the human perception of technology and their beliefs about innovations and innovation diffusion. This is based on the individual’s perception of usefulness and ease of use (Compaeau, Higgins, & Huff, 1999).

TECH Bridge is trying to change the way educators work and Concerns Theory has been studied greatly over the past thirty years especially, with regards to professional development dealing with an individual’s reaction to change and recent innovations such as technology. The theory consists of five different concerns. The individual is first concerned with the self and instinctively reacts many times resulting with an instinctive, irrational resistance to change. The second type of concern has to do with investment and effort and the third type is competence. The fourth and fifth type of concern deal with influence and fairness (Van den Berg, 2002). The TTI instrument designed by Atkins, Frink, and Viersten, 1995 (as cited by Atkins & Vasu,
will be used as a pretest and a posttest to measure teachers’ concerns, and technology usage, in order to measure changes in technology concerns as the program progresses.

The Macro Community’s immediate stakeholders are primarily teachers and administrators which are all adults. Therefore, Knowles’ theory of Androgogy will be applied to the instructional design which must address the specific needs of adult learners. The four key assumptions in this theory are that adult learners are task oriented, they are diverse and need to see an immediate value or use for the learning that should be specific to their situation or life experiences, and they need to know why they are learning something (Kearsley, n.d.).

Learning Materials

The learning materials will include online course presentation, syllabus, and calendars, reading material in the form of books, handouts, and Internet resources which will include access to the district library database. Laptop computers will be available for check-out from the individual schools media centers. Elluminate sessions will be held on certain teacher workdays. Several professional development days will be allotted for online group projects that will promote online learning communities and add a finished project to a collection of teacher technology Internet projects that will be available for all district teachers through the online technology distance programs web site (Martin & Smith, 2006).

Mega Community

Society

The Mega society is the Global Community which is experiencing a technology supertrend according to Cornish (2004). Therefore, the global community is emphasizing the improvement of technology mastery and application in education as evidenced by the Department of Education’s Technology Plan 2004 and numerous reports by the Department of
Education. The ISTE’s and SREB’s recommendations and standards for professional development of teachers in the area of technology also show this in their research. According to many in the Mega Community there appears to be a technology deficiency in education and the need for technology integration in the classroom (Education, 2001, 2007a, 2007b; Griffin, 2004; ISTE, 2008; Thomas, 2004). Research shows that the Mega Communities and the Macro Communities need to invest in training, support, and leadership to facilitate this change (Atkins & Vasu, 2000; Vanessa Coca & Allensworth; Gershner & Snider, 2001)

*Location in the Broad Scheme*

The Mega and Macro Communities location in the broad scheme is shown in Figure 3. The arrows depict the hierarchy of authority between the different communities. The Mega community is depicted in blue while the Macro Community is depicted in red. The green components interact with both communities.
Discernable Outcomes

A discernable outcome of the Mega Community is requirement that educational institutions make technology classroom infusion an objective. The discernable outcomes of the
Mega Community are reflected in the vision and mission of the Macro Community which has a technology focus. The Mega Community through agencies such as the SREB has made the Macro Community aware of the need for a quality professional development program in technology. 

*Input-Process-Output*

The Mega Communities output is that of direction. The Department of Education has specified a Technology Plan for the United States educational community. In this plan specific recommendations for the states and educational community are described in Action Steps (Education, 2004). Furthermore, NCATE has constructed new certification for teacher education degrees (Burke, 2000). The ISTE has published its Nets for Teachers and the SREB is advocating online professional development (ISTE, 2008; Thomas, 2004). These are examples of the Mega Community output advocating technology integration in the classrooms after ongoing research (input) and debate (process).

*Boundary*

The Mega Community is society. The boundary of the Mega Community is open and global. It extends down to the district level. The TECH Bridge Program is a pilot program for this southern state and once successful, it will be duplicated throughout the state, therefore changing the open boundary of the Mega Community to outside the state level.

Macro Community

*Largest Structure Solely Devoted to the System*

The largest structure solely devoted to the system is the Distance Teacher Education Program of Instruction for professional development in technology education or TECH Bridge. This structure will be responsible for providing quality distance education in technology to certified working teachers and administrators in the district.
Organizational Environment

The distance education program for professional development for administrators and teachers will be housed under the Department of Instructional Technology which will have the final authority in the implementation process. The Tech Bridge administrator, research based program assessment team, resource support team, and the IT staff, will all collaborate to insure adequate support and ongoing evaluation, management, and upkeep. The program designers and the local community college team will produce course design to meet the assessed needs of the administrators and teachers.

Hierarchy of Authority

The hierarchy of authority for the Macro Community is depicted by arrows and moves from the top left to the right side of Figure 4. The Research based Program Assessment Team receives data input from teachers, administrators, IT resource personnel, parents, and students. The IT Administrator is in charge of final decisions after the flow of information, assessments, research, and possible designs are produced by collaboration (see Figure 4).
Figure 4. The hierarchy of authority of the macro community displaying the IT administrator with final authority.

Table 1 shows the inputs, processes, and outputs of the Macro Community. The inputs arrive from recommendations by organizations of the Mega Community. The inputs then produce actions that are identified as processes. These processes then lead to a result which is labeled as an output.
**Table 1:**

The inputs, processes, and outputs of the Macro-Community.

<table>
<thead>
<tr>
<th>INPUT</th>
<th>PROCESS</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers TTI pretest and post test, e-mails, comments, and survey answers.</td>
<td>Evaluating program with data driven methods</td>
<td>Certified Faculty in online professional development in technology.</td>
</tr>
<tr>
<td>School Administrator</td>
<td>Participating school Administrator with staff</td>
<td>Importance of the program</td>
</tr>
<tr>
<td>Administrators and team meetings</td>
<td>Evaluating program performance</td>
<td>Quality professional development.</td>
</tr>
<tr>
<td>Professional Development Team</td>
<td>Accesses the program</td>
<td>Professional development courses that target teacher needs and student needs.</td>
</tr>
<tr>
<td>State Department of Education</td>
<td>Granting accreditation</td>
<td>Course credit for recertification</td>
</tr>
<tr>
<td>Data collection input to research based program assessment team</td>
<td>Researching</td>
<td>Data driven program evaluation and redesign</td>
</tr>
<tr>
<td>Require group technology curriculum projects</td>
<td>Producing technology group curriculum projects</td>
<td>Teacher-produced curriculum projects and the establishment of online learning</td>
</tr>
<tr>
<td>National, State, and District Funding</td>
<td>Paying salaries, purchasing software and hardware, purchasing course material, paying stipends to teachers, up keeping software and hardware.</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Marketing prepared by the district</td>
<td>Marketing of the program</td>
<td></td>
</tr>
<tr>
<td>Stipends</td>
<td>Paying stipends to teachers</td>
<td></td>
</tr>
</tbody>
</table>

**Boundary**

Figure 5 shows that the boundaries of the Macro Community overlap. The dashed circles depict open boundaries as communication flow is essential to the TECH Bridge Program.
Figure 5. The open boundaries of the Macro Community.

Micro Community

Immediate Stakeholders

The immediate stakeholders will be the teachers, the administrators, the students, and the community. The students will benefit from the knowledge and experience the teachers and administrators acquire and incorporate into the classroom instruction. Furthermore, the
community will benefit from an increase in the knowledge of its citizens.

Immediate Spheres of Influence

The State, the district, and the local administrators must show that they are willing to fund and support the project. Local administrators must be involved in the actual program as leaders and participants. The program needs to be marketed so that the teachers and administrators are aware of the program and see the importance of the program (Griffin, 2004). Furthermore, administrators will encourage mentoring by technology proficient teachers and teachers that are quick adaptors. A research study by Gershner and Snider has shown that mentoring decreases the level of concern of technology usage (Gershner, V.T., & Snider, S.L., 1998).

Input-Process-Output

The inputs, processes, and outputs of the Micro Community feed from the Macro Community. Inputs are quality TECH Bridge courses, motivation, and a clear view of the importance of the program by the Micro Community. The process will be that teachers will establish learning communities through online discussion boards and experience quality technology learning (Martin, & Smith, 2006). The outputs will be quality instruction, technology integration in the classrooms, quality technology learning for the district’s students, and a quality TECH Bridge Program that can be duplicated and used throughout the state thus bringing the state in line with the Department of Education’s Technology Plan (Education, 2004). These inputs, processes and outputs of the Micro Community are organized in Table 2.
Table 2:

*Input-Process-Output of the Micro Community.*

<table>
<thead>
<tr>
<th>Input</th>
<th>Process</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality Accredited courses</td>
<td>Teachers enroll in courses</td>
<td>Teacher recertification</td>
</tr>
<tr>
<td>Marketing</td>
<td>Teacher understanding of importance</td>
<td>Increased motivation and enrollment</td>
</tr>
<tr>
<td>Administrator evaluation</td>
<td>Teacher Mentoring</td>
<td>Increased technology application</td>
</tr>
<tr>
<td>TTI instrument, surveys, e-mails</td>
<td>Measuring levels of concern</td>
<td>Research based evaluation</td>
</tr>
<tr>
<td>Required Curriculum Projects</td>
<td>Teachers applying Technology</td>
<td>Increased technology application</td>
</tr>
<tr>
<td>Ongoing WebCT discussion boards</td>
<td>Teachers communicate and discuss ideas</td>
<td>Communities of learning will be determined by monitoring online discussions.</td>
</tr>
</tbody>
</table>

*Boundary*

The boundaries of the Micro Community extend into the Macro Community because of a necessary exchange of information for research, motivation, design, materials, resource help, and
many other exchanges. These other exchanges include TTI testing, surveys, e-mails and others that must occur in this open system design. The boundary also extends to the students, the parents, and the community as quality technology integration improves the learning outcomes of all.

Assessment Systems

Evaluation

The research based program assessment team will be given all survey information from the administrators, teachers, students, parents, and community leaders. E-mail communications to the resource support team will also be given to them for data analysis as well as surveys from the IT personnel housed at each location. This data will be categorized by the research team and made available to the IT administrator, the TECH Bridge administrator, the district administrator. Additionally, the research based program assessment team will evaluate the program and report their findings and recommendations for improvement.

Cybernetic

The system is managed and led by the IT administrator in collaboration with the research team. The assessments will be the TTI instrument constructed by Atkins, et al., 1995 (as cited by Atkins & Vasu, 2000), surveys, e-mails and qualitative data gathered from administrators, teachers, and IT personnel through observations, and interviews.

Change Systems

Based on the data and research conducted by the research team, collaborative changes will be made. The research team will present their findings and recommendations for change to the IT administrator and work with the IT administrator to draft the changes to the system. Finally, the IT administrator will make the final determination and implement the changes.
Summary

The TECH Bridge program will be a pilot program based on the research and recommendations for the educational community that have been made by the Mega Community. The state and district will show complete support with funding, leadership and participation by the administrators, marketing, and active research. The recommendations of Mega Community leaders will be incorporated into the program design. This effort will be a state educational effort as the local Community College and the State Universities will collaborate with the district’s Macro and Micro Communities for the educational benefit of the entire state in the long run. Teacher learning communities will be established as well as a growing bank of teacher produced technology integrations projects. Technology integration in the classroom as well as student and community benefits will be assessed periodically and evaluation of the system will result in recommendations and adjustments that will continue to refine the program.
References


