



# ***Integrating Service-Learning into Technology Training in Teacher Preparation: A Study of an Educational Technology Course for Preservice Teachers***

Rick Voithofer

## **Abstract**

*Based on a partnership between a teacher preparation program and an urban school district, this study evaluates a project that used a service-learning model to connect preservice teachers to working teachers to help the working teachers integrate technology into their teaching while giving the preservice teachers an authentic context for their assignments. Using multiple data sources including questionnaires, class projects, interviews, and field notes, this study looked at the success of service-learning in technology instruction in terms of student satisfaction and student learning related to technology skills, technology integration strategies, and issues that teachers confront teaching diverse populations. The results of the study provide suggestions for the successful integration of service-learning for technology training in teacher education.*

Based on a partnership between a teacher preparation program at a large Midwest university and a local urban school district, this project employed a service-learning model to connect preservice teachers to working teachers to help the working teachers integrate technology into their practice while giving the preservice teachers an authentic context for their assignments. Reporting on this project, the following study was centered around two courses (a required educational technology course for preservice teachers that will be called PRECLASS and a technology integration course for working teachers that will be called INCLASS) that were taught at the same time and that presented similar content related to acquiring technology skills and developing technology integration knowledge. Participants in the study included 53 preservice teachers in early childhood education (K–3) and seven working teachers who taught in elementary and secondary contexts. The purpose of the study was to determine the success of service-learning in technology instruction in terms of student satisfaction and student learning related to technology skills, technology integration strategies, and issues that teachers confront while integrating technology into classrooms with diverse student populations.

## **Background**

The preservice teachers in this study were enrolled in an 18-month Masters in Education teacher education program. PRECLASS and INCLASS were taught in the same five-week summer session. INCLASS, which was sponsored by the local urban public school district, was offered in a library computer lab at an urban middle school and structured into two three-hour classes per week. During INCLASS, working teachers learned how to create Web pages, electronic presentations (Microsoft PowerPoint), and spreadsheets (Microsoft Excel). In addition, educational Web site evaluations, PowerPoint presentations, and lesson plans were created for them by the PRECLASS students in exchange for the working teachers sharing information about their district, school, students, and personal teaching philosophy while meeting at least twice in person with the students in PRECLASS.

PRECLASS is a required technology integration course that is divided into three hours of lecture and five hours of lab per week. Generally taken in the first quarter of study before the students have had any field experiences, PRECLASS provides students with basic technology skills in Web development, presentation software, and spreadsheet software while also teaching them how to evaluate educational Web sites and software for pedagogical appropriateness, use electronic communication including threaded electronic discussions, and create lesson plans that incorporate media and technology in teaching higher-order thinking skills such as problem solving. Students leave the course with the beginning of a Web-based teaching portfolio that they build upon as they continue their program. This portfolio ultimately forms the basis of their Masters in Education capstone project. Because PRECLASS students have little or no classroom experience, it is difficult for them to create course projects that are authentic. To provide more realistic contexts for student projects, PRECLASS students were matched with working teachers in the local urban school district and required to create their projects for the working teachers who were taking INCLASS.

Service-learning (Albert et al., 1998; Cooper, 1998) was selected as the model for this project because it is predicated on reflective learning (Eyler, Giles, & Schmiede, 1996) in real contexts through community service (Harkavey & Puckett, 1991). Familiarity with the community through local engagement provides one strategy for orienting new teachers—especially those who do not grow up in an urban environment—to teach in schools with diverse student populations. Scholars have shown that successful teachers of racially and ethnically diverse students are culturally competent and understand the communities in which their students live (Gay, 2000; Ladson-Billings, 1994, 1995; Murrell, 2001). The local urban school district was selected because it includes the schools with the fewest resources (e.g., hardware, software, and technology integration and support personnel) and the greatest need for technology integration training in the districts surrounding the university (Maybach, 1996).

Service-learning combines the acquisition of content knowledge with reflective real-world experiences by supporting partnerships that benefit both the community and the student. Freeman and Swick (2000) showed that students gain ownership of their learning and increased learning satisfaction when service-learning is connected to teacher education. By engaging in a reciprocal relationship with a community organization and filling unmet needs in the community, students see the relevance of an academic subject to the world.

There has been little research across the three areas of teacher preparation, technology training, and service-learning. Although most of the literature on the intersection of technology, education, and service has been in the areas of technology education and industrial education (Folkestad, Senior, & DeMirana, 2002; Freeman, Dyrenfurth, & Field, 2001; Michael, 2001), there was little systematic inquiry to offer guid-

**Table 1: Similarities between ISTE's NETS•T and Service-Learning Principles**

<b>NETS•T Standard</b>	<b>Service-Learning Principle</b>
<b>I. Teachers demonstrate a sound understanding of technology operations and concepts.</b>	<b>Teachers will demonstrate knowledge of service-learning including the rationale, definition, supporting research, barriers, and issues related to K–12 education.</b>
<b>II. Teachers plan and design effective learning environments and experiences supported by technology.</b>	<b>Teachers will demonstrate critical thinking and problem-solving skills in the development and implementation of service-learning projects.</b>
<b>III. Teachers implement curriculum plans that include methods and strategies for applying technology to maximize student learning.</b>	<b>Teachers will demonstrate knowledge of and skill in the use of service-learning pedagogy, including: inclusion of students in establishing and prioritizing community needs, determining resources, planning activities, developing lessons, and facilitating reflections and evaluating outcomes.</b>
<b>IV. Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies.</b>	<b>Teachers will demonstrate knowledge of and skill in the use of service-learning pedagogy [through self assessment, reflection, and evaluation strategies]'</b>
<b>V. Teachers use technology to enhance their productivity and professional practice.</b>	<b>Teachers will collaborate with others and support collaboration within the classroom/school/community.</b>
<b>VI. Teachers understand the social, ethical, legal, and human issues surrounding the use of technology in PK–12 schools and apply those principles in practice.</b>	<b>Teachers will demonstrate an ability to work with the diversity found in school and community. Teachers will view school as an integral part of the larger community, demonstrate their own sense of responsibility as citizens, and promote a sense of civic responsibility in their students.</b>

*\* This addition was made at the end of this term by the author to make it more consistent with NETS•T Standard IV.*

ance to this study. There exists, however, a more established literature surrounding service-learning and teacher preparation. This research illustrates how service learning can be utilized to teach preservice teachers about multicultural issues (Barton, 2000) and support the scholarship of students in a teacher preparation program (Buchanan, Baldwin, & Rudisill, 2002), both issues important to this project. The following discussion brings the literature of teacher preparation, service-learning, and technology integration training together.

Myers and Pickeral (1997) along with Ryan and Callahan (1999, 2002) have noted that service-learning is an instructional strategy that addresses many of the standards for beginning teachers (Interstate New Teacher Assessment and Support Consortium [INTASC], 1992). Table 1 extends the comparison that Ryan and Callahan (2002, pp. 129–130) make between basic service-learning principles and the INTASC teacher education standards to show how the International Society for Technology in Education's (ISTE) National Educational Technology Standards for Teachers (NETS•T) (ISTE, 2001) complement Service-Learning Principles for preservice teachers. ISTE's NETS•T Standard I and Service Learning Principle (SLP) #1 stress the importance of content knowledge for new teachers in each respective area. NETS•T II and SLP #2 both emphasize the ability of new teachers to plan and implement a curriculum or project. Sound pedagogical knowledge is the focus of NETS•T III and SLP #3. NETS•T IV and SLP #4 address the importance of effective assessment practices. NETS•T V and SLP #5 require teachers to collaborate with peers and community members to enhance their professional practice. Issues of equity and diversity are addressed in NETS•T VI and SLP #6.

To begin to sensitize PRECLASS students to the categories of the above mentioned standards, the first project required the students to interview their partnering teacher about the teacher's district, school, class, teaching style, assessment philosophy, professional development strategies, approach to teaching with technology, and technology integration needs. After the interview PRECLASS students were asked to write a profile of their partnering teacher that guided their subsequent projects. Because of the short duration of the courses and because the local public schools

were not in session, it was not possible for PRECLASS students to go to the surrounding schools and visit the teachers' classrooms—something that would generally take place in a traditional service-learning course. Instead, the teachers were asked to come to the university campus for two visits, once at the beginning of the course for students to interview the teachers and once at the end of the summer session to give PRECLASS students feedback on their projects. All other communication between the preservice teachers and working teachers occurred through e-mail. Because most of the teachers in INCLASS taught elementary school and because elementary education covers a variety of content areas, seven of the eight teachers who enrolled in INCLASS<sup>1</sup> were matched with groups of seven or eight of the 53 students taking the early childhood section of PRECLASS<sup>2</sup>.

## Research Questions

To determine student learning and satisfaction while using a service-learning model for technology integration training, the following questions guided the inquiry of this study:

1. What were the short- and long-term effects on student learning (in both PRECLASS and INCLASS) in terms of technical skills and reflective technology integration knowledge in culturally diverse classrooms?
2. What level of understanding did the students and teachers develop about the goals of service-learning?
3. How appropriate and useful were the projects that PRECLASS students created for the partnering teachers?
4. How could these courses be taught differently to improve student satisfaction and learning?

<sup>1</sup> Because of scheduling conflicts, one teacher did not participate in the collaboration with the working teachers.

<sup>2</sup> There are two sections of PRECLASS, one for early childhood preservice teachers and one for secondary English, Social Studies, and foreign language preservice teachers.

**Table 2: Participating teachers and self described technology proficiency**

Subject/Area	Self Described Computer Proficiency
Sixth Grade Teacher	Low to Medium
Second Grade Teacher	Low
Middle school librarian	Medium
Fourth grade special education teacher	Low to Medium
High school Spanish teacher	Medium
High school computer multimedia teacher	High
High school band teacher	Medium

## Methodology and Data Sources

To answer the research questions raised by this study, multiple data sources were collected, analyzed, and triangulated (Cohen & Manion, 1986). The analysis centered on determining the answers to the major areas raised by the questions, including student:

- technical skills
- technology integration knowledge
- service-learning understanding
- reflectivity around cultural diversity and technology integration
- course improvement information.

The data sources and methods of analysis included:

1. A questionnaire using a five-point Likert scale administered at the beginning of the quarter to 53 PRECLASS students that included questions about each student's comfort level with and knowledge of various computer programs, technology skills, and education topics, including word processing, spreadsheets, presentation software, Web development, and lesson plan development, among others. Mean scores were used to summarize the results of the questionnaire.
2. A course evaluation of PRECLASS conducted by the local service-learning initiative that included both a questionnaire and follow-up discussion with the class. The questionnaire included yes/no questions about student prior knowledge surrounding service learning and questions about each student's service-learning experience in PRECLASS. The discussion focused on encouraging students to elaborate on their answers to the questionnaire. A representative from the local service-learning initiative summarized the results of both the questionnaire and discussion.
3. Formal and informal interviews with students from both PRECLASS and INCLASS throughout the quarter. Questions in these interviews inquired about the progress of the class and how the service-learning partnership between the two courses was progressing.
4. Final reflection papers for PRECLASS. PRECLASS students were asked to write a paper that reflected on their service-learning experience in relation to developing technology integration skills and learning about the local urban school district.
5. Instructor field notes taken throughout the summer session. Field notes were taken after each lecture and each lab section and were used to record data when it was not possible to record the actual words of students (e.g., informal interviews, lab sessions).
6. Follow-up interviews with both INCLASS and PRECLASS students approximately eight months after the end of both courses. The interviews of nineteen PRECLASS students were conducted on the university campus and included students who responded to an e-mail request to be interviewed. The INCLASS interviews of all seven teachers were conducted over the phone. Both sets of interview were tape-recorded. Each interview was summarized around the themes mentioned at the beginning of this section and compared with one another.

**Table 3: Self-described computer proficiency of PRECLASS students**

Computer Proficiency	Knowledge (Mean)	Comfort (Mean)
Spread Sheets	2.28	2.18
PowerPoint™	2.13	2.17
Web Development	1.47	1.45
Basic Word Processing	4.05	4.07
Basic Web Browsing	3.74	4.23
Advanced Web Browsing (i.e., organizing bookmarks, installing plugins)	2.15	2.13
Basic E-mail	4.34	4.38
Advanced E-mail (i.e., creating mail filters, organizing mail in mailboxes)	2.67	2.7

**Notes: Knowledge / Comfort Scale: 1=Very Low 2=Low 3=Moderate 4=High 5=Very High**  
**N=53**

## Findings

### Computer Proficiency

Table 2 lists the areas taught by each teacher in INCLASS and their self-identified technology proficiency when the course began<sup>3</sup>. A formal questionnaire was not administered to the teachers because the small number in the course would not have produced representative means. Instead, each teacher was asked individually how she or he would characterize her or his computer proficiency while providing examples of the software with which they were comfortable. "Low" indicated basic computer skills, including word processing, simple Web browsing, and e-mail; "medium" included familiarity with programs such as PowerPoint and Excel and more advanced uses of e-mail (e.g., use of mailboxes to sort mail), Web browsing (e.g., organizing bookmarks), and word processing; "high" described advanced computer skills, including computer-based video production, writing JavaScript, and multimedia development.

A survey was conducted at the beginning of PRECLASS to assess the self-described computer proficiency of each student. Table 3 summarizes the results of some of the key factors related to this study.

Based on a comparison between the surveys, interviews, and field notes, the INCLASS and PRECLASS students had approximately the same level of computer proficiency and range of abilities. Both groups reported low to medium proficiency on average. In addition, at no point in the classes did members of either group indicate that the other group seemed to know dramatically more or less about computers. This similarity in skill level offered a common ground between the two groups and led to the teachers feeling more confident about their own skills in relation to the generally younger preservice teachers, while the preservice teachers saw the variety of skill levels that successful working teachers possess.

### Service-Learning Evaluation (PRECLASS)

A representative from the local service-learning initiative conducted an evaluation in PRECLASS toward the end of the course that consisted of an anonymous survey followed by open discussion about the topics assessed in the survey. During the discussion portion of the evaluation, approximately ten students (of the 49 present) expressed some confusion about the purpose of a service-learning course and wondered how

<sup>3</sup> This information was gleaned from instructor field notes taken during the first day of INCLASS.

**Table 4: Service-Learning Survey**

Question	Yes	No	NA
Are the learning objects of the course clear?	43 (87.8%)	4 (8.2%)	2 (4.1%)
Are the in-class instruction and the service clearly connected?	36 (73.5%)	11(22.4%)	2 (4.1%)
Are the methods of reflection on your service useful in helping learning courses content?	25 (50%)	14 (28%)	11 (22%)
Is the quality of discussion good (e.g., Do you have opportunities to voice your opinion and ask questions?) Are differences in opinion accepted or allowed?	33 (68.8%)	7 (14.6%)	8 (16.7%)
Are the assignment/homework appropriate?	45 (90%)	5 (10%)	0
Has the service contributed to your learning of particular concepts in the course?	37 (74%)	10 (20%)	3 (6%)
Are the goals of the service/activity/activities clear?	35 (71.4%)	11 (22.4%)	3 (6.1%)
Do you see a connection between this course and an identified community need?	27 (56.3%)	15 (31.3%)	6 (12.5%)
Do you receive useful orientation or training for your service?	22 (45.8%)	16 (33.3%)	20 (20.8%)

service-learning fit into PRECLASS. This number is consistent with the survey results summarized in Table 4, which indicates that more than 73% of the students felt that the in-class instruction was connected to the service and 74% believed that the service had contributed to their learning in the course.

### **End of Class Results—Working Teachers**

The teachers stated that they would be using some of the Web site and educational software evaluations, PowerPoint presentations, and lessons that PRECLASS students created for them. For these working teachers the projects addressed the problem of not having the time to create new materials that integrate technology. The most consistent feedback that the teachers offered was that some of the PRECLASS projects were not age- or ability-appropriate for their students.

Approximately half of the teachers indicated that they were not clear about their role in this partnership until well into the course. This observation along with the feedback from the PRECLASS students indicated that a more thorough orientation to service-learning was necessary for both populations.

### **End-of-Class Results—Preservice Teachers**

Based on discussions with the class at the end of the quarter, individual student interviews, and the students' final reflection papers, the responses to the service-learning aspect of the course were mixed in terms of student satisfaction. This was partially a result of the frustration that some of the preservice teachers felt about not being matched with teachers in their content areas and partially due to the confusion that some students expressed about the nature of a service-learning course. Those students who were matched with an elementary teacher and understood the concept of service-learning had a positive experience and learned extensively from the partnership. Some students felt that they didn't spend enough time with their partnering teachers and therefore did not have the opportunity to get sufficiently acquainted with them to create projects well suited to the teacher's students.

Positive responses included observations that the interactions with their partnering teacher provided insights into different types of scheduling (i.e., block scheduling, year-round schools), information about the technology resources in local schools, and ideas about creating an inclusive classroom that values diversity. Many students stated they acquired new knowledge about practical aspects of classroom management, including how to utilize technology resources. One student observed, "Incorporating her needs into my project assignments gave me the ability to realistically see technology in the classroom."

### **Eight-Month Follow-Up—Working Teachers**

All seven teachers were questioned about whether they used the projects that students created for them and about how they have utilized the skills they learned in INCLASS. One teachers was unable to use the projects created for her because she did not have access to computers in her classroom for that year, two other teachers found that the materials were not age-appropriate for their students, and one teacher did not have time to use the extra materials because of constraints created by a busy schedule and full curriculum.

Those teachers with lower computer skills felt more confident using computers after taking INCLASS and working with PRECLASS students and reported that they used computers more with their students. Some gained confidence when they realized that the generally younger PRECLASS students did not necessarily have greater computer skills than they had. One teacher did not specifically use the projects but drew the best ideas from the lesson plans created for her to write her own lesson. Based on the questions that the PRECLASS students had asked during the initial interview with their partnering teacher, one teacher made inquiries into her school's Internet acceptable-use policies and learned that the school had such a policy in place. When asked about her feedback for the course format, one teacher responded, "I loved it. I had never had that experience before. I thought that was really neat. When I was in college it would have been nice to have been doing a project that was actually going to be used by someone and not just for make-believe."

Another teacher found that sharing her teaching experiences with new teachers was the most rewarding part of the process because it validated the work that she does in her classroom. Four of the seven teachers were using the electronic presentations and Web sites that they created in INCLASS with their classes. A second-year teacher felt the most useful part of the collaboration was the feedback that he received from PRECLASS students who gave him suggestions about course organization, management, and ideas for communicating with parents. He characterized their discussions as collaborations between colleagues. He mentioned a successful open house that he organized that was suggested to him by PRECLASS students.

### **Eight-Month Follow-Up—Preservice Teachers**

Nineteen students from the initial 53 who took PRECLASS were interviewed toward the end of their teacher education program after they had begun their student teaching. Repeating the feedback offered at the end of the course, students noted the need for more time with the partnering teacher and the importance of being matched with a partnering teacher who taught in early childhood. Those students who created projects for earlier grades were able to use the projects they created for their partnering teacher for their student teaching.

The fact that all of the students interviewed did not maintain contact with their partnering teacher after the course may be attributed to insufficient time to establish a sustainable relationship during the two meetings and e-mail exchanges in the five-week course. A few of the students suggested having the service-learning experience continue across their program. One significant and consistent observation made by the preservice teachers who student taught in an urban school was that learning about the classroom diversity and computer resources within the school of their partnering teacher helped to prepare them for the students and technology they encountered while student teaching. They expressed that the service-learning experience helped them to see how the interrelationships between race, class, students' cultural affiliations, and school and community resources affected how and what they taught with technology.

## Discussion

The following sections discuss the benefits found while implementing service-learning in PRECLASS and provide a discussion of the lessons learned to improve this course in the future.

### Benefits

Service-learning exposed PRECLASS students to descriptions of authentic classroom, school, and community contexts that address some of the issues surrounding race, class, gender, and technology resources that exist in an urban school district. Because students asked their partnering teachers specific questions about classroom diversity, they were able to recognize how race, class, ethnicity, and gender affect the creation of successful technology-enhanced learning opportunities for students. The experience helped them to understand the technological and support resources of local schools. PRECLASS students learned information about a variety of pedagogical techniques (e.g., learning stations) that not only helped them to think about technology integration but also about other classroom issues relevant to their future roles as early childhood teachers. Because students created projects that were used in a real classroom, they were motivated to complete creative and engaging projects.

The partnership encouraged INCLASS teachers to reflect on their own use of educational technology, and the interactions with PRECLASS students often gave the teachers more confidence to use technology with their students. By allowing the inservice teachers to share their own experiences with preservice teachers, the working teachers were able to validate their experiences in the classroom as they reflected on their teaching practices. The working teachers came away from the service-learning experience not only with a self-authored Web site, an electronic presentation, and spreadsheet, but also PowerPoint presentations, Web site and educational software evaluations, and lesson plans that were created for them. The process of creating these projects and providing preservice teachers with guidelines for their projects offered the inservice teachers new ideas for integrating technologies into their classroom.

### Lessons Learned

To better facilitate the goals of service-learning (e.g., reflection and service connected to course content), the teachers and the students would have benefited from a more thorough introduction to service-learning. An orientation video with interviews from both working teachers and preservice teachers with examples of the two groups working together would be an effective tool to show what successful service-learning activities look like. The study showed the importance of reflection and the need for constant feedback from teachers and students to make adjustments in the flexible course structure necessary for a successful service-learning experience. Flexibility in course projects allows students to respond to the unique needs and circumstances of each individual teacher. For example, during the follow-up interview one teacher suggested the option of having teachers and students co-create projects together. Sharing reflections between

teachers and students (i.e., meta-communication about the collaboration process) would help address the general questions of each group and assist in establishing mutual trust.

In this particular partnership one of the primary lessons learned is the importance of closely matching the preservice teachers with working teachers who teach the level and context in which the preservice teachers eventually plan to work. This conclusion was consistent with other research on the integration of service-learning and teacher education (McKenna, 2000). An ideal scenario would partner PRECLASS students in the schools and classrooms in which they will do their student teaching. Facilitating ongoing communication between teachers and students after the course would provide increased continuity between the service-learning experience and the rest of the teacher education program. To better establish and sustain their partnerships, students and teachers would benefit from both taking the course during a normal ten-week quarter and also maintaining contact with their partnering teacher throughout the teacher preparation program of PRECLASS students. To address the mismatch that sometimes occurred between some PRECLASS projects and the students for whom they were created, the teachers could be asked to explicitly describe and show examples of what they feel is developmentally appropriate material for their students.

## Conclusions

This study presented an integrated model of technology preparation for preservice teachers and working teacher professional development using service-learning that is highly contextual to the needs and characteristics of the local community and schools. Preservice teachers learn what they can expect to encounter in the classroom while working teachers receive help in developing technology-based teaching materials and technical skills. Presented in this way, technology is seen as an integral part of teaching that is influenced by district, school, classroom, and student and teacher characteristics rather than as a separate add-on to the curriculum. This model of teacher education complements recent trends in teacher preparation and teacher professional development that stress the importance of community and school district involvement and input in teacher education and teacher professional development (Schoon & Sandoval, 2000; Quartz, 2003).

Because service-learning pays particular attention to issues of diversity and community needs, it is especially effective for preparing preservice teachers to work in urban schools where many new teachers are not raised in the settings in which they teach, contributing to the high teacher attrition rates in urban schools (Follo, Hoerr, & Vorheis-Sargent, 2002). Future research will benefit from studying different kinds of service-learning experiences (e.g., a service in which preservice teachers help students in a community center to develop computer skills) to enhance the abilities of new teachers to integrate technology in meaningful ways for their students. Other areas for further research include studying service-learning partnerships in which the preservice teachers spend time within the classrooms for which they are creating their projects, collaborations that lead to prolonged interactions between preservice teachers and K-12 students, and projects that maintain sustained and sustainable technology integration support for working teachers.

Although the paucity of research on the integration of service-learning experiences with the technology integration preparation of preservice teachers makes it difficult to predict the long-term effects of this combination, if the integration of service-learning and teacher technology preparation is consistent with the research on service-learning and teacher preparation then service-learning has the potential to meet numerous goals of teacher training. In particular, the strength of service-learning to develop culturally relevant and situated knowledge—acquired through academic rigor combined with authentic, reflective experiences—complements teacher preparation programs that strive to train new teachers who

have the ability to support the academic achievement of students with diverse abilities and backgrounds, in a variety of classroom settings, and with varied school resources.

## Acknowledgements

Funding and support for this study was provided by The Ohio State University Service-Learning Initiative through a Higher Education Grant from Learn and Serve America/Corporation for National and Community Service.

## References

- Albert, G., Chickering, A., Clark, M. A., Eyler, J., Ivel, H., Lazarus, F., et al. (1998). Foundations of experiential education. *NSEE Quarterly*, 23(3), 1, 18–22.
- Barton, A. C. (2000). Crafting multicultural science education with preservice teachers through service-learning. *Journal of Curriculum Studies*, 32(6), 797–820.
- Buchanan, A. M., Baldwin, S. C., & Rudisill, M. E. (2002). Service learning as scholarship in teacher education. *Educational Researcher*, 31(5), 28–34.
- Cohen, L., & Manion, L. (1986). *Research methods in education* (2nd ed.). Dover, NH: Croom Helm.
- Cooper, D. (1998). Reading, writing, and reflection. In R. Rhoads & J. Howard (Eds.), *Academic service-learning: A pedagogy of action and reflection* (pp. 47–56). San Francisco: Jossey-Bass.
- Eyler, J., Giles, Jr., D. E., & Schmiede, A. (1996). *A practitioner's guide to reflection in service-learning: Student voices and reflections*. Nashville, TN: Vanderbilt University.
- Follo, E., Hoerr, B., & Vorheis-Sargent, A. (2002). Where will urban high school teachers for the 21st century come from? *American Secondary Education*, 30(3), 2–22.
- Folkestad, J. E., Senior, B. A., DeMirana, M. A. (2002). The implications of service-learning for technology studies. *Journal of Technology Studies*, 28(1), 52–58.
- Freeman, N., & Swick, K. (2000). Serving and learning at a university laboratory school: Students from birth through adulthood benefit when service-learning is integrated into the preservice curriculum. *Journal of Early Childhood Teacher Education*, 21(1), 93–105.
- Freeman, S. A., Dyrenfurth, M. J., & Field, D. W. (2001). Using contextual learning to build cross-functional skills in industrial technology curricula. *Journal of Industrial Teacher Education*, 38(3), 62–75.
- Gay, G. (2000). *Culturally responsive teaching: Theory, research, & practice*. New York: Teachers College Press.
- Harkavey, I., & Puckett, J. (1991). Toward effective university-public school partnerships: An analysis of a contemporary model. *Teachers College Record*, 92(4), 556–581.
- International Society for Technology in Education [ISTE]. (2001). *National Educational Technology Standards for Teachers (NETS-T)*. Retrieved May 1, 2003, from <http://cnets.iste.org/>.
- Interstate New Teacher Assessment and Support Consortium [INTASC]. (1992). *Model standards for beginning teacher licensing and development: A resource for state dialogue*. Washington, DC: Council for Chief State School Officers.
- Ladson-Billings, G. (1994). *The dreamkeepers: Successful teachers of African-American children*. San Francisco: Jossey-Bass.
- Ladson-Billings, G. (1995). Toward a theory of culturally relevant pedagogy. *American Education Research Journal*, 32(3), 465–491.
- Maybach, C. W. (1996). Investigating urban community needs: Service-learning from a social justice perspective. *Education and Urban Society*, 28(2), 224–236.
- McKenna, M. J., (2000). Students, agencies, and faculty sign on for academic service learning: A natural partnership for teacher education. *Teacher Education Quarterly*, 27(3), 89–102.
- Michael, K. Y. (2001). Technology education students make a difference through service learning. *Technology Teacher*, 61(3) 30–32.
- Murrell, Jr., P. C. (2001). *The community teacher: A new framework for effective urban teaching*. New York: Teachers College Press.
- Myers, C., & Pickeral, T. (1997). Service-learning: An essential process for preparing leaders in the reform of public education. In J. Erickson & J. Anderson (Eds.), *Learning with the community: Concepts and models for service-learning in teacher education* (pp. 13–41). Washington, DC: American Association of Higher Education.
- Quartz, K. H. (2003). “Too angry to leave”: Supporting new teachers commitment to transform urban schools. *Journal of Teacher Education*, 54(2), 99–111.
- Ryan, L., & Callahan, J. (1999). Service-learning competencies for beginning teachers. *Academic Exchange Quarterly*, 3(4), 69–79.
- Ryan, L. B., & Callahan, J. (2002). Making connections: Service-learning competencies and beginning teacher standards. *The Teacher Educator*, 38(2), 126–140.
- Schoon, K. J., & Sandoval, P. A. (2000). Attracting, preparing, and keeping great urban teachers: The urban teacher education program, Option II. *Urban Education*, 35(4), 418–441.

---

*Rick Voithofer is an assistant professor in the School of Educational Policy at the Ohio State University. His research interests include studying issues of equality in the design and integration of technologies in education.*

*Rick Voithofer, PhD  
School of Educational Policy and Leadership  
Ohio State University  
104 Ramseyer Hall, 29 West Woodruff Ave.  
Columbus, Ohio 43210-1177  
Phone: 614.247.7945  
voithofer.2@osu.edu*

**<http://www.iste.org>**