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Hanau Model Schools Partnership Research Report

Professional Development and Full-School Technology Integration: A Description of the Professional Development Model of the Hanau Model Schools Partnership

by

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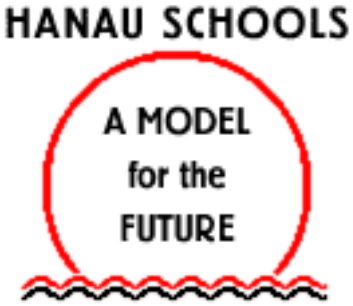


Hanau Model Schools Partnership Research Report

Professional Development and Full-School Technology Integration: A Description of the Professional Development Model of the Hanau Model Schools Partnership

The Hanau Model Schools Partnership formed in 1995 with the aim of providing a testbed for exploring the development of networked schools. The goal of this project, supported by the National Science Foundation (NSF), was twofold: to infuse technology into a cluster of K–12 schools so that learning with technology becomes a deeply accepted part of daily school life for all members of the school community and to actively support the development of exemplary teaching approaches that complement the aims of the district's and nation's educational reform goals and make good use of technology. The site of the work was a four-school cluster on the American army base in Hanau Germany, part of the Department of Defense Education Activities system (DoDEA). TERC served as the implementation/research mentor for this work.

From the beginning, we recognized that this work would be full-school or systemic in nature; that is, it would engage all parts of the school community and multiple aspects of school life—from classroom practices to administrative structures. Professional development would be critical for educators and administrators to develop the knowledge, skills, and experience they would need to tackle these issues.

As we begin to plan for the effort with the four schools, several important questions emerged. First, what constitutes a consistent professional development approach to foster technology integration? Given that we had identified technology integration as a systemic or full-school/cluster issue, what, then, constitutes a systemic professional development approach to meet these needs? Finally, to ensure that technology integration builds, rather than detracts, from school capacity, *how can a systemic approach to professional development to foster technology integration and support content assist schools in building capacity to manage systemic change initiatives?*

In designing this model, we have been attentive to the winds of change in the world of professional development. This new paradigm in professional development includes the movement toward school-based learning, teachers as active learners, and a focus on student learning (Sparks & Hirsh, 1997); the growing recognition of the complexity of professional development designs and the importance of attention to context and sustained engagement (Loucks-Horsely, Hewson, Love, & Stiles, 1998); and, the importance of developing collegiality within professional communities to support change (Little, 1987; Lord, 1994; Louis, Marks, & Kruse, 1996; Morocco, Shure, DiGisi, Yenkin, & O'Connor, 1998).

In this report, we describe the professional development model for full-school technology integration that evolved through a collaborative partnership between the schools and the implementation/research partners at TERC.

The Hanau Model School Partnership

The aim of the Hanau Model School Partnership (HMSP), a full-school technology infusion project in a K–12 cluster of four schools on the American army base in Hanau, Germany, is to serve as a testbed for understanding the possibilities and implications of full-school technology integration and the supports that will be required to undertake, institutionalize, and sustain such systemic initiatives. Besides the implementation work, we have also conducted a complementary formative and summative qualitative research program.[1]

Over the course of three years (1995–1998), the four schools, which serve 1,500 students, have become a networked cluster of schools with more than 500 networked computers and a faculty broadly knowledgeable of the technologies available to them and the ways in which these tools can be applied to all grades and content areas. Getting to this point required many kinds of supports and processes: a cross-school planning team, on-site curriculum integration support, family and community involvement, and most important, a comprehensive professional development plan—the bare bones of which we describe in this paper.

The four Hanau schools—two elementary, one middle, and one high school—are much like other schools within large school systems that one would find stateside. From the bulletin boards in the hallways to the gymnasium, and the annual achievement testing, they look, sound, and operate like American schools. The 120 educators who work in Hanau have training, backgrounds, and concerns similar to many stateside teachers. For instance, they have concerns about the future of their communities and the stability of their jobs: When we entered their classrooms in 1995, many expressed anxiety about the future of their jobs due to the recent military downsizing. They worry about the old and the new: Will technology be of real benefit to their students? All in all, this is a mature faculty; many have been teaching 20 to 30 years, having entered the profession at a time when computers were unknown in the classroom.

Initiated in 1995, the partnership was envisioned as a technology integration project, not a restructuring effort. This distinguishes it from mandated restructuring efforts that are entered with intentions to address educational reform issues from a systemic perspective.

This caveat aside, we were aware from the beginning of the importance of understanding the DoDEA system and the district's educational reform agenda so that we could think strategically about how our efforts would intersect with this agenda and what the implications might be. We learned early on of the systemwide emphasis on the schools' Strategic Implementation Plans (SIP), which were tied to a set of benchmarks for progress. At the grassroots level we found that, at best, the SIP process was held in skepticism by local educators, and their involvement with it had a reactive rather than a proactive flavor to it. In truth, the most powerful educational reform agenda in operation within the DoDEA system, we learned, were the regularly scheduled curriculum adoptions. Changes in educational practice, which

are at the heart of any educational reform agenda, were most likely to be grounded in a teacher's struggle to understand a new curriculum adoption.

Besides developing knowledge of the educational reform agenda of the district, we also sought to develop an internally consistent research-based foundation in which to ground the professional development efforts in Hanau. TERC team member Cathy Miles Grant (1996) spearheaded that process with the development of a background paper on professional development research. This document outlined the professional development principles that would guide the partnership.

- Professional development for technology must extend a *vision of technology as an empowering tool for teachers and students.*
- Professional development must stimulate reflective practice and be grounded in the *context of teaching.*
- Professional development must exemplify our *deepest beliefs about learning: inquiry, collaboration, and discourse.*
- Professional development must recognize the *interplay in learning between activity and belief.*
- Professional development must value and cultivate a *culture of collegiality.*
- Professional development programs must provide *continual contexts for formal and informal learning.*
- Professional development must provide *opportunities for meaningful teacher leadership roles to emerge.*
- Professional development must enable teachers to *shape their own learning*.

As we conducted the investigations mentioned above, we were also coming to recognize some of the implications of approaching technology integration as a systemic or full-school or cluster initiative, and we began to search for a means of describing what the universe of systemic would mean for this project. Over time we have come to describe this universe as composed of the following four parts:

Educational Practice	The composition and conduct of classroom learning activities and the growth of students' knowledge, skill, and experience as it evolves over the school year from engagement in these activities.
Professional Culture	The social medium in which adults in the schools interact, grow, and develop as knowledgeable educational professionals. This includes the composition and conduct of educators' formal and informal learning activities and the growth of their knowledge, skill, and experience as it evolves over the school year and across their careers as educators.
Technology Leadership Management	The matrix of formal administrative structures and policies *and* the system through which learning experiences and resources are organized within and across schools
School Community and Family	The school community comprises the services that support and extend young people's educational experiences outside the normal school day, and the family members and friends who support the learner and are concerned about his or her educational development and learning opportunities

Within this matrix, we believe professional development to be a key element of a school's professional culture. It was our goal, working hand-in-hand with Hanau educators, to design a comprehensive program of professional development that would embody the principles laid out by Grant, thus enriching the professional culture of the four schools. Professional development would be systematically oriented in that it would support the new learning needs of the entire school community of adults from teachers and specialists to administrators and parents. The aim of professional development would be to integrate technology broadly and deeply within and across grades and content areas, so that *all* students, not just a select few, would be able to learn with the new resources.

Given these assumptions, we hypothesized that if the professional development plan were successful, the evidence of this success would be visible over time in each of the four arenas of change we had identified—practice, culture, structure, and context. Moreover, we would also be able to discern the ways that professional development created richer ties across these arenas as those at the site grew in knowledge and experience.

Positive outcomes of a systemic approach to professional development for technology integration would include a rise in technical knowledge and skills across all populations within the school, evidence that technology was being used across all grades and subject areas, and, better yet, proof that it was contributing to more thoughtful pedagogical styles. A means would also be needed to detect whether teachers were using technology for a variety of administrative purposes and whether technology was contributing to bettering their work lives. We assumed that as teachers gained experience with technology, across the schools there would be a pool of internal technology leaders of various sorts. Finally, we would expect to see evidence that structures, policies, procedures, and administrative bodies had been put into place to support these new resources and to ensure their continued effective use

over time. Ultimately, it was our hope that the experience of the partnership—a full-school and cross-school technology initiative—would lead to changes in educators' perspectives on how to manage change within their environments.

A Model for Full-School Technology Integration or the Principles of Commitment

Our professional development model for full-school technology integration is composed of a few broad principles of commitment from which we spun out a range of activities. These activities constituted a comprehensive professional development program that provided every learner with multiple opportunities individually and in various groupings to explore the use of technology in the context of teaching and learning. These guiding principles are as follows:

- Everyone makes a commitment.
- The commitment is for everyone.
- There is full on-site support for the commitment.
- There is full off-site support for the commitment.
- The commitment is integrated with district goals.
- The commitment contributes to the system's goals.
- Implementation of the commitment is a responsive process.

We are not the first to organize our notions of school improvement around principles or beliefs, rather than tasks or standards (Sizer, 1992). The notion of commitment speaks to the individual and corporate will that must be mustered to undertake such broad endeavors. It also speaks to the spirit of engagement that is required. In this section we illustrate the ways these principles were enacted in practice.

<u>Everyone Makes a Commitment</u>

Full-school technology integration requires the participation and commitment of every adult school member—teacher, specialist, and administrator. Only in this way can one develop the mass and momentum necessary for such a taxing systemic initiative.

On the other hand, from a professional development perspective, more begets more. The more people involved, the more they learned and faster because of their greater access to technology expertise. The fuller the participation, the more different kinds of technology and content integration experts emerged. The net result of our principle that "everyone makes a commitment" is that professional development is richer and more effective, and the rate of technology integration is greatly hastened.

Cluster Visioning Day

In Hanau, the process of developing full-school commitment began in earnest December 8, 1995, when the adults from the participating schools gathered in the gym of Argonner Elementary School for a full-day visioning process. They shared their hopes and fears for school change and technology integration and provided the TERC team with timely advice about their needs and the ways that they would like to proceed. By simply being present, listening, and voicing an opinion in the town hall-like meeting, staff members were taking the first steps in their process of commitment.

The visioning day initiated our emphasis on the development of a collaborative professional culture to undergird the comprehensive professional development activities that would be central to the project.

Technology Action Plans

The following summer in two 2-week workshops and at meetings in the fall of 1996, faculty and specialists begin the next step—developing a *Technology Action Plan,* or TAP. Everyone, without exception, was expected to undertake a process of technology learning that would be defined by the plan and unfold over the year. Individuals, however, were in charge of defining what they would learn and the level at which they would participate.

The TAP process focused teachers on connecting technology to classroom content and, in the case of specialists, on using technology to support student needs. As part of this process, in the fall teachers and specialists were asked to chose a content or student area of exploration or select a software tool of particular interest. They had several weeks to explore and think before they were asked to describe how they might use technology to address this area or how they might employ this tool in their classroom. In the second half of the school year they put their ideas into action in the classroom or other work area, reporting on their experiences in the spring of the next year.

The plans were broad in focus, demonstrating the range of technology expertise across the schools. Here are a few examples:

- A second grade teacher developed students' knowledge of the Amazing Writing Machine software application, and then used this application for creating student story books that were collated into a collection and added to the school library collection.

- A fourth grade teacher used cameras, tape recorders, video recorders, smart boards, and selected software packages in science studies of plants and animals.

- In the middle school, the home economics teacher and the nurse teamed up to use the Internet to investigate student-selected topics for a health unit.

- Art teachers from the middle and high schools used scanners and graphic software to create a cross-school electronic student art gallery.

- In ninth grade biology, students made Hyperstudio presentations on all the phyla of the Kingdom Animalia. This project required use of the Internet, scanner, and smart boards as well as the software packages Hyperstudio, Adobe Photoshop, and Microsoft Word.

The plans, then, formed the basis for each individual's professional development plan for the year.

The Commitment Is for Everyone

Three critical items branched from our principle that "the commitment is for everyone": a community-based planning team that had responsibility for the broad-brush design of the professional development plan, a set of shared assumptions about the technology and the support for it, and a strong emphasis on participation from families and community members.

Community-based Planning Team

Without a shared vision of project goals, systemically organized professional development will not have a legitimate focus. The Hanau Implementation Team, or HIT, a cross-school, community-based planning team, developed the shared vision of project goals and the broad-brush picture of the professional development options that would support these goals. Formed in the first months of the project, the team was composed of the principal and a teacher and parent from each school, as well as representatives from the district office, Base Command, and the teacher's union. The day immediately following the all-school visioning day, the team sat down and began to grapple with the tough issues of schools-based professional development. Their discussions formed the base of the final implementation plan that TERC presented to NSF in the spring of 1996.

Over the next two years the team continued to play a pivotal role in many aspects of professional development, including organizing the cross-school community days for sharing the progress of the project. The team's most important role may center on the sharing of information across the four schools about their various technology integration efforts, which includes much reference to the ways that members of each school community are supporting each other. Over time, the schools have begun to make more and more use of colleagues on other campuses as resources for their technology needs. This finding indicates that capacity and resources for technology integration efforts have been increased through the HMSP professional development activities.

Shared Assumptions about Tools, Training, and Technical Support

Here are the three critical assumptions that served as guiding lights to making decisions about resources:

- *In a networked school, every adult needs a networked computer in his or her workspace.*

Providing networked computer access in every adult's workspace accomplished a great deal. First, it allowed everyone to communicate daily with e-mail, and within a short space of time few would have been willing to give up that convenience. Second, it gave teachers private opportunities to explore the use of the new technology at times that best fit their schedule. Teachers needed to become personally comfortable with the basics of computer use before they could feel at ease helping students on the technology.

- *The tools and training would be offered to every educator in the school, not to a select group.*

The partnership deliberately elected to make the tools and training available to everyone at the same time. Individuals proceeded in different ways and at different paces, but everyone had equal opportunities for learning. This turned out to be a critical decision. Because everyone was involved in the same project at the same time, it increased the chances that there would be talk and focus about the same issues. This, in turn, fueled professional connections about technology issues. All across the schools, people began to turn to their colleagues for answers to their questions about technology, enriching the growth of each school's professional culture.

In large school districts such as DoDEA perceptions of inequity across professional groups and schools generate issues that can lead to great divides. Making tools and technology available to everyone in every school answered many of the concerns about equity of resources.

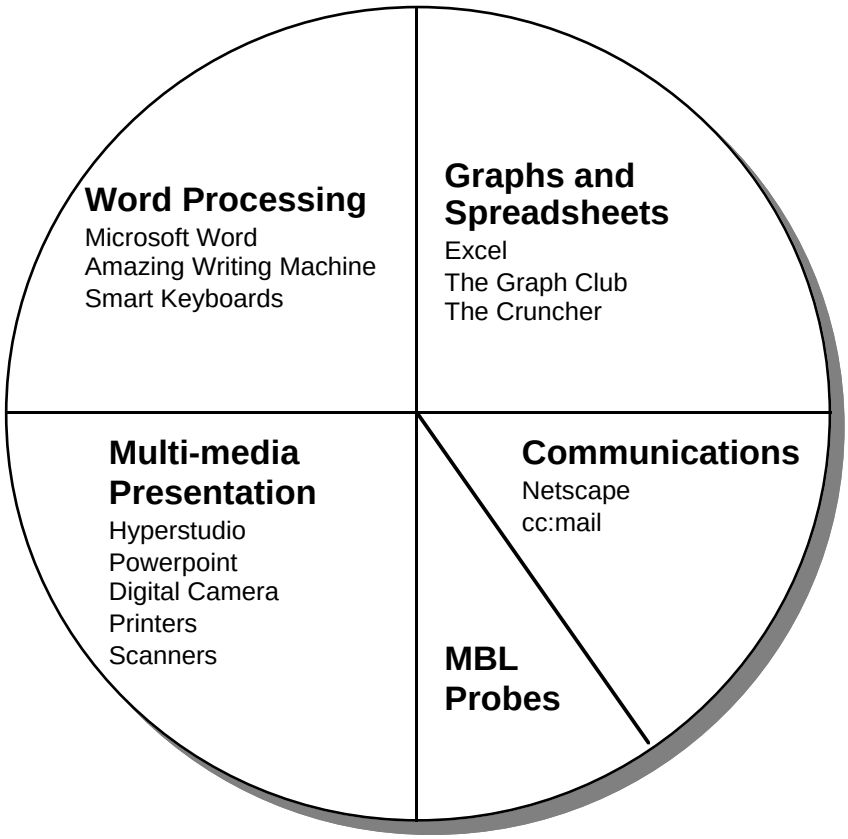
- *The same small set of common software tools would be placed on every computer in the schools.*

Every computer in Hanau is imaged with "the tool kit," a set of common software applications that can be used for a variety of classroom and administrative functions (Bruce & Levin, in press; Rubin, 1996). The team played an important role in the selection of these tools; it was another important professional development task in which they were involved.

The tool kit offered many technical advantages. It made for greater ease working across multiple workstations, not a small consideration in schools where students and teachers do not have permanently assigned workstations, but work in many different locations. Also, it helped the technical team support a finite, rather than an infinite, universe of choices.

The common tool kit had important implications for professional development and professional culture that we quickly recognized. It meant that most people were focused on one of several common tools at any one time, and this facilitated their ability to support each other as they struggled to make use of the new tool. When teachers shared their ideas with each other, even if they weren't yet making use of a tool their colleague might have tried, they could return to their classroom knowing that tool was available on the computers in their classrooms if they wished to try it (McGillivray, in progress).

The Model Schools Tool Kit



Strong Participation from Families and Community

Schools are composed of various constituencies, of which parents and concerned community agencies play a critical role in the shaping of school life, resources, and policies. Because of the systemic nature of full-school technology integration, it is critical to involve all these constituencies from the beginning of the decision-making process. The lack of inclusion or the significant disillusionment of any of these groups in the goal for full-school technology integration can cause significant retardation to the project or, in the worst case, destruction of the project.

In Hanau, teachers and community members were seen as partners in the full development of the schools' new technological resources. As members of the team, they were engaged in the planning of professional development opportunities. They also gained professional development opportunities themselves over the course of the project. In the third year of the project more than 100 parents participated in three-day training workshops and then, in turn, gave back time to the schools to support teachers using technology in their classrooms. The

educational technologist provided training to the Base Command in the use of software applications for presentations.

The technology project provided parents and community members opportunities to learn about the content of schooling as they worked side-by-side with teachers to support students' technology activities. This was the best possible way to demonstrate to them how technology can support young people's learning, and for them to experience firsthand the new kinds of content and approaches to pedagogy that technology makes possible. Over the long run, parents and community members will be more likely to support teachers' professional development activities because they recognize the benefit these bring to young people.

There Is Full On-Site Support for the Commitment

On-site support in Hanau is anchored in the educational technologist, Kevin McGillivray. It is his job to keep the focus of support on the integration of technology to support learning in the schools. To do this, he works closely with a team of "techies" that include a TERC-supported technology assistant, a district-based technology support person, and a network administrator. This core group may look to district contractors for technical support and the system's MIS division for various supports and policies. In addition, at each school the information specialist in the media center is also designated to support technology integration, and there are computer lab teachers in the middle and high schools.

The professional development opportunities that McGillivray orchestrates run the gamut from formal trainings and workshops to varied informal, but equally important, learning opportunities. Informal professional development includes e-mail follow-up messages, providing teachers with information on new web sites related to their teaching interests, checking with different teachers while in the building.

As educational technologist, McGillivray is particularly important because of the role he plays to connect the four systemic components of the project—educational practice, professional culture, technology leadership and management, and family and community participation (Wasser, McGillivray, & McNamara, 1998).

By working across all four domains, the educational technologist, who anchors professional development and technology integration support, is the assurance that the HMSP's comprehensive professional development program will be systemic in nature.

In networked schools, such as are emerging across the nation, the educational technologist will play a pivotal role in effecting full-school technology integration. Neither district administrator nor computer lab teacher, this individual must be understood as one who anchors the systemic approach to school improvement (Wasser, 1998b). This chart demonstrates how the educational technologist worked across the four domains.

Educational Practice	Professional Culture
• Investigated and offered resources for curriculum integration • Demonstrated technologies and technology integration in classroom and lab • Helped teachers create technology application plans (TAPs) • Provided coteaching experiences to teachers • Provided technology support for special learning activities • Taught groups of students and worked with individual student projects	• Provided broad range of professional development activities from informal (e-mail/drop-in) to formal (scheduled meetings or trainings) • Shared information within and across schools about the technology integration work, informally (conversation and e-mail) and formally (newsletter, meeting presentation) • Connected teachers to each other for more formal learning opportunities (coteaching experiences) • Coordinated teachers' work with outside content expert consultants • Supported technical and cultural development of the e-mail culture in schools • Supported cross-school articulation (MS to elementary schools) in planning for students & conducting professional development
Technology Leadership and Management	**Family and Community Participation**
• Organized techie support group • Responded to technical/maintenance needs on-site and through e-mail • Created student tech corps to respond to technical issues and tech integration • Monitored significant technology/maintenance issues • Supported principals on diverse technical issues • Served as resource to school technology committees • Served as resource to HIT committee • Assisted district office with technology integration issues; internal to the partnership and in support of upscaling the Hessen district • Provided coordination to outside agencies concerned with technology integration (TERC, PTI, etc.) • Coordinated visits for special visitors • Participated in presentation of project to national audiences	• Assisted principals in linking to parent groups (presentations and informal sharing) • Coordinated efforts to provide parallel software for library and home use • Facilitated publication of parent brochure • Coordinated parent technology training • Provided technical support to schools for special family/community events • Coordinated communication and publicity with community • Provided regular updates to Base Command • Trained Base Command on software tool kit applications

There Is Full Off-Site Support for the Commitment

Full-school technology integration is a massive task and few schools possess the resources or experience to do it on their own. This is particularly true around issues of professional development. This is not to say that educators in schools do not possess vast quantities of important skills and information, but networked technologies are very new and there are very few examples available yet of how it can best serve schools.

This outside expertise may come from others in the district or outside consultants. In the case of the partnership, TERC coordinated off-site support for the schools. This included support for the planning process and the computer buy and installation. The major feature of this support, focused, most appropriately, on professional development. Support for professional development took the form of (1) introducing school staff to new technology tools (summer trainings); (2) helping them connect their use of technology tools to content and administrative purposes (the TAP process); (3) deepening content connections in specific content areas (coteaching experiences with outside experts); and (4) supporting individuals and groups to develop new leadership skills and forms of organization to support technology integration (special leadership training opportunities for principals; research feedback to HIT and school technology committees).

Of particular note, TERC spearheaded an evolving model of support for deeper content integration of technology, called the "coteaching model." Piloted by Cathy Miles Grant with elementary school teachers, Grant worked hands-on with this group to show them how spreadsheet and graphing tools from the common tool kit (Graph Club and Cruncher) could be integrated with lessons from the district's math curriculum (Mathlands), as well as in lessons of their own devising (Grant, 1998a & b). This model was extended to the core content areas of science, social studies, and language arts with the help of a cadre of external content experts (McNamara & Grant, 1998). Over the last year, the educational technologist, with support from principals and the district, has expanded the model once again. Hanau teachers are now working as coteachers with other Hanau teachers, sharing the technology expertise they have gleaned with their colleagues in hands-on classroom situations.

TERC's support was from the ground up as well as behind the scenes. Through almost daily conversations with the educational technologist and others involved in the implementation of the project, TERC provided a high level of invisible support that was translated into more effective professional development opportunities in the schools.

One the most important forms of support that TERC provided, we learned over time, was simply continued pressure to focus on the twofold goals of the project and the principles of commitment. The invisible support previously described was one instance of this, but another important one was through the presence and activities of the researcher. On every visit, Wasser met with principals, teachers, and others in the four schools, asking them the same kinds of questions: how is it going? what are you doing with technology? what has worked for you? what hasn't? what needs to be improved? Seldom do educators have the chance to reflect on their work or an interested listening ear to tell their successes or concerns to. Research, we learned, can serve as an important tool for professional development.

The Commitment Is Integrated with District Goals

From the initiation of the project, the assistant superintendent has served on the HIT committee, working closely with TERC and the superintendent to facilitate the Model Schools Partnership work at each stage. This presence provides authority for the decisions of the implementation team and the technology integration work within the schools. Without this support, neither principals nor teachers would feel empowered to undertake the work or sustain it over time.

Knowledgeable of the content and scope of the technology integration project, they weave this information into many strands of concurrent work across the district. They have been able to offer a range of financial and in-kind support for teachers' professional development. In so doing, they are not just contributing to the growth of the Hanau school community, but because this work is on the cutting edge, they are developing a professional development resource site that can support the entire district as all schools move to integrate technology.

Within DoDEA schools the primary moving force is the adopted curricula, which change periodically with the staggered adoption cycle. Teachers' primary responsibility is to instruct students with these materials. Through a variety of means, the HMSP professional development work provided teachers opportunities to deepen their work with the adopted curricula through the use of technology. By working in this way, the technology integration work complemented the district goals, as opposed to adding a new layer of goals to teachers' work.

The Commitment Contributes to the System's Goals

As the HMSP has matured, observers from the DoDEA system have come to learn from it. These visitors have included the acting associate director, the director of technology, and the leaders of various curricular areas and special programs. As they develop a deeper sense and appreciation of the work in Hanau, they, in turn, are able to draw upon this understanding as they develop systemwide programs. Hanau staff have also shared their knowledge of the model they have developed with their colleagues in various systemwide activities.

As interesting, the tours of these visitors have proven to be important professional development opportunities for those in Hanau. In sharing what they have learned, the visitors have given Hanau staff and students opportunities to reflect on their growth and to take account of the knowledge they now possess about working in technologically enriched educational settings. The educational technologist, who is responsible for the careful scheduling of visitors, approaches the tours as learning experiences for both parties, and works carefully with teachers to ensure that the engagement will not be a burden.

Implementation of the Commitment Is a Responsive Process

We sought to make implementation, at all levels, a responsive process, that is, to provide opportunities for a constant reflective loop between action and consideration of that action. The TAP process provided this for individual teachers as well as opportunities for them to work in collaborative support groups. Coteaching with the educational technologist, an outside content expert, or a school colleague was another way by which we sought to build reflection into implementation.

The implementation team provided another important reflective loop. They planned implementation activities and once these had been implemented, discussed and critiqued them.

The formative research process that Wasser spearheaded also provided opportunities for everyone to learn as they followed the steps along.

The Impact of the Professional Development Model

Professional development, as we have been referring to it, is a matrix of formal and informal learning opportunities for adults within an educational setting that supports their efforts to integrate technology broadly and deeply into school life. Our assumption was that if our professional development offerings were systemic in nature, that is, that they crisscrossed the different arenas of school life—from the practice of classrooms and teachers culture to the administrative structures and policies and the participation of family and community—then we should see growth in the use of technology in these different arenas as well as in the development of structures and policies at every level for sustaining its use. This section briefly illustrates the kinds of systemic impact that the professional development program has promoted.

Educational Practice

In October 1997, early in the school year of the third project year, we surveyed all students at all four Hanau schools about their technology use. Virtually every student in the four schools was using technology in at least one subject area, and the majority were using multiple technologies for multiple purposes. The students' use of technology continued to increase across that year.

We also see much evidence that technology has been a factor in changing pedagogical practices. Teachers who have been working to integrate the use of spreadsheets in the elementary math curriculum have expanded the use of these tools to different areas. Students in these classrooms now frequently make surveys, record the results on spreadsheets, and create graphs to represent their results. Other good examples of the ways that the use of technology has "pushed" pedagogy in some manner show changes in student-teacher roles, revision of classroom management practices, changes in teacher questioning practices, and a greater teacher focus on the study of student products.

Professional Culture

Teachers' knowledge about the use of computers in a networked school and specific software applications has increased dramatically—from zero in many cases to competency. As a group, they no longer cringe when they hear the word computer, nor do they apologize for their lack of skills.

Teachers' knowledge about the integration of technology in specific curricular areas has also increased remarkably. Beginning with the technology action plans and branching out from there, everyone has begun to get a number of technology-based lesson plans under their belts.

Professionally speaking, Hanau is now an electronic culture. Those who work in Hanau now say they couldn't live without e-mail. Some were fearful that it would lead to greater isolation among staff, and they are now surprised to admit that the exact opposite has happened. They speak of using e-mail to plan field trips, congratulate colleagues, or disseminate union materials. E-mail has drawn them together and made their teaching lives much easier.

A systemic approach to professional development has led to a number of changes in the Hanau professional culture. The adults in the system profess that the environment is more collegial and that they are more likely to see "doors open" and "teachers in each other's rooms." They now consider it standard practice for cross-grade, cross-subject area, and cross-school groups to meet for professional development or planning. Teachers and specialists see value in learning from one another.

Technology Leadership and Management

The size and scope of networking in Hanau led to technical issues, problems, and management concerns. But these situations became authentic opportunities for professional growth on many fronts. The Hanau technical staff has become skilled with handling a wide variety of problems, but teachers and students have also gained considerably in technical expertise. For example, in the first year of the project teachers were often unable to unpack and hook up their computer pieces. In the second year, everyone could do this by themselves. Today there is even a student tech corps in the high school and plans for this type of support in other schools.

At the school and cross-school level, technology committees have been formed or reshaped to answer the kinds of policy questions that are now emerging. These include such concerns as logins, Internet policies, smart board checkout procedures, and teacher professional development. In some ways, because of the scope of networked issues, these committees look like site-based management groups. They are developing as proactive, strategic planning groups, very different from what committee function had been in the schools in the past.

Family and Community Participation

From the beginning, parents and the community have participated as equal members on the project planning and implementation team. This was a new role for both. It appears that both schools and family and community have benefitted from the partnership.

Families and the community have garnered much from this project. A parent survey across all four schools in October 1997 demonstrates that parents are pleased with the technology resources available. One of their greatest concerns is that their child will not get enough access to the technology. The Base Command, too, has expressed satisfaction with the ways that the technology resources have served as a means of connecting schools to community.

Implications and Significance

In the fall of 1997, the Hanau schools and the implementation team received word that there was a new DoDEA-wide technology initiative starting—the President's Technology Initiative,

or PTI—and that they were eligible to apply. They were not sure what inclusion in the project would mean for their schools, but they were eager to be involved. The team seemed to be the natural place to discuss the proposal. Having decided to go forward, a subcommittee of the team met for a day at the high school to hammer out a proposal. As they worked, they clearly understood that certain principles they had learned through the partnership were critical to communicate. These included the need for equity, an emphasis on integrating technology across the curriculum, a systemic approach to professional development, and the inclusion of parents and community members in the decision-making process. They discussed these points in detail in the cover letter accompanying the proposal.

The development of the PTI proposal marked a special milestone in the HMSP process. From this endeavor, the four schools presented a united front that was grounded in a strong principled approach to educational reform. Their proposal made clear that they recognized their role as managers of change, rather than simply as recipients of outside projects. The schools presented their new identity to themselves and to the DoDEA system. It was a momentous occasion.

This change in the approach and outlook of the Hanau cluster has now come full circle. For instance, when we first entered Hanau, few people seemed to recognize much connection between the system mandated school implementation plans, or SIP, and the technology integration efforts of the partnership. Today, on the other hand, practically everyone recognizes that the technology integration efforts are a vital part of schoolwide strategic planning. On all levels of school planning, the parties involved exhibit greater recognition of the need for proactive, as opposed to reactive, approaches.

Professional development, as it was enacted from a systemic perspective, seems to have been most significant to bringing about these changes in Hanau. A systemic approach to professional development, grounded in the principles of commitment, provided opportunities for full-school dialogue about critical issues of concern at the same time that it provided opportunities for learning new professional knowledge and skills, trying those out in sheltered settings, and working over time to full integration. The world of classrooms was not disconnected from school administration or family and community concerns. Rather, these arenas were knitted thoughtfully together through the work of the educational technologist, the implementation team, and other bodies.

The ability of the Hanau community of educators to manage change grew over time, as the various effects of the professional development began to manifest. No one activity by itself (e.g., technology action plans, coteaching, the educational technologist) could have led to the outcomes we have documented, but together, building one activity on another, with a conscious effort at weaving meaning across these experiences over a period of three years, the design of the cloth becomes discernible.

The Hanau schools are examples of typical public schools. Although located in Germany and part of the military culture, they are more, rather than less, like public schools across America. The Hanau Model Schools Partnership demonstrates that such typical schools can undertake systemic change initiatives and create a new culture for teaching and learning. Most significant

about this project, the model demonstrates how cooperation and a common goal can build capacity to manage change.

In constructing the model described here, we have learned that professional development in systemic initiatives cannot be seen as a separate and divisible category of activity. In other words, professional development in service of systemic change must be constructed on the order of suggested shifts in the paradigm of professional development (Sparks & Hirsh, 1997). Professional development is integral to the entire change effort, and, if conducted piecemeal, the end result will be negligible.

For better or for worse, networked technology is systemic: It involves everyone in the school and every aspect of schooling. It forces the issue of full-school functioning in ways that few other school issues have the power to do. Whether this creates dangers or benefits for the school depends upon educators' abilities to use the introduction of technology as an opportunity to learn to manage change.

[1] Research data were gathered on-site during multiple extensive fieldwork visits over the three years of the project. Data gathered included hundreds of individual and focus group interviews with teachers, students, administrators, parents, and community leaders, observations of classroom practice and school activities, as well as documentation of numerous HMSP-sponsored events. In addition, we have developed an extensive database of the still photographs collected over multiple visits, as well as examples of changing student products. Off-site data collection included daily electronic logs from the educational technologist and communications specialist, student and parent surveys, student drawing inventories, and other artifacts. Using standard qualitative research procedures, data analysis has been conducted simultaneously with data-gathering procedures. We have used NUD.IST software for the organization and management of our database and as a tool in the analysis of the materials.

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