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Technology Integration into Teacher Preparation: Part 1—Current Practice and Therotical Grounding for Pedagogical Renewal

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ABSTRACT

The authors conducted three distinct but interrelated studies regarding the integration of technology into teacher education and report from these studies in a two part set of articles where they discuss the theoretical grounding and the practical application of technology integration into teacher preparation. Part 1, presented here, reports from the first and second study. The first study, addressed in the section subtitled "Practice," discusses shortcomings of existing teacher preparation practice, describing three critical elements that contribute to the comprehensive preparation of technology-proficient future teachers. The second study, discussed at "Theory," describes and analyzes one model for drawing these three components coherently together in a teacher preparation program. In the forthcoming Part 2 of this series, the authors report on a research project that applied this model at a university in the United States.

KEYWORDS: technology integration, teacher preparation, pedagogical renewal

Öğretmen Eğitiminde Bilgi ve İletişim Teknolojileri Entegrasyonu: Bölüm 1—Mevcut Uygulamalar ve Pedagoji Değişimi İçin Model Önerisi

ÖZET

Bu çalışma kapsamında, Bilgi ve İletişim Teknolojileri (BİT)'nin öğretmen eğitimine entegrasyonu konusunda birbirleri ile baglantılı üç ayrı araştırma yapılmıştır. İki ayrı seri halinde sunulan bu çalışmalarla ilintili olarak, öğretmen eğitiminde BİT entegrasyonu konusuna yönelik görüş ve öneriler yer almaktadır. Burada sunulan birinci bölüm ilk iki araştırmayı kapsamaktadır. "Mevcut Uygulamalar" başlığı ile sunulan ilk çalışmada, öğretmen yetiştirme programlarında teknoloji entegrasyonu konusundaki mevcut eksiklikler ortaya konulmuş teknoloji becerileriyle donanmış yeni nesil öğretmenlerin yetiştirilmesinde kritik önemi olan üç faktör tartışılmıştır. "Teori" başlığı ile sunulan ikinci çalışmada, bu üç önemli faktörün öğretmen eğitimine nasıl entegre edilebileceğine ilişkin bir model önerisi sunulmuştur. Bu serinin ikinci bölümünde "Model Uygulaması"

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başlığını taşıyan üçüncü araştırmada, ilgili model önerisinin Amerika'daki bir üniversitede uygulanmasıyla elde edilen sonuçlar sunulmuştur.

ANAHTAR KELİMELER: bilgi ve iletişim teknolojileri entegrasyonu, öğretmen eğitimi, pedagoji değişimi

In order to live, learn, and work successfully in an increasingly complex and information rich society, students need to use information and communication technologies effectively. Even though schools must enable students to "become information literate and skilled in using computer-based tools" (Rakes, 1996, p. 52), Collis (1996) contends that the teacher builds "the eventual success or lack of success of any computers-in-education initiative" (p. 22). Luke, Moore, and Sawyer (1998) describes that teachers are key to putting information technology in the hands of students by integrating it into the teaching and learning process. They also point out that by using technology as a natural and necessary part of classroom practice, teachers can give students the knowledge and experiences they need; therefore, for students to be better prepared to "learn with" technology, teachers need to be better prepared to "teach with" technology.

Helping future teachers to perceive technology as meaningful, authentic, and necessary for their work is a goal of many teacher education programs. However, in the last decade, one of the greatest challenges in teacher education has been to effectively integrate information technology into teacher preparation programs (Barron & Goldman, 1994). As a response to this challenge, the authors conducted three different but interrelated studies and report from these studies in a two part set of articles where they discuss the theoretical grounding and the practical application of technology integration into teacher preparation. Part 1, presented here, reports from the first and second study. The first study, presented in the following section subtitled "Practice," addresses shortcomings of existing teacher preparation programs, describing three critical elements that contribute to the comprehensive preparation of technology-proficient future teachers. The second study, discussed at "Theory," describes and analyzes one model for drawing these three components coherently together in a teacher preparation program. In the forthcoming Part 2 of this series, the authors report on a research project that applied this model at a major research university in the United States.

THE FIRST STUDY: PRACTICE

INTRODUCTION

By the late 1990's, most teacher preparation institutions in the United States offered at least one educational technology course as a core component of their teacher preparation programs (Leh, 1998). Such courses had been identified earlier as playing a critical role in introducing pre-service teachers to fundamental technology concepts and skills (e.g., Kim & Peterson, 1992). Several studies conducted in mid and late 1990's, however, concluded that a stand-alone technology course was not sufficiently preparing new teachers in the

effective use of technology in their teaching practice (Hunt, 1994; Moursund & Bielefeldt, 1999; Wetzel, 1993). Surveys administered by the National Center for Education Statistics (NCES) in 1999 confirmed that a lack of preparation in classroom technology characterizes the preparation of most teachers in the U.S.

Addressing the shortcomings of the stand-alone technology courses, various studies in mid and late 1990's highlighted the importance of additional technology use and faculty modeling in non-technology courses such as methods and content courses (Barker, Helm, & Taylor, 1995; O'Bannon, Matthew, & Thomas 1998, Wetzel, 1993) and meaningful integration of advanced technology tools into the pre-service teacher's field (clinical) experiences (Wetzel & McLean, 1997). Three key elements including core course work, effective faculty modeling of instructional technology, and technology-enriched field experiences emerged as the critical components in the preparation of technology-proficient future teachers (Instructional Technology Resource Center [ITRC], 1998; Moursund and Bielefeldt, 1999; National Council for Accreditation of Teacher Education [NCATE], 1997).

To examine these three critical components of technology integration in teacher preparation, the first study was initiated to investigate the perceptions of pre-service elementary teachers regarding the extent to which their institutions provide the experiences needed for them to use technology effectively in their future profession. Specific research questions probed perceptions of pre-service teachers about the extent to which (a) educational computing courses, (b) education faculty, and (c) field experiences provided the experiences needed for them to use technology in the classroom.

METHODOLOGY

Research Design

The study was an exploratory study applying "focus group" approach as its research method. Morgan and Krueger (1998) explain that the focus group is a qualitative research method that "uses guided group discussions to generate a rich understanding of participants' experiences and beliefs" (p. 11). Relaying on the strengths of qualitative methods, including exploration and discovery, understanding things in depth and in context, and interpreting why things are the way they are and how they got that way, focus group approach was particularly desirable to collect data in order to appropriately answer the research questions investigated in this study.

Research Context

The study took place in a College of Education (COE) at a major Midwest university in the United States. The College has a long history of service to the public and profession offering teacher training programs in Elementary Education, Secondary Education, Early Childhood Education, Middle Childhood Education, and Special Education. The College has over 70 full-time faculty

members, serving more than 2000 students and placing approximately 600 pre-service teachers in student teaching each year.

During the time of this study, pre-service teachers at the COE were provided access to state-of-the-art computer labs, software, and educational materials and information technology resources. All faculty and staff were also provided a personal computer with necessary software and Internet access as well as a printer in their offices. Faculty had limited access to information technology in their classrooms but were supported through a Curriculum and Technology Center that loaned equipment for classroom use. One might consider that the College with its faculty, staff, and resources, is a "typical" teacher preparation college that provides service to its pre-service cadre.

Participants

During the academic year that this study was conducted, 1,110 students with an elementary education major were enrolled at the College investigated, with 114 of them in student teaching positions at 27 different elementary schools. The study included a total of 18 elementary level student teachers within three focus groups during fall, winter, and spring terms.

A "maximum variation sampling" method was used to select the study participants with a range of technology experiences. According to Schumacher and McMillan (1993), maximum variation sampling is a strategy for inclusion within a case that seeks to represent a range of differences of perceptions about a topic among "information-rich" potential participants.

The lead researcher (and leading author of this study) developed a technology survey to identify study participants. The survey was administered to all 114 potential participants in the fall, winter, and spring terms. To determine the respondents' level of information technology experience, descriptive statistics were used to study the data acquired through the survey in each group. The level of information technology experience was categorized into five groups; (a) those very well acquainted with technology, (b) those well acquainted, (c) those with some experience, (d) those with very little experience, and (e) those with no experience. Two potential participants in each category were randomly selected and invited to the respective focus group interview. Among them, five from Group 1, seven from Group 2, and six from Group 3 decided to participate in the focus group interviews. All groups included at least one participant in each identified category. Study participants were student teachers in grades K-6 at 10 different elementary schools.

Instrumentation

The aforementioned survey instrument was developed based on the International Society for Technology in Education (ISTE) Recommended Foundations in Technology for All Teachers (ISTE, 1996). An 18-item draft instrument was

developed first and then presented to a number of educational technology faculty for review, comments, and recommendations. The instrument was revised based on the committee's recommendation and reduced to 17 items. Then, the survey instrument was piloted with 27 student teachers in elementary education. The pilot study indicated a .91 reliability coefficient (Cornbach α) for 17 items.

The lead researcher used "questioning route" approach (Morgan and Krueger, 1998) to develop the questions for focus group discussions. According to Morgan and Krueger, the questioning route is a sequence of questions in complete and conversational sentences, which is often preferred in public, nonprofit, and academic environment. The researcher developed the first draft of 11 item questions. Then, he shared and revised the questions with his colleagues for review and feedback. Finally, the questions were piloted with six pre-service elementary teachers. Based on the piloting, the questions were revised and finalized.

Data Collection

Quantitative data was collected through the technology survey in order to identify potential participants for focus group interviews. Qualitative data was collected from focus group interviews and document analysis (e.g., course syllabi) to investigate research questions. All focus group interviews were videotaped. Multiple educational technology course syllabi from different instructors were also collected.

Data Analysis

Descriptive statistics were used to analyze the technology survey data to identify potential study participants with a range of technology experiences. Educational technology course syllabi were analyzed to understand the course content and the way that the course thought. "Focus group analysis" (Morgan and Krueger, 1998), which uses many qualitative analysis strategies and approaches was conducted on the qualitative data collected through the focus group interviews. The lead researcher participated in the focus group interviews as an assistant moderator. Immediately after each group, the researcher met with the moderator to debrief to capture participants' thoughts for each question. After debriefing process, they identified the major themes and most notable points in each group. A well-trained professional typed and abbreviated transcripts as soon as possible after each focus group interview. Each time, the lead researcher reviewed the videotapes and verified that the transcripts were correct. The researcher reviewed each transcript before conducting the next group. After completing the series of transcripts, the researcher started to analyze systematically across groups. The researcher analyzed the data questions by questions, looking for themes within questions and across questions.

RESULTS

Coursework in Educational Technology

Like all elementary education majors at this institution, the participants were required to take an educational technology course in their program. As one course syllabus stated, “the course [was] designed to provide students with knowledge and experience regarding the use of information technology to enhance teaching and learning.” During focus group interviews, most participants stated that the course introduced them to "basic" technology skills such as word processing, spreadsheets, databases, presentation software, and communication. However, a prevalent feeling among the participants was that a single required technology course did not adequately enable them to use technology in their future practice.

The need for instructional support addressing the implementation of technology in the teaching and learning process was an underlying theme across focus groups. One participant offered the following reflection on her experience:

> It [educational technology course] only covered word processing, spreadsheets, databases...We viewed some [educational] software which I think was a little bit beneficial just to kind of know what was out there...We did a little bit of Hyper Studio, too. But in terms of integrating it into the classroom, it didn't teach me how to do that by any means...View the software, create a program, but not how do you implement it at all. I didn't learn any of that.

"My class was the same," said another participant, when she described her experience in the educational technology course:

> This class kind of got me into it a little more. It was good practice on a computer. The things that teachers can use like Internet functions or electronic mail, spreadsheet, database, we just went through that...Well, like it didn't say if there is one computer in your class how do you teach all the students...That is the thing we need to know.

One of the main concerns about the technology course that participants frequently raised was the lack of any mention of actual classroom management skills within a technology-enriched environment. One participant raised her voice about this issue:

> To me, I am still searching how to use, how to integrate...I would like to know strategies for using three computers in a

> class of 25. Or like basic troubleshooting stuff. Like if this little problem occurs here what are the things that you can do.

Participants were also mainly concerned about the design of the course in their college curriculum. Several participants criticized having only one educational technology course in their entire program. Most participants agreed that there were two different foci in the course and one course was not sufficient to try to do "all things in one." They strongly felt that there should be two separate classes: one where they could learn "about the technology" and one where they could learn "teaching with technology." Some other participants suggested a different approach to deal with this issue. They strongly expressed their feeling about integrating technology into their entire program, explaining that technology instruction should be integrated into other courses and activities rather than being limited to a single course.

The discussion, in sum, clearly indicated that even though the educational technology course introduced participants to basic technology skills, one required course was problematic in addressing the task of actual classroom management skills within a technology-enriched environment and implementing technology in the teaching and learning process.

Opportunities for Observing Technology-Proficient Faculty

All participants had taken their methods and content courses at least one academic term prior to participation in the focus groups. Most participants agreed that their experience with and exposure to technology in the teaching and learning process had been somewhat random in their methods and content courses, and the need to observe technology-proficient faculty in their methods and content courses was a common theme. One participant, for example, explained that her exposure to technology was limited to the technology course that she took.

> The only class where I learned about computers was the technology course. My methods and content courses…they didn't integrate computers at all. It would have been very helpful if they would have.

Several participants agreed that they were encouraged to use technology in their courses; however, they were not really taught "how to go about doing it." One participant explained the feeling of many others when she reflected on her experience:

> Everyone is encouraging you to [use technology in the classroom.] However, nobody is telling you how to go about doing it. It's like you are encouraged but you are not really taught what you really need to do…you are encouraged but not really given the tools that

> you need to do it. In a couple of my classes I got a list of some good Web sites that I could use, that's all. But my planner that I bought at Office Max had educational Web sites in it too!

Those few students who had different experiences concerning their technology exposure in methods and content courses explained that when the use of technology is modeled in their courses, they received the benefits of enhanced instruction as well as examples of the use of technology in an instructional setting in specific disciplines. One participant described her experience:

> We used technology in my art class. We found all the information through the Internet and the library. She [the instructor] took us to a class ahead of time to learn how to research, how to e-mail all this kind of thing, which was helpful. Then we taught the class….We used our lessons that we created. We found the artist and the museum and made a lesson and then we presented it to the class.

One participant explained similar technology exposure in her mathematics methods class. The course instructor introduced them to productivity software usage in math. She explained her experience:

> I want to say our math methods class—there was only one day in the lab, or maybe it was 2—but the things he showed us just on spreadsheets and having the kids go in and bring in graphs, I mean it was wonderful. We only had the two days in the lab. If we had more time that would have been wonderful. The things he showed us were great. Like he showed us how to find pi and the things you can do with math.

One participant's experience clearly indicated that the education faculty's use of and attitudes towards technology in their courses strongly influenced the implementation of the technology by pre-service teachers. He described his experiences as follows:

> One of the things that I have done in the classroom teaching [during student teaching] was using the geometry sketch program. But I didn't learn that at all in the computer class. I learned that in my EDEL 330 class [Teaching Mathematics K-3] for my math major. That helped a lot. So I had that and used that a lot in the math [during my student teaching].

In summary, the discussion clearly indicated that pre-service teachers feel that teacher education faculty need to serve as role models. Their uses of and attitudes towards technology influence the implementation of the technology by pre-service teachers. However, most participants agreed that they had few

opportunities to observe appropriate models of technology usage in the classrooms throughout their methods and content courses.

Opportunities for Technology-Enriched Field Experiences

All participants were student teaching during the conduct of focus group interviews. Most participants agreed that they found themselves in technology-equipped classrooms/schools during their student teaching but felt strongly that they viewed only scattered examples of technology use by their K-12 cooperating teachers. The need to observe teachers who routinely use technology in the field was commonly raised, with most participants agreeing that they had few opportunities to observe appropriate models of technology usage in the classrooms where they participated as student teachers.

A prevalent feeling among participants was that in the classroom computers were extensively used during "free time as a reward." One participant put it best as she reflected on her experience:

> Kids get 10-15 minutes on the computer in the corner…and they play some type of games. They are done. It's the next person. So…I have never seen computers incorporated into the curriculum in any way. It's just go do on your time, okay your time's up and you are off.

Another participant mentioned that they had two computers in their classroom; however, her cooperating teacher was not comfortable using them. She said,

> I am just kind of laughing because we have two computers in my classroom and I definitely know that my teacher is not comfortable with them because she is always [asking] "Can you type up this rubric for me? You seem to be better at it than I am."…The kids play games…I have seen them type up a paper once in a great while.

Only few participants expressed positive feelings about what they have observed during their field experiences. One participant, for example, described her experience in terms that were different from most of her peers:

> Actually each neighboring classroom is joined by a little computer lab in my school. And then each teacher has one [computer]. There is no designated computer time but she [teacher] does use the computers to supplement her lesson…[For example, she says] "We are going to be graphing today and we are going to do it with your group; when you are finished you can enter it into the computer…or we are going to write poems today and you can make the word problems on the computer to process it." So maybe not as much as she should use the computers but she does.

In summary, participants highlighted that during their student teaching, they found themselves in technology-enriched classrooms/schools. However, they had few opportunities to observe appropriate models of technology use in the classrooms where they participated as student teachers.

The overall study findings indicated that only one course in the undergraduate teacher preparation curriculum had educational technology as its primary focus, and pre-service teachers experienced somewhat random exposure to information technology in their methods and content courses. This trend continued in field experiences, which provided scattered opportunities to observe technology use by K-12 mentor teachers.

DISCUSSION

The pre-service elementary teachers involved in this study did not feel that their teacher preparation program fully provided the kinds of experiences needed for them to use technology effectively in their future practice. Most participants clearly indicated that they knew little about integrating technology into the teaching and learning process or about managing classroom learning activities within a technology-enriched environment. Participants' teacher preparation experiences were characterized by limited modeling of effective technology usage by either university faculty or mentoring K-12 teachers. The stand-alone course work focused on educational technology was insufficient especially in the light of these shortcomings. Larger scale studies (e.g., ITRC, 1998; Moursund & Bielefeldt, 1999) demonstrated that the pattern that the present case study depicted was typical of teacher preparation programs across the United States during late 1990's.

One finding that has been common to other studies is that the first systematic attempt at preparing pre-service teachers in technology usage is an educational technology course (Leh, 1998; Moursund & Bielefeldt, 1999; Strudler, 1991). Even though educational technology courses play critical roles in introducing pre-service teachers to fundamental technology concepts and skills, a stand-alone technology course is not considered a sufficient way to prepare new teachers to use technology effectively in the classroom. Yet the literature does not support the idea that additional technology-specific coursework will greatly improve the aspect of technology integration in instruction. Specific technology training has a role, but only up to a point (Moursund & Bielefeldt, 1999).

Educational reformers have long noted that teachers teach as they are taught (Baron & Goldman, 1994). If we want to encourage the effective use of technology in the teaching and learning process, it makes sense that we want faculty to model this activity for students at all levels in all contexts. The findings of this study suggest that most education faculty do not model technology usage in their classrooms. Nothing is found in the literature to refute

this statement (Moursund & Bielefeldt 1999; Persichitte et al. 1997; Wetzel, 1993; Willis & Mehlinger 1996).

The situation in college classrooms to some extent mirrors the situation in K-12 classrooms. There is apparently more opportunity to be in technology-equipped K-12 classrooms than there is to actually apply information technology skills in those classrooms or to work under information technology-proficient supervision.

IMPLICATIONS / CONCLUSIONS

In reviewing the situation described above, one might argue that teacher preparation institutions treat "technology" as a special addition to the teacher education curriculum—requiring specially prepared faculty and specially equipped classrooms—not as a topic that needs to be incorporated across the entire teacher preparation program (NCATE, 1997). The study reported here reflected a pressing need to develop models to integrate information technology into teacher preparation curriculum in ways that would address each of the critical components of technology integration—core course work, effective faculty modeling of instructional technology, and technology-enriched field experience.

THE SECOND STUDY: THEORY

The U.S. Department of Education responded to the need described by the first study above by launching a major project called Preparing Tomorrow's Teachers to Use Technology (PT3). By 2005, the sixth year of the initiative, PT3 enabled numerous schools and colleges of educations in the U.S. to develop models and examine their impact on technology training for future teachers.

In the early years of the PT3 initiative, a variety of new models proposed for technology integration focused on addressing each of the critical components of technology integration individually such as strategies for effective faculty modeling of instructional technology (Mehlinger & Powers, 2002; Eifler, Greene, & Carroll, 2001) or providing technology-enriched field experiences (Snider, 2002; Brush, Glazewski, & Rutowski, 2003). Models for drawing all of the three components simultaneously and coherently together, however, remained in short supply. In response to this dearth of overarching models, the authors conducted a conceptual study aimed at developing a comprehensive model. The following section provides an overview of the model that emerged as informed by theoretical perspective.

CENTER OF PEDAGOGY

In the United States, various parties involved in teacher preparation; postsecondary schools of education are one of them. Commonly, these teacher

education units maintain tight links with K-12 schools in their regions to serve as sites within which future teachers pursue coordinated clinical experiences. In addition, colleges of arts and sciences have vital roles, since, within these units in particular, future teachers shape their expertise in various fields of emphasis. The task of integrating the three key elements of core educational technology coursework, faculty modeling, and clinical experience thus warrants the cooperative engagement of all of these entities.

John Goodlad (1994), in discussing what he calls the “center of pedagogy,” has provided a basis for pursuing this type of cooperative engagement by bringing together “simultaneously and integratively the commonly scattered pieces of the teacher education enterprise and embed[ing] them in reflective attention to the art and science of teaching" (p. 10). As Figure 1 illustrates, Goodlad’s contention is that effective interaction regarding teaching improvement calls for engagement among the three entities—schools of education, school districts, and colleges of arts and sciences—stressing that each is an essential and equal player in a healthy teacher preparation “ecosystem” (p. 9). In sum, the "centers of pedagogy" idea constitutes a means of addressing the shortcomings of the status quo in teacher education, comprised, as it typically is, of an "undergraduate curriculum of general and special studies interspersed with essentially required courses in education and student teaching" (p. 10).

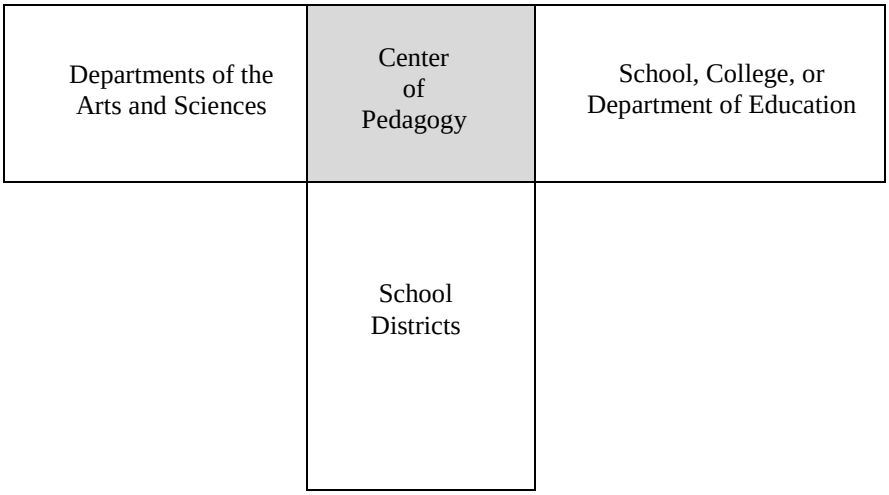

Figure 1. Goodlad's (1994) depiction of the "Major Collaborators in a Center of Pedagogy."

NETWORKED LEARNING COMMUNITY

As illustrated in Figure 2, Goodlad’s center of pedagogy idea lends itself to adaptation in smaller scale via the creation of a “networked learning community”

(NLC) among K-16 educators.

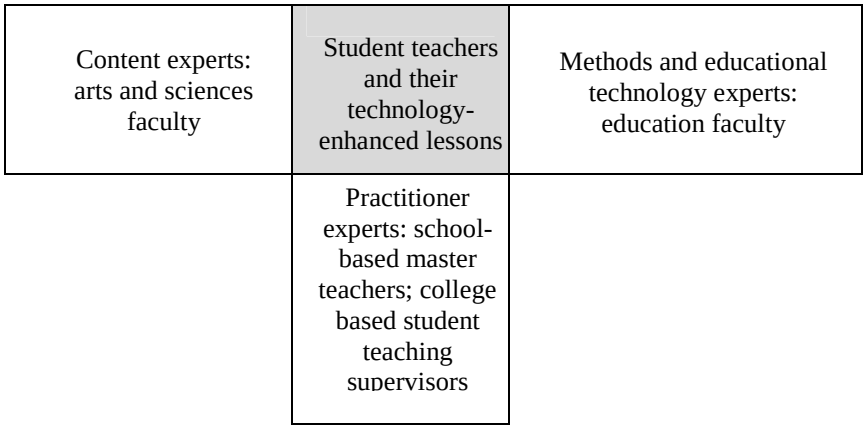

Figure 2. The "Networked Learning Community" (NLC): a structure for collaboration on technology integration, adapted from Goodlad (1994).

The rationale for learning communities is mostly associated with Wegner's (1998) social learning theory that calls for communities of practice in which participants mutually engage in the task at hand, focuses on joint enterprise, and develops shared ways of working. With respect to teachers, the notion, according to Parr and Ward (2006) is to provide an ongoing, sustainable vehicle for teacher learning. Parr and Ward further describe learning communities as having distinctive features that include shared norms and values, collective learning through collaboration, the application of that learning in a focus on student learning, shared personal practice, and reflective dialogue. And Parr and Ward argue in addition that strong professional learning communities are those focused on "joint work" involving not only acquiring new knowledge but also revisiting the basic assumptions about teaching and learning to improve practice and, as a consequence, student learning.

The increasingly popular online learning environment in which we currently live and work has generated considerable interest in "networked learning communities" where technical infrastructure and networked learning technologies such as the Internet are utilized to support and complement learning communities for the creation and transfer of knowledge within and between individuals and groups as a means for continuous, systematic improvement of practice. As Kerr et al (2003) describe, central to networking is the notion of increasing communication channels that provide opportunity for interaction at different levels. Such communication leads to a range of benefits, such as:

- opportunities for participants to share their knowledge and expertise,
- vehicles for participants to discuss, plan, reflect on and explore professional issues,
- avenues for increased inspiration, innovation and motivation among

participants,
- possibilities for increased social contact between individuals from differing backgrounds,
- access to empowerment and professional development,
- potential reductions in feelings of isolation (both geographically and emotionally), and
- gains in access to shared resources.

As the Figure 2 suggests, in this particular case, the NLC calls for the engagement of participants of four types: (a) the student teachers themselves; (b) content area faculty of the arts and sciences, specializing in the student teachers' major fields of study; (c) education faculty specializing in educational technology and methods; and (d) practitioner experts comprised of the student teachers' school-based mentoring teacher and their university-based field supervisors. This diversity of groups engaged in the focal activity of the NLC model seeks to enable the development of shared meaning, which Fullan (2001) has identified as key in reaching outcomes related to educational change.

The work of student teachers lies at the heart of the NLC model, and this attention to the student teacher's clinical experience has marked strengths. Foremost among these, it facilitates engagement, interaction, and collaboration, on the pre-service teachers' behalf, and it undoes the kind of detachment between the postsecondary and the K-12 educational worlds that has tended to characterize the clinical experience.

The typical student teacher's clinical experience has tended to foster—and at a most critical juncture in the pre-service teacher's preparation—distance rather than engagement between pre-service teachers and their college and university-based faculty members. Having concluded most or all of their course work, student teachers are regularly "released" by their academic instructors into the hands of their hosting teachers. Just as regularly, a supervising teacher that the student teacher's college or university appoints has an important role in supporting the pre-service teacher and, to varying degrees, to help synthesize the student teacher's experiences with content and pedagogical knowledge already learned. Yet, like the student teachers themselves, these supervisors too rarely have sustained contact during the clinical experience with members of the faculty mainstream.

This structured separation has negative consequences of at least two sorts. First, the pre-service teacher is unable to benefit from meaningful continuing contact with content and pedagogical expertise. Second and perhaps even more limiting, the faculty members themselves are unable under most prevailing models to reconnect with the K-12 world in ways that might inform and rejuvenate their own instruction. Smith and Kaltenbaugh (1996) noted the desirability of establishing the meaningful input of "academicians, master teachers, and master practitioners" to overcome the tendency for each of these vital participants in teacher education to stand as an "autonomous unit" (p. 96). Venues that foster

genuine dialogue between and among pre-service teachers and members of these three groups are necessary elements of programs aimed at spurring structural change, and the NLC model provides a basis for pursuing this kind of cooperative engagement.

While the NLC adaptation of Goodlad's model has strength in theory such as those noted above, its application required testing. In Part 2 of this article series, the authors report on a research project that applied this model at a major Mid-Western research university in the United States.

Acknowledgment

The first study reported in this article (discussed in the section subtitled "Practice") is from a dissertation study conducted by the first author. The research for the second study (discussed in the sections subtitled "Theory") is based on a project being funded by the U.S. Department of Education through Preparing Tomorrow's Teachers to use Technology (PT3) Grant. An earlier version of the discussions presented in the "Theory" section appeared in some of the previous presentations and publications of the authors.

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GENİŞLETİLMİŞ ÖZET

Öğretmen eğitiminde bilgi ve iletişim teknolojileri (BİT) entegrasyonu konusunun incelendiği bu çalışmada, birbiriyle bağlantılı üç araştırmaya yer verilmiştir. İki ayrı seri halinde sunulan bu çalışmalara dayalı olarak öğretmen eğitiminde BİT entegrasyonuna yönelikgörüş ve öneriler geliştirilmiştir. Burada sunulan birinci bölüm ilk iki araştırmayı içermektedir.

"Mevcut Uygulamalar" başlığı ile sunulan ilk çalışmada, öğretmen yetiştirme programlarında BİT entegrasyonu konusundaki mevcut eksiklikler tartışılmaktadır. Çalışmada, teknoloji becerileri ile donanmış yeni nesil öğretmenlerin yetiştirilmesinde kritik öneme sahip üç faktöre dikkat çekilmektedir. Bunlar:—(a) zorunlu eğitim teknolojileri dersi, (b) eğitim teknolojilerinin alan ve yöntem derslerinde kullanımı ve modellenmesi, (c) benzeri kullanım ve modellemenin öğretmenlik uygulamalarındaki sınıf ortamlarında devam etmesidir.

Bu üç faktörün Amerika Birleşik Devletleri'ndeki öğretmen yetiştirme programlarına ne düzeyde entegre edildiğini araştırmak üzere örnek olarak bir eğitim fakültesi seçilmiş ve ilköğretim öğretmen adaylarının bu konuya ilişkin algıları araştırılmıştır. Bu ilk araştırmada aşağıdaki sorulara cevap aranmıştır:

1. Zorunlu eğitim teknolojileri dersi ne düzeyde öğretmen adaylarının eğitim teknolojilerini etkin bir şekilde kullanabilmelerine yönelik gereksinimlerine cevap vermektedir?
2. Eğitim teknolojileri alan bilgisi ve yöntem derslerinde ne düzeyde kullanılmakta ve modellenmektedir?
3. Eğitim teknolojileri öğretmenlik uygulamalarındaki sınıf ortamlarında ne düzeyde kullanılmakta ve modellenmektedir?

Yukarıdaki soruları cevaplayabilmek için verilerin toplanması ve çözümlenmesinde nitel araştırma yaklaşımlarından yararlanılmıştır. Öğretmenlik uygulamalarına devam eden 18 ilköğretim öğretmen adayı ile üç ayrı gurup halinde kış ve bahar dönemlerinde odak gurup görüşmesi gerçekleştirilmiştir. Farklı düzeylerde teknoloji becerilerine sahip bu adaylar, araştırmanın yapıldığı yıl içerisinde öğretmenlik uygulamalarına hak kazanan 114 öğrenci arasından maksimum çeşitlilik örneklemesi [maximum variation sampling] yöntemi ile seçilmiştir. Odak gurup görüşmelerinden elde edilen verilerin yanı sıra eğitim teknolojileri derslerine ait belge analizleri de yapılmıştır. Elde edilen nitel veriler araştırma soruları doğrultusunda çözümlenmiş ve aşağıdaki sonuçlara ulaşılmıştır:

1. Zorunlu eğitim teknolojileri dersi öğretmen adaylarının eğitim teknolojileri ile ilgili temel bilgi ve becerileri kazanmalarında yararlı olmuşsa da; bu becerilerin ders ortamlarında etkin bir şekilde nasıl kullanılacağı konusunda yeterli olmamıştır.
2. Araştırmaya katılan öğretmen adaylarının çoğunluğu, alan ve yöntem derslerinde eğitim teknolojilerinin düzenli ve yeterli düzeyde kullanılmadığını ve eğitim teknolojilerini ileride meslek hayatlarında kullanmaları gerektiği konusunda bu dersleri veren öğretim üyelerinin kendilerini özendirdiklerini belirtmekle birlikte bunun nasıl yapılacağı konusunda kendilerine herhangi bir öğretim ortamı düzenlenmediğini bildirmişlerdir.
3. Yine araştırmaya katılan öğretmen adaylarının çoğunluğu öğretmenlik uygulamalarına katıldıkları sınıf ortamlarında eğitim teknolojilerinin düzenli ve

yeterli düzeyde kullanılmadığını ve hizmet içi rehber öğretmenlerin kendilerine yeterli modellemeler sunmadıklarını bildirmişlerdir.
Elde edilen bulgular doğrultusunda ilköğretim öğretmen adaylarının eğitim aldıkları öğretmen yetiştirme kurumlarında eğitim teknolojilerinin meslek yaşamında etkili bir şekilde nasıl kullanılacağı konusunda kendilerine yeterli bir eğitim verilmediğini algıladıkları sonucuna ulaşılmıştır.. Bu araştırmanın örnek olarak seçilen eğitim fakültesinden elde edilen sonuçlarının genelde Amerika Birleşik Devletleri'ndeki diğer öğretmen yetiştirme kurumlarında da gözlendiği araştırmayla eşgüdümlü yapılan diğer geniş çaplı çalışmalarda da ortaya çıkmıştır (bakınız, ITRC, 1998; Moursund & Bielefeldt, 1999). Bulgular; öğretmen adaylarının zorunlu eğitim teknolojileri dersinde eğitim teknolojileri ile ilgili temel becerileri kazanmakla birlikte alan ve yöntem dersleri ile öğretmenlik uygulamaları sırasındaki eksikliklerden dolayı eğitim teknolojilerinin öğretme ve öğrenme sürecinde etkin kullanımı konusunda kendilerini yetersiz olarak algıladıklarını göstermektedir.

"Teori" başlığı ile sunulan ikinci çalışmada,eğitim teknolojilerinin öğretmen eğitimine entegrasyonu konusunda bir model önerisi sunulmuştur. Yukarıdaki ilk çalışmada ortaya konulan eksikliklere cevap aramak amacıyla gerçekleştirilen bu teorik çalışmada teknoloji becerileri ile donanmış yeni nesil öğretmenler yetiştirilmede kritik öneme sahip üç faktörün öğretmen yetiştirme programlarına nasıl entegre edilebileceği tartışılmıştır.

John Goodlad'in 1994 yılında ortaya koyduğu "Pedagoji'nin Merkezi" [Center of Pedegogy] kavramı öğretmen eğitimindeki üç önemli unsuru ortaya koymaktadır. Goodlad'e (1994) göre öğretmen adaylarının pedegoji derslerini aldıkları eğitim fakültesi, alan derslerini aldıkları fen ve edebiyat fakültesi, ve öğretmenlik uygulamalarına katıldıkları hizmet içi okullar öğretmen eğitiminin temel birimleri olup bu üç kurumun birlikte ve ahenkli çalışmaları öğretmen eğitimi için hayati önem taşımaktadır. Goodlad öğretmen eğitiminde hâlihazırda bu üç kurumun birbirinden bağımsız olarak hareket ettiğini ve bunun da öğretmen eğitimini olumsuz yönde etkilediğini belirtmektedir. Ayrıca, sağlıklı bir öğretmen eğitimi için mevcut durumun değişmesi gerekliliğine dikkat çekmektedir.

Goodlad'in bu görüşünden hareketle yazarlar, "bağlantılı öğrenme topluluğu" [networked learning community (NLC)] olarak tanımladıkları bir model önerisi geliştirmiş ve bu modelin uygulanmasıyla ilk araştırmada ortaya konan ve teknoloji becerileri ile donanmış yeni nesil öğretmenlerin yetiştirilmesinde kritik öneme sahip üç faktörün öğretmen eğitiminde entegrasyonunun nasıl sağlanabileceğini tartışmışlardır. NLC modelinin temelinde Wegner'ın (1998) sosyal öğrenme teorisi, öğretmenlik uygulamaları dönemindeki öğretmen adayları ve bunların eğitim teknolojilerine ilişkin ders içi uygulamaları bulunmaktadır. Böyle pedagoji merkezî bir yapılanmada, NLC modeli öğretmen eğitimi ile ilgili dört ayrı gurubun birlikte çalışmasını öngörmektedir. Bunlar: (a) öğretmen adaylarının kendileri, (b) fen ve edebiyat fakültesinde alan derslerini

veren öğretim üyeleri, (c) eğitim fakültesinde yöntem ve eğitim teknolojileri derslerini veren öğretim üyeleri ve (d) öğretmenlik uygulamasına rehberlik eden hizmet içi sınıf öğretmenleri ve bu uygulamaları denetleyen gözetmenlerdir.

Bu serinin ikinci bölümünde "Model Uygulaması" başlığını taşıyan üçüncü çalışma, NLC model önerisinin Amerika'daki bir üniversitede uygulanmasıyla elde edilen sonuçlar sunulmaktadır.