Supporting Technology Integration Across the Teacher Education System

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Abstract: The purpose of this case study was to examine a teacher education system relative to the degree of performance support for the use of technology to support learning. Degree of support was measured by the presence of factors such as clear expectations, feedback, tools, rewards, incentives, motivation, capacity, skills, and knowledge within the system. Major stakeholders within the teacher education system at the target institution included teacher education faculty, student-teacher candidates, and cooperating teachers in local schools. Several areas of performance support were found to be required within and across stakeholder groups. Results of the study are discussed with a particular focus on the degree of alignment of supports across the system. Recommendations for the allocation of system resources related to technology integration are also discussed.

Background

Public schools in the U.S. have been the target of reforms and federally-sponsored programs and initiatives almost since their inception. A common thread between many of these recent reforms has been a focus on what students should know and be able to do in preparation for the world of work and how technology will influence that preparation. For example, SCANS and Workforce 2000 (Johnston & Packer, 1987) emphasized learning to learn, problem solving with visual tools such as graphs and charts, and working collaboratively on teams. The recent Partnership for 21st Century Skills report included digital literacy and the use of technologies for the purpose of communicating and collaborating. Another recent technology-oriented focus of school reform at the federal level has been in the area of integrating technology into classrooms through a variety of programs, such as the Technology Literacy Challenge Fund and Preparing Tomorrow's Teachers for Technology (PT3). Given these and other reform efforts at the state and school district level, why has the K-12 educational system not been successful in integrating technology in order to provide students with those necessary skills?

The adoption and diffusion of technology by various stakeholder groups within the teacher education system has previously been examined from a system change perspective. Researchers have investigated the broader system context in which technology is adopted, implemented and institutionalized within a school system (Fullan and Stiegelbauer, 1991), and Ely (1999) identified conditions that facilitate use of educational technology by examining examples of successful technology integration. The eight conditions that are necessary for successful integration of technology that Ely identified have many similarities to performance support system models.

In the current study, the performance pyramid developed by Wedman & Graham (1998) was used to identify the presence of support for the use of technology in K-20 classrooms by various stakeholders (see Figure 1). The performance pyramid is composed of eight elements that are believed to significantly impact the ability of a performer to produce valued results in the workplace (or classroom). The importance of each element to the functioning of an organizational system is supported by research and the presence of several similar models in the education, training, and organizational psychology literature. These elements include: (1) Vision , (2) Culture, (3) Expectations & Feedback, (4) Tools, Information & Processes (5)Rewards & Incentives, (6) Desire and Self-concept, (7) Capacity to Perform , and (8) Knowledge & Skills.

Research Questions

To more fully understand the complex issues surrounding integration of technology into classrooms, a teacher education system affiliated with a large Midwestern university was studied. The following research questions were examined: What performance support elements have the greatest impact on technology use by teacher education system stakeholders? What elements limit or serve as barriers to effective use of technology in the K-12 classroom? What elements in a teacher education program limit or serve as barriers to effective preparation for use of technology to enhance learning?

To study barriers and enhancers to technology use in the classroom, we will partially replicate and build upon a study by Wedman & Diggs (2001). Their study focused on barriers to technology use within the teacher education program at the University of Missouri. While they studied barriers for teacher education faculty, this study also examines teacher education students (pre-service) and in-service teachers in area K-12 classrooms. Examining multiple stakeholders across the teacher education system may provide insight into patterns of performance support that would not otherwise be observable if stakeholder groups were viewed in isolation.

Method

Teacher education faculty in the Department of Curriculum & Instruction within the School of Education, students in teacher education classes were participants, as were cooperating teachers at area K-12 schools. Twenty-three faculty members out of the 46 within the department completed the survey, and 6 members of the faculty were interviewed. A total of 21 students completed a questionnaire and a total of 6 were interviewed. Twenty-two cooperating teachers (CT) completed the questionnaire and 1 was interviewed for the study. All participants volunteered for the study.

Questionnaire and interview items were developed based on the performance pyramid elements (see figure 1) and adapted from Wedman and Diggs (2001) Technology and Leadership System Survey and the Technology Leadership Support System Interview for teacher education program faculty. Companion survey instruments were also developed for student teachers and cooperating teachers. Questionnaires included general information and demographic sections as well as several open-ended questions. There were nine questions related to each block of the performance pyramid. Participants rated the presence of each pyramid element within their work or school environment by indicating if a statement related to technology use was true, false or if they were unsure about making a response to the statement. Interview guides also included items related to the culture and vision of the organization as they relate to support of technology use. Questionnaires were administered on the World Wide Web thus it is difficult to calculate an exact return rate. Faculty respondents represented 50% of the teacher education faculty, student teachers represented approximately 15% of the active student teachers in the semester data was collected, and participating cooperating teachers represented 23 schools across the state that partner with the university to train student teachers.

Findings

Questionnaire data collected for each of the stakeholder groups is shown in Table 1. The percentage of respondents within each stakeholder group indicating the presence of each type of performance support is shown. The percentages that are bolded indicate a particularly low level of performance support for the stakeholder group. Across the teacher education system, performance support system elements that produced the lowest percentage of agreement among and across stakeholders included:

- Insufficient rewards and incentives for the use of technology was a significant barrier for all stakeholder groups
- The lack of feedback regarding the appropriateness of current technology use was a significant barrier for all stakeholder groups
- Unclear expectations regarding technology use in the classroom was a significant barrier for all stakeholder groups
- University faculty indicated that they lacked sufficient knowledge to use technology to teach or to model it for pre-service teachers.

- The degree to which tools and environment within classrooms and labs supported technology was a barrier across stakeholder groups

Pyramid Block	**Coop Teacher (n=24)**	**Faculty (n=18)**	**Student (n=79)**
Knowledge & Skills	72	**50**	79
Performance Capacity	76	89	86
Motivation	85	89	76
Rewards & Incentives	**3**	**28**	**30**
Tools, Environment, Processes (Access)	91	65	91
Tools, Environment, Processes (Physical Environment)	72	**56**	76
Tools, Environment, Processes (Technical Support)	63	72	**57**
Feedback	**21**	**18**	**39**
Expectations	**51**	**41**	**34**

Table 1. Percentage of agreement that support for use of technology was present across stakeholder groups

Knowledge and Skills

As shown in Table 1, both cooperating teachers and students felt for the most part that they possessed the necessary skills and knowledge to integrate technology, at 72% and 79% respectively. Responses to open-ended questionnaire items suggests that cooperating teachers indicated that they had received much training in technology skills, but possessed less knowledge related to effective technology implementation. Similarly, students indicated during interviews (n=6) and through open-ended questions that they also possessed technology skills but would like to have their cooperating teachers demonstrate and/or teach technology integration.

Half of the university faculty, on the other hand, indicated that knowledge and skills related to technology integration was a barrier. Faculty interview data generally supported the questionnaire findings. For example, all of the faculty interviewed (n=6) pointed to opportunities to receive training in skills and integration as a helpful but temporary opportunity. Several faculty mentioned that they were unsure of what would happen when the grants aimed at improving skills and knowledge, such as PT3, ended and predicted things would return to the "status quo".

Expectations & Feedback.

As evidenced by Table 1, all three stakeholder groups overwhelmingly indicated they felt they were lacking in feedback related to their technology integration performance as well as expectations related to its use. All stakeholder groups indicated during interviews that they felt there were expectations for technology integration but they were either unsure of what they were or how it impacted their performance. Only one-third of the university faculty surveyed indicated they were sure expectations did exist for them. Interview and open-ended question responses, indicated that while technology was not a "real" requirement with no detriment to their careers if technology was not employed within the curriculum, it was encouraged and valued. Several also indicated that feedback was informal at best. Students stated that a better understanding of what is expected of them in terms of technology use was needed, as well as whether those expectations were course-based or program-based.

Rewards and Incentives

All three stakeholder groups indicated a lack of rewards and/or incentives in the workplace. Only 3% of cooperating teachers indicated that formal rewards or incentives were available to teachers who integrated technology, followed by 28% of faculty and 30% of students. Some faculty mentioned the current PT3 grant as well as a few campus-wide programs that offered small grants to faculty, but explained that these incentives and rewards

were very competitive and temporary. Faculty did, however, perceive themselves as receiving recognition for their use of technology from administrators. Finally, some students indicated they received rewards and incentives (30%) in the form of project or course grades, but no incentives were provided to them as student teachers in K-12 classrooms.

Tools & Environment

The component of the Performance Pyramid labeled as "tools & environment" actually entails three categories: access to technology, physical environment of classrooms and labs, and technical support. In terms of access, both cooperating teachers (91%) and students (91%) felt that they had ready access to technology, with university faculty indicating this to a lesser degree (65%). During interviews and through the open-ended questions, cooperating teachers indicated that technology was available in their classrooms as well as shared within schools (e.g. computer labs, projectors, etc.), thus it was generally available to them as they needed it. Students for the most part felt that they had access to technology, especially computers, either through on-campus labs or in their dorm rooms. However, several also indicated that when they were in the K-12 schools they had less access in the classrooms. When faculty were queried about technology access, they spoke of having technology in their offices and access to labs, but that many of the university classrooms were lacking in available, working equipment. In contrast, university faculty reported the highest level of technical support (72%) available to them, with 63% of cooperating teachers and 57% of students indicating the availability of technical support.

Organizational Culture & Vision

In terms of organizational culture, university faculty indicated that they felt there was a strong value associated with technology at the university level, in accordance with the university's strategic plan developed over the past year. In addition, several stated that the university culture was one that viewed technology in a broader sense than technology integration, including technology parks. Faculty also indicated that at the departmental level there was a strong vision, mostly associated with the department chair, who encouraged and valued technology. However, it was also mentioned that their had been an interim dean in the school of education until the current academic year, thereby putting on hold the alignment of the School of Education's strategic plan with that of the University's.

Since the arrival of the new Dean for the School of Education, however, educational technology has been chosen to be one of four signature areas within the School's strategic plan, thereby strengthening its role. Furthermore, as one administrator put it, "The reformed teacher education programs have four programmatic threads: diversity, field experience, portfolio assessment, and technology. Hence, there is clear recognition in school documents of the importance of preparing pre-service teachers to use technology. …The same is true at the department level where "infusion of technology" is overtly identified within the department's mission statement."

The student interviews (n=6), however, reflected a different picture than that of faculty. In terms of the culture in the teacher education program, responses reflected a continuum of experiences; from "no technology is expected or exists" to "technology is always utilized". Several did mention the implementation of the e-portfolio system required of teacher education students as an indication to them that technology was being "pushed". In terms of the vision within the School of Education, students indicated that basic skills were encouraged and/or a comfort with technology, but not much beyond that was discussed or expressed to them, except for, again, the e-portfolio requirement.

Conclusions and Recommendations

Several barriers to technology use in a teacher education system were identified during this study. Overall, the results of this study show the importance of thinking systemically and supporting performance across stakeholder groups. Support of technology integration in schools too often focuses on acquisition of hardware and software, and associated skills training. It is recommended that a broader definition of technology integration be considered that goes beyond digital literacy to digital fluency with a focus on learning to learn with technology tools. From a strategic resource allocation point of view, performance support models help to elucidate specific ways to target resources in order to optimize technology integration efforts.

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