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ABSTRACT

This pilot study was designed to explore how vicarious learning experiences and goal setting influence preservice teachers' self-efficacy for integrating technology into the classroom. Twenty undergraduate students who were enrolled in an introductory educational technology course at a large midwestern university participated and were assigned into four conditions (three experimental and one control). Vicarious experiences for technology integration were presented to the students using an instructional CD-ROM, VisionQuest. Students were grouped into vicarious experience with or without learning goals, learning goals only presented, and a control group of neither vicarious experience or learning goals. Results show significant treatment effects of vicarious experiences and goal setting on participants' judgments of self-efficacy for technology integration. A significant interaction effect was not observed, possibly due to small sample sizes. The survey is attached. (Contains 16 references.) (Author/SLD)

Impact of Vicarious Learning Experiences and Goal Setting on Preservice Teachers' Self-Efficacy for Technology Integration: A Pilot Study

Paper presented at the 2003 annual meeting of
the American Educational Research Association, Chicago

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Abstract

This pilot study was designed to explore how vicarious learning experiences and goal setting influence preservice teachers' self-efficacy for integrating technology into the classroom. Twenty undergraduate students who were enrolled in an introductory educational technology course at a large Mid-western university participated and were assigned into four conditions (3 experimental and 1 control). Results showed significant treatment effects of vicarious experiences and goal setting on the participants' judgments of self-efficacy for technology integration. A significant interaction effect was not observed, possibly due to small sample sizes.

Keywords: technology integration, self-efficacy, vicarious learning experiences, goal setting

Introduction

Despite the increased availability and support for classroom computer use (Zehr, 1997; 1998), relatively few teachers have fully integrated computers into their teaching (Becker, 2000; Marcinkiewicz, 1996). There is substantial evidence to suggest that teachers' beliefs in their capacity to work effectively with technology, that is, their computer *self-efficacy*, may be a significant factor in determining patterns of classroom computer use (Albion, 1999; Oliver & Shapiro, 1993). For example, Honey and Moeller (1990) reported that when computer anxiety was not a factor preventing technology integration, the 20 elementary and secondary school teachers they interviewed were able to successfully integrate technology within a constructivist, student-centered approach. Results from previous studies on teachers' self-efficacy beliefs provide sufficient reason to undertake further investigations in this area and to consider approaches to teacher education and professional development that might be effective in increasing teachers' self-efficacy for teaching with technology.

Bandura (1986) identified four sources of information used to judge self-efficacy: successful performance attainment; observing the performances of others (vicarious learning); verbal persuasion indicating that one possesses certain capabilities; and physiological states by which one judges capability, strength, and vulnerability. Although performance accomplishments are considered to be the most robust source of self-efficacy information, vicarious learning is also a powerful source (Bandura, 1986; 1997). That is, viewing others successfully accomplish a particular task can increase learners' perceptions of others' efficacy as well as their own efficacy for performing similar tasks (Bandura, 1997).

While novice learners can acquire skills and strategies from social modeling, when performing independently they are likely to over- or underestimate their own capabilities (Schunk, 2001). However, students' judgments of progress, as well as their judgments of self-efficacy, increase in both accuracy and strength when goals are made explicit (Schunk, 2001). By establishing goals, students typically experience a sense of efficacy for attaining them. Thus, goals can both motivate behavior and inform learners about their capabilities (Bandura, 1997; Schunk, 1996).

The literature has established independent effects of both vicarious learning experiences and goal setting on learners' judgments of self-efficacy, yet little work has been done to examine how these strategies might be combined to create even more accurate and more robust judgments of efficacy. In 1992, Gist and Mitchell identified three general strategies for enhancing self-efficacy beliefs. Of these three, two related to vicarious learning and goal setting, respectively: providing opportunities to observe experts' practice and providing opportunities to address a specific goal while resolving a particular teaching issue. Gist and Mitchell concluded that these strategies contributed to building teachers' confidence for achieving effective teaching.

According to Neck and Manz (1992), when individuals mentally rehearse a task, they see themselves performing it and thus are exposed to the positive effect of modeling (i.e., learn through vicarious experiences). Furthermore, the intense cognitive processing that occurs during mental practice can heighten awareness of how to attain specific goals and hence increase goal commitment and task performance. Based on these premises, it was hypothesized that vicarious learning experiences and goal setting could be combined to achieve a significant effect on learners' self-efficacy beliefs and task performance.

Purpose of the Study

This study was designed to examine the impact of vicarious learning experiences and goal setting on preservice teachers' self-efficacy for technology integration. Specifically, this study was guided by the following research question:

What are the effects of vicarious experiences and goal setting on preservice teachers' judgments of self-efficacy for technology integration?

Based on the self-efficacy literature described above, it was hypothesized that preservice teachers who engaged in vicarious experiences related to successful technology integration would experience a significantly greater increase in judgments of computer self-efficacy than those who did not engage in these vicarious experiences. Furthermore, it was hypothesized that preservice teachers who engaged in goal setting, related to increasing their technology integration skills, would experience a significantly greater increase in judgments of computer self-efficacy than those who did not engage in goal setting. Finally, it was hypothesized that preservice teachers who engaged in vicarious experiences *and* goal setting would demonstrate the greatest increases in judgments of computer self-efficacy compared to students who engaged in either one of these conditions alone.

Methods

Research Design

A 2 x 2 (Vicarious Experiences x Goal Setting) mixed factorial research design was used to examine how vicarious experiences and learning goals impacted preservice teachers' judgments of computer self-efficacy. These independent variables were combined to form four experimental conditions: (a) NVE/NG: no vicarious experiences and no learning goals (also defined as the control group), (b) NVE/G: no vicarious experiences but with learning goals, (c) VE/NG: vicarious experiences, no learning goals, and (d) VE/G: vicarious learning experiences, with learning goals.

Sample

Participation was solicited from students enrolled in an *Introduction to Education Technology* course during a 4-week summer session held in May, 2002. Participants were all sophomores in the Teacher Education program and ranged in age from 18 to 25 years old. Thirty-one students signed the informed consent form and agreed to participate, but only twenty students actually completed the study. Participants were randomly assigned into one of four experimental conditions. The numbers of participants in each condition were 6, 6, 4, and 4 (Note: The unequal group sizes were due to the dropouts from the study).

Procedures

At the beginning of the course, demographic data were collected from all participants who signed the informed consent form. Participants completed a 21-item survey, measuring self-efficacy for technology integration (described in more detail below), after they received one of the four experimental treatments. In this study, vicarious experiences for technology integration were presented to the students using VisionQuest,© an instructional CD-ROM that features the technology practices and beliefs of six K-

12 teachers. According to Ertmer, Conklin, Lewandowski, Osika, Selo, and Wignall (2003), "VisionQuest© is designed to support users' reflections on both the underlying beliefs and classroom strategies that enable exemplary technology use." The various cases highlighted on the CD-ROM illustrate that technology integration can be achieved successfully in a variety of contexts despite differences in settings, resources, and student backgrounds.

VisionQuest© provides vicarious learning experiences for the user through the use of video segments, augmented by electronic artifacts (lesson plans, student products) from teachers' classrooms. Cases are constructed such that users can explore teachers' classrooms either one at a time (case by case) or thematically (i.e., comparing components of technology integration across cases). Each case contains a variety of elements that combine to illustrate how teachers' visions for technology use are translated into practice. Users examine how teachers planned for integration, how they currently implement technology within their classrooms, and how they assess the impact of their efforts.

Students participated in one of the four experimental conditions (and completed the self-efficacy survey) during a two-hour lab session in the second week of the summer session. The participants in the VE/G and VE/NG conditions explored the VisionQuest© CD-ROM and observed the exemplary teachers' technology use and classroom management practices. The participants in the VE/G and NVE/G conditions were given, at the beginning of the experiment, a number of specific goals related to learning about technology integration. For example, the following learning goals were assigned to the participants in the VE/G condition:

> While you are exploring VisionQuest, it helps to keep in mind what you are trying to do. A list of expected outcomes from this activity is shown on this page and can be thought of as goals that you are trying to accomplish. So while you are going through the VisionQuest, you should keep in mind the following goals:
>
> For each teacher on VisionQuest, determine:
> - his/her beliefs about technology use
> - the roles technology plays
> - the way he/she organizes technology-based class activities
> - the way students are assessed

Students in the NVE/G condition received the following goals:

While you are exploring these WebQuests, it helps to keep in mind what you are trying to do. A list of expected outcomes from this activity is shown on this page and can be thought of as goals that you are trying to accomplish. So while you are going through the WebQuests, you should keep in mind the following goals:

For each WebQuest that you view, determine:
- the instructional goal
- how students' achievement of the goal will be evaluated

The participants in the NVE/G and NVE/NG conditions explored a specific website, related to WebQuests, selected by the researcher. The website was relevant to using technology in teaching but did not contain the characteristics of vicarious learning experiences. The participants in the VE/NG and NVE/NG conditions received instructions regarding how to navigate through the software or the website, as did their counterparts in the two VE/G and NVE/G conditions, but did not receive any information related to what knowledge/information they were expected to gain from the software or the website (i.e., no specific learning goals assigned to them).

Data Collection and Analysis Strategies

Demographic data, including information about gender, class, and previous computer experiences were collected from all participating students. A Likert-style survey measuring participants' self-efficacy served as the primary data source and was administered at the end of each experimental condition. The survey was constructed by the researcher in consultation with content area experts. The survey included 21 items regarding participants' confidence for technology use (see Appendix). The participants were asked to rate their levels of agreement (from 1-strongly disagree to 5-strongly agree) with statements related to their possession of confidence regarding technology use (e.g., "I feel confident that I understand computer capabilities well enough to maximize them in my classroom." "I feel confident I can regularly incorporate technology into my lessons, when appropriate to student learning."). Cronbach alpha was calculated to determine the reliability of the survey items. The alpha coefficient was 0.9293 suggesting that the instrument was highly reliable.

Means and standard deviations for each experimental condition were calculated. Two-way ANOVA was used to determine the main effects of IV_1 (vicarious learning experiences through viewing

VisionQuest CD-ROM) and IV_2 (learning goals) and the interaction of IV_1 and IV_2. One-way ANOVA was then used to determine which of the four experimental conditions were significantly different from the others.

Results

The four experimental conditions had the following means and standard deviations: VE/G (M = 4.55, SD = 0.33); VE/NG (M = 4.30, SD = 0.41); NVE/G (M = 4.24, SD = 0.52); and NVE/NG (M = 3.57, SD = 0.14). The F (3, 16) value (F = 5.57, p = .0082) from the two-way ANOVA indicated that at least one main effect of the two factors was significant. Results indicated that the vicarious learning factor had a significant main effect on self-efficacy (F (3, 16) = 9.18, p = .0080). Learning goals also had a significant main effect on self-efficacy (F (1, 16) = 6.06, p = .0256), but the interaction of the two factors was not significant (F (1, 16) = 1.48, p = .2407). Figure 1 illustrates the main effects and the interaction effect.

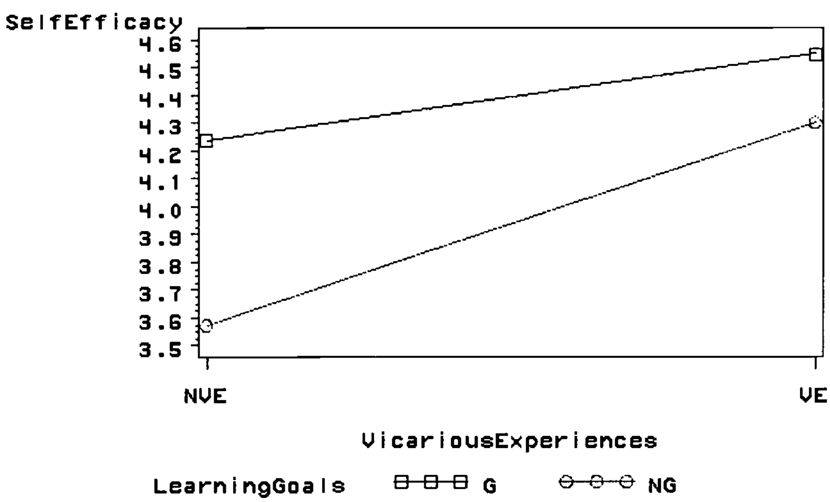

Figure 1. Graph depicting the main treatment effects and (lack of) an interaction effect.

The F (3, 16) value from the multiple comparison test (F = 5.57, p = .0082) indicated that the treatment conditions had a significant effect on self-efficacy. When examining which conditions were significantly different from the others, the following between-condition differences were found to be significant at the .05 level: VE/G – NVE/NG (mean difference = 0.98), and VE/NG – NVE/NG (mean difference = 0.73). Figure 2 illustrates the differences among the four experimental conditions.

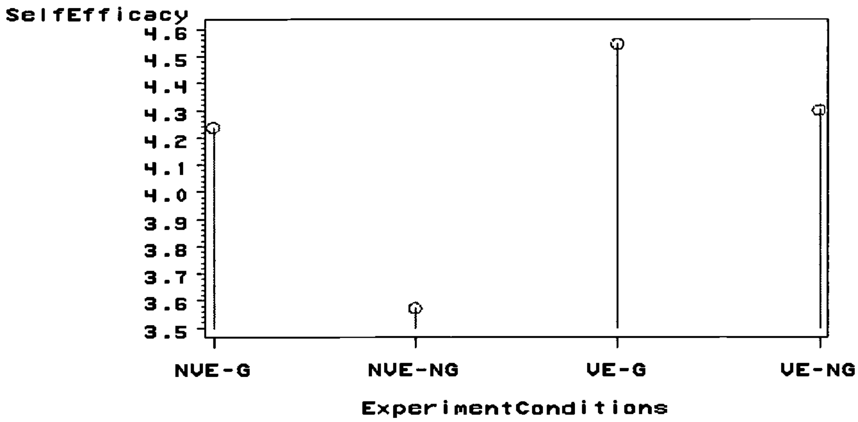

Figure 2. *Graph illustrating self-efficacy scores for each treatment condition.*

Discussion

The results of this study indicated that preservice teachers who engaged in vicarious experiences, related to successful technology integration, experienced a significantly greater increase in judgments of computer self-efficacy than those who did not engage in these vicarious experiences. Furthermore, preservice teachers who engaged in vicarious experiences, with or without learning goals, demonstrated significant increases in judgments of computer self-efficacy compared to those who did not engage in either vicarious experiences or learning goals. These results support previous research regarding the benefits of vicarious learning on judgments of self-efficacy (Albion, 1996; Handler, 1993; Schrum & Dehoney, 1998) and highlight the potential benefit to providing preservice teachers with opportunities for observing exemplary technology-using teachers as one way to increase their self-efficacy for effectively using technology in their own classrooms. According to Bandura (1997), building self-efficacy is an important first step toward developing the capacity to perform a particular skill. Without a sufficient level of self-efficacy for performing computer tasks, technology integration may not even be attempted (Olivier & Shapiro, 1993).

Unfortunately, the hypothesized interaction effect of vicarious learning experiences and learning goals on preservice teachers' self-efficacy for technology integration was not found; that is, preservice teachers who engaged in both vicarious experiences and learning goals did not demonstrate significant increases in judgments of computer self-efficacy compared to those who engaged in either of the two conditions alone. Additionally, preservice teachers who received learning goals, but without vicarious experiences, did not demonstrate significant increases in judgments of computer self-efficacy compared to those who received neither treatment (the control group). That is, the use of learning goals was effective in enhancing preservice teachers' self-efficacy for technology integration only when combined with vicarious learning experiences. This finding demonstrates the potential importance of combining learning goals with vicarious experiences when helping preservice teachers learn about technology integration. This finding supports the suggestion made by other researchers (e.g., Gist & Mitchell, 1992; Neck & Manz, 1992) regarding effective strategies for increasing self-efficacy as well as the possible benefit to be gained by combining strategies. As such, teacher educators might consider using both strategies when helping preservice teachers learn about technology integration.

In this pilot study, there were only twenty participants. Assigning students into each of the four experimental conditions resulted in having only a few participants in each condition. Therefore, the small sample sizes of the study could be a factor affecting the results. For further studies, larger sample sizes may be used and different results may be expected.

Educational Implications

The results of this study contribute to the existing body of literature in two significant ways: (1) by describing how preservice teachers benefit from observing teacher models presented via vicarious learning experiences, such as those provided by VisionQuest, and (2) by describing how preservice teachers benefit from adopting learning goals for technology integration. From an instructor's perspective, the use of vicarious learning experiences and the incorporation of learning goals can positively impact students' self-efficacy beliefs for technology integration. Furthermore, this type of modeling and goal setting may help preservice teachers develop a vision for what technology integration looks like in real classrooms as well as strategies for implementing those visions in their own classrooms. Thus, as our future teachers develop clearer visions and more powerful strategies for achieving them, meaningful technology use can come closer to being the norm, rather than the exception, in our K-12 classrooms.

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Appendix

Computer Technology Integration Survey

Direction:

The purpose of this survey is to determine how you feel about integrating technology into classroom teaching. For each statement below, indicate the strength of your agreement or disagreement by circling one of the five scales.

Below is a definition of technology integration with accompanying examples:

Technology integration:

Using computers to support students as they construct their own knowledge through the completion of authentic, meaningful tasks.

Examples:

- Students working on research projects, obtaining information from the Internet.
- Students constructing Web pages to show their projects to others.
- Students using application software to create student products (such as composing music, developing PowerPoint presentations, developing HyperStudio stacks).

Using the above as a baseline, please circle one response for each of the statements in the table:

SD = Strongly Disagree, D = Disagree, NA/ND = Neither Agree nor Disagree, A = Agree, SA = Strongly Agree

1.	I feel confident that I understand computer capabilities well enough to maximize them in my classroom.	SD	D	NA/ND	A	SA
2.	I feel confident that I have the skills necessary to use the computer for instruction.	SD	D	NA/ND	A	SA
3.	I feel confident that I can successfully teach relevant subject content with appropriate use of technology.	SD	D	NA/ND	A	SA
4.	I feel confident in my ability to evaluate software for teaching and learning.	SD	D	NA/ND	A	SA
5.	I feel confident that I can use correct computer terminology when directing students' computer use.	SD	D	NA/ND	A	SA
6.	I feel confident I can help students when they have difficulty with the computer.	SD	D	NA/ND	A	SA
7.	I feel confident I can effectively monitor students' computer use for project development in my classroom.	SD	D	NA/ND	A	SA
8.	I feel confident that I can motivate my students to participate in technology-based projects.	SD	D	NA/ND	A	SA
9.	I feel confident I can mentor students in appropriate uses of technology.	SD	D	NA/ND	A	SA
10.	I feel confident I can consistently use educational technology in effective ways.	SD	D	NA/ND	A	SA
11.	I feel confident I can provide individual feedback to students during technology use.	SD	D	NA/ND	A	SA

12.	I feel confident I can regularly incorporate technology into my lessons, when appropriate to student learning.	SD	D	NA/ND	A	SA
13.	I feel confident about selecting appropriate technology for instruction based on curriculum standards.	SD	D	NA/ND	A	SA
14.	I feel confident about assigning and grading technology-based projects.	SD	D	NA/ND	A	SA
15.	I feel confident about keeping curricular goals and technology uses in mind when selecting an ideal way to assess student learning.	SD	D	NA/ND	A	SA
16.	I feel confident about using technology resources (such as spreadsheets, electronic portfolios, etc.) to collect and analyze data from student tests and products to improve instructional practices.	SD	D	NA/ND	A	SA
17.	I feel confident that I will be comfortable using technology in my teaching.	SD	D	NA/ND	A	SA
18.	I feel confident I can be responsive to students' needs during computer use.	SD	D	NA/ND	A	SA
19.	I feel confident that, as time goes by, my ability to address my students' technology needs will continue to improve.	SD	D	NA/ND	A	SA
20.	I feel confident that I can develop creative ways to cope with system constraints (such as budget cuts on technology facilities) and continue to teach effectively with technology.	SD	D	NA/ND	A	SA
21.	I feel confident that I can carry out technology-based projects even when I am opposed by skeptical colleagues.	SD	D	NA/ND	A	SA

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