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ABSTRACT

Collaborations between K-12 schools and universities offer tremendous potential for mutual enrichment. Collaborations that focus on computer technology and its integration into the classroom offer unique challenges. A number of factors must be considered prior to and during the planning and implementation stages of the technocentric collaborative. The continuums of technological innovations, teacher development, and teacher acceptance of computer technology can be overlaid to give a multidimensional view of the complexities of the demands that will be placed on the collaborative. The facets of initiating change in a school environment must be considered beforehand and continually revisited throughout the implementation period. Finally, each presentation of the collaborative needs to be planned in light of research on successful professional development for educators and respect for their unique needs as adult learners. Consideration of these three areas may diminish the opportunities for university faculty to take pratfalls in the collaborative ventures with K-12 schools. (MES)

Avoiding Pratfalls in K-16 Collaboratives

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Abstract: Technocentric collaboratives pose unique challenges to university faculty. Recommendations from prior research in the areas of technological innovation, teacher development, teacher acceptance of technology, implementation of change processes, and professional development can provide valuable insights for university faculty while informing the planning and implementation of technocentric collaboratives with K-12 schools.

Introduction

The call for collaboration between universities and K-12 schools comes from sources ranging from state legislatures to local school districts to regional colleges of education. Increasingly, universities are working towards fulfillment of the vision of the Holmes Report (1995) to form "not just a working coalition of schools and universities as they are, but a powerful synthesis of knowledge to help us find out what the schools of tomorrow might be like." Many proposed collaboratives center on the use of computer technology in schools as local districts find themselves inundated with new hardware and scrambling to provide teachers with meaningful education on the use and integration of computers in the curriculum. No matter how innovative and creative the vision for the collaborative venture, the reality of creating working and viable technocentric collaboratives between institutions of learning whose traditional organizational patterns champion closed doors and individual initiative is often more difficult than originally envisioned. Existing research can inform the planning and implementation of any technocentric K-16 collaborative.

An Overlay of Continuums

Embedded within the culture of schools are individual teachers who could theoretically be placed on three continuums: acceptance of technological innovations, teacher development, and acceptance of computer technologies. The overlay of these continuums illustrates the complexity of the system in which the collaborative will be placed.

Continuum of Technological Innovation

Three stages can be observed as technological innovations move from potential to fulfillment (Naisbitt 1982). In the first stage, the technology is introduced in ways that are non-threatening. In schools this level was observed when Apple II-e's, sitting in the back of the classroom, were widely used as classroom behavior reinforcement props or free-time activities.

Second stage technological innovation occurs when the new technology becomes increasingly merged with older technologies. At this stage, the new technology performs existing tasks more efficiently than older technologies. In education, teachers use electronic gradebooks, professors convert overhead transparencies to PowerPoint presentations, both students and teachers use the computer as a typewriter, and students become facile with skill and drill software aimed at mastery of discrete skills.

As people become accepting of a new technology and recognize its place in their present lives, a third stage of innovation emerges. At this stage, the innovation itself begins to drive practice in different directions while opening the door to new applications and further innovation.

Educational use of computers in today's schools illustrates acceptance at the second stage level of innovation. However, as school districts across the country are discovering, this is not exclusively the result of low levels of hardware availability in classrooms. Indeed massive infusions of hardware may impede the use of computers rather than nourish their use. The answer to this curious contradiction may lie within additional continuums that must also be considered.

Continuum of Teacher Development

A variety of researchers have provided descriptions of the various stages of teacher development. Whether their descriptors utilize a three stage or four stage developmental scale, all point to varying needs of in-service teachers at each stage. Each illuminates the vastly different behaviors and methodologies of teachers along their respective continuum. One teacher development scale sets forth a four-stage pattern of development with the following stage descriptors: becoming, growing, maturing, and the fully functioning professional (Gregorc 1973).

The *becoming* stage teacher was identified as just beginning to develop initial ideas about the nature of teaching, role expectations, and the role of school as a social organization. They felt that their role as a teacher was to impart knowledge to students, get through the book, and do what the principal said. In a technocentric collaborative venture, these teachers, while exhibiting great enthusiasm for technological innovations, may become frustrated at how to implement these innovations in light of the perceived need to make it through the book. Likewise, they are easily influenced by other educators at the school site and their preconceived perceptions of technology in the classroom.

As teachers moved into the *growing* stage, their concepts and stereotypes of their roles and school continued to develop but in the light of more personal knowledge and familiarity with curricula, students, materials, equipment, and their own strengths and weaknesses. Gregorc also found that some teachers made it to only this stage, stopped developing, and rejected new experiences. The group of teachers at this level, whether entrenched or merely stopping by, can provide the greatest amount of challenge in any K-16 collaborative. Having successfully completed the becoming stage, educators in the growing stage have developed a sphere of comfort and any intrusion into that sphere may be viewed with suspicion and skepticism. From this group of teachers may also come the fear of technology as one more subject to teach.

The *maturing* stage found teachers who were characterized by a strong sense of commitment to education, participation in the greater school community, and service as educational resources to fellow faculty. Earlier stereotypes were reexamined leading to new insights about education, students, and themselves. Teachers at this stage, should they personally embrace the value of integrating technology into their curriculum, will move rapidly in allowing students to serve as leaders in absence of the teacher's personal expertise and allow technology to serve as another valuable tool in their curricula. These educators will most often be willing to share their experiences with fellow staff members. How other faculty members receive their efforts will be independently determined by each teacher's place on the development continuum.

Finally, teachers at the fully functioning professional stage have made a full commitment to education while trying to realize their full potential both as individual teachers and as part of the larger profession. New concepts are tested and belief restructured in a continual spiraling growth pattern. Such teachers may find that technology will fundamentally change the way they teach, moving more towards project-based curriculum, collaboration with other faculty, encouragement of student cooperative groups, and educational inventiveness.

Regardless of where an educator exists on the developmental scale, the introduction of computer technology can challenge current belief systems, pedagogical patterns, and their patience. Attention must be paid to their self-concept as learners. Their acquisition of the skills needed for personal use of the computer and the ability to successfully integrate the computer into their classroom curriculum will place them on yet another continuum.

Continuum of Teacher Acceptance of Computer Technology

Teachers immersed in a technology rich environment move through distinct stages of use and application. A four-stage process of growth has been identified (Dwyer, et al. 1990). In the *adoption* phase, educators were involved in learning how to use the technology themselves and were concerned with how to make it work with their traditional curriculum and method of instruction. Most often they turned to

CAI software for drill and practice of basic skills. Minor technical glitches in both software and hardware were initially viewed as insurmountable obstacles. As much support was needed for these technical glitches as was needed for simple skills development. Classroom computers were turned on only occasionally and the computer lab was frequently void of students.

The *adaptation* phase found teachers discovering that they could cover their usual curriculum faster with technology and that left more time for experimenting with restructuring ideas such as problem-centered curriculum. Curricula were modified to take advantage of time opened up by increased productivity. Skills the teachers had worked hard in mastering for their personal use in the adoption stage such as basic desktop publishing began to be presented to students and encouraged in use by students. Labtime became a precious commodity, resulting in scheduling conflicts.

Entering the *appropriation* stage, the majority of teachers began experiencing a fundamental shift in their view of teaching. Technology became integrated into more innovative approaches such as team teaching, team curriculum development, student collaboration, and interdisciplinary projects. Team teaching was explored, as was flexible scheduling at the secondary level. The demand for instruction in more complex technology issues increased. Web publishing emerged as a collaborative venture for faculty. Advanced applications such as PhotoShop were employed as were digital cameras and scanners. Greater interest in mastery of multimedia software emerged. Teachers found increased need for computers in the classroom as they began to facilitate student cooperative groups.

The final stage or *invention* phase of the study found teachers building new learning environments that employed technology as a flexible learning tool. They came to view learning as a creative and interactive process. Knowledge became something learners needed to construct for themselves rather than receive from someone else. Alternative forms of assessment were integrated and a balanced, strategic use of direct teaching and project-based teaching was developed. Computers in classrooms were turned on from the beginning of the day and used frequently by students throughout the day. Lab time evolved to a more refined usage, primarily used as an opportunity to complete projects begun in the classrooms.

The convergence of these three continuums – technological innovation, teacher development, and teacher acceptance of computer technology – occurs uniquely in each educator at each level in each school. The vision of this complexity can inform the planning of any K-16 technocentric collaborative for it points to the need for flexibility in planning and implementation to satisfy the needs of individual teachers. It can also serve to illuminate behaviors encountered as the collaborative proceeds.

The introduction of computer technology and the consideration of its infusion into a curriculum represents a significant change process. After reflection on the complexity of the individuals being served by any collaborative, factors of implementing change should be considered.

Implementation of Change Processes

Consideration of the myriad of possibilities afforded by an overlay of the above three continuums illustrates that the plan of any technocentric project can appear deceivingly simple if it fails to consider the complexities of initiating change in the school environment. This complexity is well described in 3 tiers of interactive factors in the implementation of any change process (Fullan 1991). The first two of these three tiers - characteristics of change and local characteristics - may inform the implementation of any collaborative.

Fullan's first tier stresses the characteristics of change and consists of four items: need, clarity, complexity and quality. It seems obvious to note that early in the implementation stage of any project, the people involved must agree that the *needs* being addressed are significant. However, while this may have been accomplished in the planning of the project, the larger group of participants must buy into the significance of the need as well. In complex projects, all needs may not be apparent early in the project period. Participants must be involved in hands-on projects immediately so that emerging needs may be identified and stated.

Clarity about the goals and means of any project presents a continuing problem. Complex innovations in a human environment highly dependent on teacher continuums increase obscurity of goals. Teachers are likely to be unable to state the vision and focus of a technocentric change at their school and may be frustrated by not knowing what change in behavior is expected of them. Revisiting the goals of the project often can be beneficial but changes in the means for achieving those goals must be approached with caution. Too much fluidity can give the impression of lack of concrete planning and may ultimately cause K-12 faculty to question the competency of both their administration and the university partners.

Complexity of change deals with the extent of change required of the participants in the project. It is compounded by each participant starting from differing positions on each of the continuums as well as the complex interactions between required skill levels and internal conflicts with existing belief systems, pedagogy, and materials. Technocentric projects are extraordinarily complex, requiring teachers to develop new skills, examine existing beliefs, and adjust current methodology.

Finally, the *quality* of the innovation must come under close scrutiny as it underscores the subtle interplay of need, clarity, and complexity. While the need for the innovation may be obvious, the quality of the program must not be taken for granted. Any project being brought to an educational institution must pass the "practicality ethic" (Doyle & Ponder 1977-78). Changes perceived as practical by educators will address observable needs, fit well with the teaching environment, be logical in implementation, and let educators walk away with concrete applications adaptable to their classrooms and teaching styles. The project also must be structured such that tangible successes are observable by the participants early in the implementation period (Huberman & Miles 1984).

The second tier of interactive change factors deal with local factors: school district, board and community characteristics, principal, and teachers. One significant precondition to the success of any collaborative is the track record of the *school district* in not only encouraging innovation but also supporting it through financial and philosophical means. While staff at a local school may be able to successfully implement a technocentric project, that project will not be replicable at other sites without top down support from the district administration. Central administration must demonstrate through actions that they will support innovation for teachers learn quickly which innovations to pay attention to and which to discount as a passing fad.

Board and community characteristics may seem at a level beyond which to consider as an implementation factor but support from both the board and the community of the local school are critical in the continuation of the innovation after the implementation phase. Involving parents and local businesses from the start provide an outer level of support for the project. The wisdom of building in exit experiences in the project that provide a showcase for board members is politically astute.

Of more obvious value to successful implementation of a technocentric project is the support of the *principal* and the *teachers*. Ultimately whether the innovation is accepted or blocked lies within the purview of the principal and the teachers. While it could be assumed that their support was part and parcel of the planning stage of the project, one must continue to plan for their support during the implementation as well. It cannot be taken for granted.

Principals must be viewed as partners in the grant implementation. Ideally, principals should act as instructional leaders and care should be taken to facilitate and encourage them in that role. When teachers see and feel the active support of their principal in any change, through psychological support, material support, and active participation in workshops, projects stand the greatest chance of success.

Obviously, teachers play a significant role in the implementation process. When teachers who are at the maturing and fully functioning professional points on Gregorc's scale approach innovation, they do so in a self-actualizing manner with a greater sense of efficacy than do those teachers at the first two points of the scale. Likewise, relationships among teachers are of vital concern for the researcher. Schools that have a high number of change-oriented teachers who have had the opportunity to establish a learning community, albeit informally, provide a psychologically safe environment in which to experiment and learn as a professional. A technocentric project ideally involves learning to do something new and interaction is the basis for social learning. If opportunities for communal discussions do not currently exist, then the project must be structured to provide that time in a facilitated manner. Judith Little (1981) distinguished this type of social learning as, "Teachers engage in frequent, continuous and increasingly concrete and precise talk about teaching practice (as distinct from teacher characteristics and failings, the social lives of teachers, the foibles and failures of students and their families, and the unfortunate demands of society on the school). By such talk, teachers build up a shared language adequate to the complexity of teaching, capable of distinguishing one practice and its virtue from another."

Professional Development of Educators

Technocentric collaborations must not only address sound teacher development principles but also the need for technological support of emerging learners. Needs may emerge that extend beyond the original vision of the collaborative. Whatever the needs being addressed, key elements of successful in-service teacher development programs must be addressed consistently throughout the implementation

process. Loucks-Horsely and colleagues (1987) have identified ten characteristics of successful teacher development. These characteristics are listed below along with some applications of each in technocentric collaboratives.

Characteristics of Successful Teacher Development	Application to Technocentric Collaboratives
1. Collegiality and collaboration	Respect of teacher expertise and experience; gradually move towards collaboration (it's not native to the teacher culture)
2. Experimentation and risk taking	Create a safe environment by providing ample support for learners at a variety of levels
3. Incorporation of available knowledge bases	Teachers know where their strengths lie as an educator – allow flexibility so that they can start from that strength
4. Appropriate participant involvement in goal setting' implementation, evaluation, and decision making	Build in means for obtaining feedback from all participants throughout these steps
5. Time to work on staff development and assimilate new learning	Respect teachers' time; build in funds for release time; be prepared to provide in-class support and modeling of new processes
6. Leadership and sustained administrative support	Seek to have principal participate in large group activities; nourish emerging leadership among staff; use jigsaw method to create experts
7. Appropriate incentives and rewards	Make efforts to assure success at every stage; be creative in arranging time for teachers to collaborate
8. Designs built on principles of adult learning and the change process	Remember the test of practicality; recognize the unique needs of the adult learner
9. Integration of individual goals with school and district goals	Reflect on the continuums presented above and how those inform individual goals and the support structure for those goals
10. Formal placement of the program within the philosophy and organizational structure of the school and district	Find the ways technology can support the unique programs of the school; consider what will happen when the collaboration ceases as an active agent.

Particular emphasis should be placed on the eighth characteristic, "...built on principles of adult learning and the change process." While the change process was discuss in the preceding section, research from the field of adult learning lends credence to the ability to develop on-site collaboratives that would allow teachers to integrate new information into their existing stage of development. Wood and Thompson (1980) support programs that include experiential learning and informal learning situations in the context of social interaction among participants. The following components comprise such a learning experience:

1. A brief orientation that is followed by participation in a variety of experiences embedded within a real situation. This allows learners to experience and implement the skill, concept or strategy being presented.
2. Reflection on the experience: what was learned, how this can be applied to their particular setting, analysis of the way the experience was presented and extension into the workplace.
3. Opportunity for participants to generalize and summarize this reflection, to provide closure to the situation, and to vocalize principles attained.
4. Opportunity to return to work site to try out new knowledge, principles and to develop confidence in what was learned and its real application.

When applied to a school setting, these four components can be applied within project-centered in-service segments of a collaborative. Teachers are presented with a brief orientation to the innovation at hand and then given an authentic project to complete in cooperative groups. At the end of the session,

teachers return to the large group to share their products and the facilitator leads a bridge-to-practice closure session that promotes reflection on the experience and extensions to the classroom. Teachers can then return to the classroom in the interim between sessions to find applications for what was presented. At the start of the next session, teachers share successes and examples of how they applied the knowledge in their classrooms. This iterative process of evaluation encourages experimentation with the innovation, bridging the innovation to current practice, feedback on the implementation of the innovation, and subsequent modification of methodology in a continual spiral of growth and evaluation throughout the period of collaboration.

Conclusion

Collaborations between K-12 schools and universities offer tremendous potential for mutual enrichment. Collaborations that focus on computer technology and its integration into the classroom offer unique challenges. A number of factors must be considered prior to and during the planning and implementation stages of the collaborative. The continuums of technological innovations, teacher development, and teacher acceptance of computer technology can be overlaid to give a multidimensional view of the complexities of the demands that will placed on the collaborative. The facets of initiating change in a school environment must be considered before hand and continually revisited throughout the implementation period. Finally, each presentation of the collaborative needs to be planned in light of research on successful professional development for educators and the respect for their unique needs as adult learners. Consideration of these three areas may diminish the opportunities for university faculty to take pratfalls in their collaborative ventures with K-12 schools.

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