
Videotaping as a Means of Self-Monitoring to Improve Theater Students' Performance

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ABSTRACT. The purpose of this study was to investigate the effects of retroactive and focused self-monitoring, actualized by videotaping, on children’s theater performance. In Experiment 1, 20 students in a theater performance program were randomly assigned to either a control or a self-monitoring condition, and their weekly rehearsals were videotaped. Only students in the self-monitoring condition viewed their videotaped rehearsals. The authors found that retroactive self-monitoring enhanced theater performance. In Experiment 2, 36 children preparing for a Christmas play were randomly assigned to either a focused or to a general self-monitoring condition. They viewed their videotaped rehearsals; the focused self-monitoring group received a list of important aspects of the performance to watch. The focused self-monitoring enhanced the children's performance in the play.

Key words: self-monitoring, self-recording, theater education, theater performance

SELF-MONITORING, which involves “observing and tracking one’s own performance and outcomes” (Zimmerman, 1998a, p. 78), has proven to be an effective way to enhance learning and performance of different student populations in a variety of tasks. For example, special education teachers have used self-monitoring extensively to improve time on task and completion of assignments of students with learning disabilities (Blick & Test, 1987; Dean, Malott, & Fulton 1983; Heins, Lloyd, & Hallahan 1986; Maag, Rutherford, & DiGangi, 1992; Wills, 1995). Researchers (Delclos & Harrington, 1991), using a series of questions before, during, and after a task to “force the individuals to monitor

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the problem-solving processes being used" (p. 38), improved elementary students' efficiency in solving complex computerized problems. Researchers have also shown the enhancing effects of self-monitoring on college students' learning. By providing a protocol that helped graduate students to record the amount of time they spent in learning important concepts and to monitor their understanding of the concepts in a statistics course, researchers (Lan, 1996; Lan, Bradley, & Parr, 1993) improved students' academic performance on course examinations and use of learning strategies in the class. Zimmerman (1998a) reviewed biographies and autobiographies of successful writers, athletes, and musicians and concluded that experts in these different professions most commonly used self-monitoring as one of their self-regulated learning strategies.

Despite the benefits of self-monitoring, students' involvement in self-monitoring is relatively low. In a study (Lan, 1998) examining self-monitoring strategies used by students at different school levels for learning tasks with different levels of significance, only about 20% of elementary students reported using self-monitoring strategies to observe or track their learning outcomes. Among graduate students who were supposed to be the most advanced in developing learning strategies, only 50% reported being involved in self-monitoring in learning tasks that carried significant consequences.

Researchers have provided cognitive explanations for the low involvement in self-monitoring among students. They argued that, as any cognitive process, self-monitoring uses learners' information-processing capacity. Being engaged in learning and self-monitoring simultaneously, a learner may experience competition between the two cognitive processes for the limited cognitive capacity, and the competition could be severe when the learning task is difficult or the learner has low ability in the task (Winne, 1995). Winne believed that if the two cognitive processes, learning and self-monitoring, exceed a learner's cognitive resources, then the learner must cease one in order to execute the other. For students, acquisition of information (learning) is always the primary process or purpose of a learning situation, whereas self-monitoring is a secondary process that may enhance learning. If the learner is cognitively overwhelmed, then he or she tends to cease self-monitoring to yield to the primary process of learning. Zimmerman (1998b) also indicated that self-monitoring could be detrimental because it could sometimes interfere with learning activities.

Although Zimmerman and Winne agreed on the cognitive hindrance of self-monitoring, they had different approaches to solve the problem. Believing that self-monitoring was helpful during all phases of learning, Zimmerman (1995) suggested that self-monitoring should focus on learning strategies during the initial practice phase, then shift to learning outcomes after the "routinization of the strategy" (p. 219). His and Kitsantas's studies (1996, 1999) showed the benefits of shifting the focus of self-monitoring from strategy to outcome in athletic and academic tasks. For example, high school girls were learning a writing skill of
combining kernel sentences into a single inclusive, but nonredundant, sentence under different goal orientations. Some students practiced with an outcome goal where they tried to use the minimum number of words in the sentences. Other students practiced with a process goal where they focused on a three-step strategy that helped them to delete redundant words and keep unique words in the kernel sentences. Another one third of the girls practiced with a shifting goal, where they focused on the strategy for the first 15 min of the practice then shifted their focus to the outcome goal. Posttest scores indicated that students working with the shifting goal had better performance and were more self-efficacious than those with the outcome or process goal (Zimmerman & Kitsantas, 1999).

Winne (1995), however, believed that premature involvement in self-monitoring could detrimentally affect learning; therefore, the optimal time to engage in self-monitoring depended on the learner’s development of domain expertise. Kanfer and Ackerman’s study (1989) provided supportive evidence for this conjecture. The researchers were interested in how Air Force personnel were juggling cognitive resources between learning how to land planes and monitoring their own learning. Kanfer and Ackerman found that it took an average of five trials for pilots to encode instructions for landing a plane and manifest the instructions in behaviors. If the self-monitoring mechanism was introduced into learning at or after the fifth trial, then the enhancing effect of self-monitoring on landing performance was most apparent. They concluded that if learners engaged in self-regulation too early in the landing skill acquisition, it hurt their performance, especially for learners with low ability.

Whereas Zimmerman (1995, 1998b) believed that strategy routinization would reduce the demand for cognitive resources so that the learner could execute self-monitoring, Winne (1995) believed that the development of domain expertise would reduce the demand for cognitive resources to process the knowledge content so that the learner could execute self-monitoring. Although the two approaches sound very different, we can still see a common cognitive principle behind the two researchers’ solutions: Self-monitoring can be optimized when either learning or self-regulation is not too cognitively demanding.

If this cognitive explanation for self-monitoring deficiencies is valid, then there should be at least two solutions to the problem. First, learners should practice self-monitoring strategies to an automatic level so that the execution of self-monitoring will be done with little or no effort (Anderson, 1987), a process called automatization by Zimmerman (1998b) or proceduralization by Winne (1995). Researchers (Lan, Repman, & Chyung, 1998) have shown that practicing self-monitoring strategies, either by repeatedly displaying a diagram of a problem-solving procedure on computer screens or by repeatedly asking a series of questions to lead students through the problem-solving procedure step-by-step, enhanced students’ self-monitoring and learning in solving quantitative problems drawn from the Graduate Record Examinations (GRE).
The second solution is for learners to separate learning and self-monitoring in time so that they can execute the two processes sequentially, rather than simultaneously, to ease the burden on their cognitive capacity. As Zimmerman (1995) suggested,

students can record their behavioral performances electronically (by audio- or videotape) and need not analyze them until afterward. Under these common behavioral self-monitoring circumstances, learners do not need to balance concentrating on learning with monitoring but rather can separate these two functions sequentially (p. 218).

In a study involving the development of medical school students' clinical skills, students in each pair videotaped each other's interaction with patients. Medical instructors and students viewed and criticized the tapes afterward. A majority of students felt that viewing their videotaped performance helped them to identify their strengths and weaknesses, enhance their abilities of self-criticism and self-evaluation, and improve their clinical skills (Paul, Dawson, Lanphear, & Cheema, 1998).

With the same line of reasoning, we expected that the enhancing effect of self-monitoring could be more profound if we further reduced the demand for cognitive resources and led learners' self-monitoring to focus on a few key aspects of the performance. Several researchers have endorsed the idea of focused self-monitoring. For example, Winne (1995) asked whether students should always (emphasis added) apply effort to self-regulation. To answer his own question, he said,

Monitoring levies charges against a learner's limited attentional resources (or working memory capacity). In the midst of a task, overly frequent monitoring or monitoring against vague or too long a list of criteria, may put students in a deficit position. It can obstruct access to cognitive resources they should apply toward acquiring the subject they are studying (p. 177).

He believed that beginners suffered more from unfocused self-monitoring because they tended to be less knowledgeable in the area and less skilled in self-regulation strategies.

Similarly, in Singer and Cauraugh's (1985) analysis of the process of learning psychomotor tasks, the researchers differentiated between primary strategies, directly related to achievement of skills, and secondary strategies, supportive of the execution of the primary strategies, such as self-monitoring defined as "monitor progress and personal states" (p. 104). The researchers contended that, because of the limit on cognitive capacity, learners could not indiscriminately use feedback obtained through the self-monitoring process. Depending on the nature of psychomotor tasks, "it is imperative that explicit procedures be designed to control the allocation of attention to appropriate feedback cues in specific situations" (p. 109). On the basis of the same reason, Zimmerman (1998b) called self-monitoring "a vital yet problematic self-regulatory process" (p. 4). He recom-
mended that learners limit “self-monitoring just to key processes or outcomes” (p. 4). Although the benefits of the focused self-monitoring are theoretically sound, empirical evidence is scarce.

On the basis of the literature reviewed, we designed this study to answer two questions: (a) whether retroactive self-monitoring improves performance and (b) whether focused self-monitoring improves performance more than unfocused self-monitoring does. In Experiment 1, we separated learning and self-monitoring by videotaping rehearsals of students in a theater performance program and letting them watch the videotapes afterward. We predicted that retroactive self-monitoring would improve students’ performance in a formal performance later. In Experiment 2, we compared the effectiveness of focused self-monitoring and general self-monitoring in enhancing students’ theater performance. We predicted that focused self-monitoring would enhance students’ learning and performance more than general self-monitoring would.

EXPERIMENT 1

Method

ACTEEN was a program that recruited students from local secondary schools to learn theater performance. Every year, students enrolled in the program identified issues with which they or their peers in schools were most concerned, such as drug abuse, alcoholism, peer pressure, and teenage pregnancy, and wrote scripts for plays on the concerns. Directed by a graduate student majoring in theater performance, members of ACTEEN met weekly to rehearse the plays. By the end of the semester, they were invited to perform the plays for students in local schools.

We recruited 28 students enrolled in ACTEEN to participate in this study. After signing their consent forms, we balanced students for gender, age, and years in the ACTEEN program and randomly assigned them to either a control condition or a self-monitoring condition. Because of attrition, the final sample contained 20 students: 11 in the self-monitoring condition and 9 in the control condition. There were 6 girls and 5 boys in the self-monitoring condition with an average age of 15.89 (SD = 1.45) and an average of 1.67 (SD = 1.32) years of experience in the ACTEEN program. In the control condition, there were 5 girls and 4 boys with an average age of 16.00 (SD = 1.34) and average of 1.91 (SD = 1.22) years of experience in the ACTEEN program.

Throughout the semester, the principal investigator participated in every weekly rehearsal of the ACTEEN program and videotaped students’ rehearsals. During the rehearsal of the following week, students were called out in small groups of 2 or 3 to receive different treatments of self-monitoring. Students in the self-monitoring group reviewed the tapes of their rehearsal performance in the previous week with a list of questions provided by the program director. Sample questions included, “Could you hear yourself?” “Did you know your
blocking?” and “Did you appear comfortable in the costumes?” Students in the control group were called out to view commercial videotapes of theater performance and asked to identify various tasks—such as using props, using costumes, and investing in the scene when they had no specific lines or action—performed by actors and actresses in the videotapes. Throughout the semester, the two groups of students viewed their own performance or commercial tapes for 9 or 10 times. When students were invited to perform the plays in local schools, their final performance was videotaped. Two experts in theater performance, an experienced theater performer and a graduate student in the theater department, watched videotapes of the initial rehearsal and the final performance and rated each student’s performances independently on a 5-point scale, with higher scores designated to better performance. They based their ratings on a list of 13 aspects of performance identified by theater performance experts as critical for successful performance, including memorizing lines, knowing blocks, using props, and presenting believable characters.

**Data Analysis**

We averaged the two raters’ ratings on the 13 aspects of the performance in the initial rehearsal and the formal performance to create a rehearsal score and a performance score for each student. The agreement between the two raters expressed in correlation coefficients was .72 for the rehearsal score and .70 for the performance score. With the acceptable interrater reliability, we averaged the two raters’ ratings to yield a preperformance score based on the rehearsal and a postperformance score based on the final performance.

We computed an analysis of covariance (ANCOVA) to examine the effect the retroactive self-monitoring on students’ performance with the preperformance score as the covariate and the postperformance score as the dependent variable. The assumption of homogeneity of variance was met, $F(1, 18) = 1.23, p = .28$. The assumption of homogeneity of slope was examined and held, $F(1, 16) = 0.73, p = .41$. The treatment effect was significant, $F(1, 17) = 8.76, p = .009, \eta^2 = 0.34$. As predicted, students in the self-monitoring condition had better performance ($M_{unadjusted} = 3.37, M_{adjusted} = 3.57, SD = 0.41$) than students in the control condition ($M_{unadjusted} = 3.32, M_{adjusted} = 3.09, SD = 0.62$). According to Cohen’s (1977) classification of $\eta^2$ that $\eta^2$ values above .14 indicate large effect size, the treatment effect was strong. Descriptively, self-monitoring improved students’ theater performance by .77 standard deviation of the control group.

**EXPERIMENT 2**

Findings of Experiment 1 demonstrated that retroactive self-monitoring by watching videotaped rehearsals enhanced students’ performance. The finding
was consistent with the cognitive explanation that limited cognitive resources cause deficiencies in self-monitoring. To provide further supportive evidence of the cognitive explanation, we conducted Experiment 2, where we worked with another group of children in a theater performance project to investigate whether focused self-monitoring was more effective than unfocused self-monitoring in improving children’s performance.

Method

Forty-two children, varying between 8 and 14 years in age, in a local private school were participating in a project of performing a Christmas play in a church with which the school was affiliated. A few adults who played roles in the play were excluded from the sample. With balanced gender and age, children were randomly assigned to two experimental conditions: a focused self-monitoring condition and a general self-monitoring condition. After the attrition of 6 participants due to missing rehearsals and poor grades in schoolwork, the final sample contained 36 children. There were 19 children in the focused self-monitoring group with 13 girls and 6 boys, and 17 children in the general self-monitoring group with 10 girls and 7 boys. The average ages were 10.37 (SD = 2.57) and 10.06 (SD = 2.93) for the focused and general self-monitoring groups, respectively.

Children rehearsed more than 30 hr for the play before formally performing it during the week of Christmas. Three times during the rehearsals, the investigator videotaped the children’s performance. The two groups of children viewed a taped rehearsal in two separate rooms. Children in the general self-monitoring condition watched the tapes with a sheet that had a general instruction of “Watch how you did in the rehearsal.” Children in the focused self-monitoring condition watched the tapes with a sheet that had the same line of “Watch how you did in the rehearsal” followed by questions that directed children’s focus of self-monitoring. With consideration of the participants’ age, only three questions were listed: “Could you hear yourself?” “Did you know your lines?” and “Were you doing what you were supposed to do?” The director of the play assisted the researchers in choosing the questions, believing that these were the most common problems manifested by young children on the stage. Children’s formal performance at the church’s Christmas gathering was videotaped as the measure of the dependent variable.

Data Analysis

Children’s first rehearsal and the final performance were sent to the two theater performance experts who rated the ACTEEN students’ performance in Experiment 1 for evaluation. The correlation coefficients of their ratings for the rehearsal and final performance were .66 and .68, respectively. It is worth noting
that the agreement between the two raters in this experiment was relatively low, perhaps because the two raters were not experienced in evaluating young children's performance. Acknowledging the limitation, we averaged the two raters' ratings of the rehearsal and the performance to yield a preperformance score and a postperformance score.

The ANCOVA was conducted with the type of self-monitoring as the independent variable, the postperformance score as the dependent variable, and the preperformance score as the covariate. The assumption of homogeneity of variance was held, $F(1, 34) = 0.91, p = .35$. The assumption of homogeneity of slope was also met, $F(1, 32) = 2.98, p = .09$. The analysis showed a significant treatment effect, $F(1, 33) = 3.99, p = .04, \eta^2 = .11$. Children in the focused self-monitoring condition had higher ratings on their final performance ($M_{unadjusted} = 3.18, M_{adjusted} = 3.09, SD = 0.75$) than those in the general self-monitoring condition ($M_{unadjusted} = 2.71, M_{adjusted} = 2.85, SD = 0.83$). The effect of the independent variable, according to Cohen's (1977) classification that values of $\eta^2$ above .06 indicate a medium size effect, was between medium to strong. Descriptively, the focused self-monitoring treatment improved children's performance by 0.56 standard deviation of the general self-monitoring condition.

Discussion

We started the research project with these questions: If limited cognitive capacity is the reason for self-monitoring deficiencies, can we use retroactive self-monitoring (in Experiment 1) or focused self-monitoring (in Experiment 2) to help students in self-monitoring and learning? The combined results of our two studies provided positive answers to both questions: Students who watched their own performance retroactively and engaged in focused self-monitoring performed better than those who did not engage in these activities. As predicted, the study showed that self-monitoring was most beneficial to learners when it did not interfere with their learning or performance, and when it was focused.

Findings of the study were supportive of the contention that for the multidimensional process of self-regulation, the obstacles of self-regulation could also be multidimensional (Zimmerman, 1995, 1998a). Deficiencies in self-regulation, self-monitoring included, could be caused by motivational, cognitive, and metacognitive reasons. To be self-regulated in learning, not only does a learner need to be motivated to engage in self-regulation and well-informed of the execution of self-regulated learning strategies, but he or she also needs to be metacognitively knowledgeable on when and how to apply the self-regulated learning strategies. For example, if a learning task is overwhelming for a learner's cognitive capacity so that he or she cannot carry out learning and self-monitoring simultaneously, then the learner should know that a possible solution is to record learning or performance in some medium and monitor it afterward. If the learning task
is complex with many facets or subprocesses, then the learner should know to narrow the scope of self-monitoring to focus on key facets or subprocesses of the task. This metacognitive knowledge of self-monitoring is most needed for beginners with a learning task because they are most likely to be overwhelmed by learning and self-monitoring and to be least skilled in adjusting their self-monitoring with task difficulty and their ability in the task. Researchers (e.g., Winne, 1995; Lan, 1998; Zubrowski, 2002) have suggested that the metacognitive knowledge of self-regulation is so crucial in developing self-regulated learners it should be embedded in course content and taught to students.

Although researchers agree that limited cognitive capacity is one of the reasons for self-monitoring deficiencies, they have proposed different solutions for the problem. As mentioned earlier, some have suggested that learners not be engaged in self-monitoring for the initial learning phase so they can concentrate on acquisition of knowledge and skills (e.g., Winne, 1995). Schunk and Swartz (1991, 1993) have contended that learners should direct their attention of self-monitoring toward strategic processes in initial practice trials. There are still others who have argued that optimal self-monitoring occurs when learners shift the focus of self-monitoring from strategic processes during a preliminary phase of the development of self-regulatory competence to performance outcomes during the final self-regulatory phase (Zimmerman, 1995). Researchers have provided evidence that all these solutions have helped learners to be self-regulated in learning. These solutions share a common cognitive reasoning of reducing demand for cognitive capacity and should not be seen as mutually exclusive to each other. Collective use of the solutions will maximize the beneficial effects of self-monitoring on learning.

Between the two alternative solutions to the cognitive hindrance of self-regulation, that is, automatization of self-regulated learning strategies and retroactive involvement of self-regulation process, researchers have paid more attention to the solution of automatizing self-regulated learning strategies to reduce the demand for the learner's cognitive resources. The solution of separating the learning process from the self-monitoring process, however, has not received much attention in self-monitoring research. Findings of the present study showed that separating the two cognitive processes was an effective way to enhance students' learning and performance. If a learner can record his or her behavioral performances electronically, by audio or video, he or she can devote cognitive resources to the learning process then to the self-monitoring process, which will improve the quality of both processes.

The findings of this study should have great potential in applying to many other learning situations. Examples include public speech, playing a musical instrument, acquisition of athletic skill, teaching, and counseling practice. Performance recorded by video or audio media will provide learners with opportunities to retroactively monitor their learning and performance objectively and
critically, especially when the monitoring is focused on key components of the learning task. Studies replicated with other learning tasks will consolidate the findings of this study.

Despite the questions answered in this study, it has imposed more questions that are still unanswered. For example, psychologists have found educational level (or age) is related to self-regulation. Benenson and Dweck (1986), working with students from kindergarten to fourth grade, showed that students' self-monitoring of their academic performance became more and more accurate with the increase in age. They also observed that only fourth-grade students' self-estimated grades were significantly related to their teacher-reported grades. Stipek (1981) reported similar findings with children in kindergarten through third grade. The interaction between self-monitoring and age was of interest to us. More specifically, we predicted that retroactive and focused self-monitoring would benefit younger students or students with less experience in theater performance more than it did for older and more experienced students. Because of limited sample size, we did not examine this prediction in this study. The variables of age and experience were experimentally controlled by a balanced distribution of participants across this study's experimental conditions. In future research, we hope we will be able to treat the variables of age and experience as independent variables to shed light on the interaction effect between self-monitoring and age or experience.

The idea of teaching metacognitive knowledge of self-regulation embedded in course content instruction sounds very appealing to educators. Teaching this idea will help to produce self-regulated learners who will take responsibility for pursuing their own education. However, this appealing idea has not been tested empirically either. With the importance of metacognitive knowledge of self-monitoring (when and how to conduct self-monitoring) demonstrated in the research, future research is needed to provide practical suggestions for educators on teaching metacognitive knowledge in regular classrooms.

REFERENCES


