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Developmental Phases in Self-Regulation: Shifting From Process Goals to Outcome Goals

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The effects of goal setting and self-monitoring during self-regulated practice on the acquisition of a complex motoric skill were studied with 90 high school girls. It was hypothesized that girls who shifted goals developmentally from process to outcome goals would surpass classmates who adhered to only process goals who, in turn, would exceed classmates who used only outcome goals in posttest dart-throwing skill, self-reactions, self-efficacy perceptions, and intrinsic interest in the game. Support for all hypotheses derived from the developmental model was found. The girls' self-reactions to dart-throwing outcomes and self-efficacy perceptions about dart skill were highly correlated with their intrinsic interest in the game. It was also found that self-recording, a formal form of self-monitoring, enhanced dart-throwing skill, self-efficacy, and self-reaction beliefs.

Mastery of complex skills, such as reading, writing, dance, music, or athletics, is a time-consuming process requiring intensive teaching and countless hours of personal practice (Ericsson & Charness, 1994). A number of theorists have attempted to identify distinctive phases or steps in the attainment of a self-regulatory level of competence in skills such as these. For example, Fitts (1964) distinguished three phases in the acquisition of motoric skills from the beginner level to mastery. These included a cognitive phase in which knowledge of a skill is acquired first, then an associative phase wherein knowledge is transformed into action sequences, and finally an autonomous phase in which actions become spontaneous or self-regulatory. Robb (1972), M. D. Adams (1971), and J. A. Adams (1980) suggested that distinct learning processes may underlie these phase changes in learning, such as forming plans, motoric practicing, and automatic motoric execution. These accounts drew attention to qualitative changes in learning processes that ultimately became self-regulatory, but they provided relatively little detail about the formative role of teaching and social experiences in the development of these processes.

This is an important issue. Complex cognitive–motor skills are difficult to learn on one's own because they are both subtle and covert and because evidence of their effectiveness is often hard to interpret or is delayed in time. To overcome these personal limitations, cultural and familial groups have resorted to social means, such as modeling, verbal descriptions, and written instructions to convey important skills to the next generation. Not only is social transmission more efficient than discovery learning but it also precludes unnecessary "risks" of trying to deploy an unfamiliar strategy in naturalistic contexts where mistakes may lead to feelings of frustration and helplessness or where adverse outcomes may entail injury or even death (Bandura, 1986). In this sense, the origin and maintenance of complex skills is social as well as cognitive.

Recently, Zimmerman and Bonner (in press) identified four phases in students' development of complex cognitive–motor skills from naturalistic and experimental research on social learning processes (Bandura, 1986; Rosenthal & Zimmerman, 1978): observation, imitation, self-control, and self-regulation. The first phase, *cognitive–motor skill observation,* involves learning through observation or hearing accounts of a model who possesses expertise, such as learning a slap shot from videotaped demonstrations by a professional hockey player. Modeling provides the learner with an image of the skill to guide further learning. During the second phase, *imitation,* the learner executes the cognitive–motor skill personally, often with the feedback and guidance of the teacher-model. Imitative performance experiences give learners a sense of how a novel cognitive–motor skill feels motorically and visually. Emulative performance not only provides sensorimotor feedback but it also enables learners to develop internal "process" standards of correct performance, which are essential to subsequent phases of learning.

During the third phase of learning, called *self-control,* the students learn on their own to perform cognitive–motor skills as a routine process. To develop this automatic level of motoric proficiency, students must practice by themselves. They no longer rely directly on the model to learn but do remain dependent on personal representations of modeled performance standards. During this phase, learning strategies that focus on proficient execution of fundamental skills, including process goals and self-monitoring, facilitate the learners' attainment of automaticity (Zimmerman & Bonner, in press).

During the final phase of learning, *self-regulation,* the

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student learns to adapt his or her cognitive–motor skill to a dynamically changing environment. Skills in this phase can usually be performed without intentional thought, and the learners' attention can be shifted toward the performance outcomes without detrimental consequences. For instance, a volleyball player's attention can be shifted from the execution of the serve to its effective use, such as placing it where it is likely to win a point. To accomplish this, students should self-monitor the outcomes of their service placements.

A key implication of Zimmerman and Bonner's (in press) distinction between the self-control and self-regulation phase of cognitive–motor skill development is the need for learners to focus initially on performance processes as students begin to practice on their own instead of outcome or product goals. Focusing on outcomes before fundamental process techniques are acquired is expected to impair learning because novice learners make maladroit process adjustments until they acquire self-evaluative expertise (Ellis, 1995). Performance outcomes are a problematic source of self-correction for novices practicing complex learning tasks because of the subtlety, apparent inconsistency, and delay in time of many outcomes. Furthermore, outcome monitoring and goals represent additional demands on novices' limited cognitive resources. By focusing their practice goals on the strategic processes of proven models initially, novice learners can circumvent the frustrations of trial-and-error learning and can instead reinforce themselves for increasing motoric correspondence to this standard. Thus, process goals are expected to enhance not only acquisition of key motoric techniques but also self-perceptions of progress, self-efficacy beliefs about future success, and intrinsic motivation to continue to mastery. This process perspective would appear to be similar to what Dweck (1986) called a learning-goal orientation.

However, after fundamental processes are mastered, students can benefit from shifting their goals to learning outcomes. The unique physical and psychological characteristics of each learner require that a model's processes be adapted to maximize personal success. By definition, outcome goals provide the ultimate criterion by which process attainments can be measured, and, as such, they motivate moderately successful learners to continue their quest toward higher levels of personal mastery. Outcome goals are expected to lead to adaptive refinements in skill as learners discover what works best for them and to the development of a personalized style of performance (Zimmerman & Bonner, in press). This fully self-regulated level of skill is hypothesized to optimize not only performance but also positive self-reactions, self-efficacy beliefs, and intrinsic interest in the skill.

There is evidence that process and outcome goals differ in their impact. Schunk and Swartz (1993) found that process goals were more effective than product or outcome goals in guiding efforts to learn to write by elementary school children. In their study, process goals involved using a multistep strategy to write short essays, whereas product goals referred to writing clearly. These researchers found that youngsters given process goals and adult feedback about adhering to the goals exhibited superior writing over classmates given product goals or general goals to do well. Zimmerman and Kitsantas (1996) extended this research on process–outcome goals to include self-monitoring. Novice high school girls were taught a dart-throwing strategy through modeling and imitation and then were given either a process or an outcome goal to guide their self-controlled practice. The process goal involved using a multistep strategy for executing the throw, whereas the outcome goal involved hitting the bull's eye on the target. To examine the effects of self-monitoring, Zimmerman and Kitsantas taught half of the students in each goal group to self-record their acquisition efforts. It was found that process-goal setting and self-recording additively increased dart-throwing mastery, positive self-reactions, and self-efficacy perceptions of competence. With regard to Zimmerman and Bonner's (in press) model, this study demonstrated that process goals and self-monitoring facilitated self-controlled learning, but it did not continue dart-skill acquisition to a self-regulatory phase. The present investigation seeks to redress this limitation.

Novice learners were taught the dart-throwing strategy through modeling and imitation and then were allowed to practice for a sufficient time period to routinize the skill. One group used a process goal throughout the practice session, whereas another group used an outcome strategy during it. Although the process-goal group was expected to surpass the outcome-goal group as it did in the Zimmerman and Kitsantas (1996) study, this experimental condition was not considered optimal because the students failed to change goals after the dart-throwing strategy became routine. A shifting-goal group was also included that began initially using process goals and then changed to outcome goals when the dart-throwing strategy was automatized. Finally, a transformed outcome–process goal experimental group was also included that was taught to self-react to outcome information by making strategic process adjustments. A transformed goal strategy was expected to surpass a simple outcome approach because it enabled learners to transform performance outcome information into process adjustments. The effectiveness of this transformed process approach relative to a simple process approach was unknown and thus was explored. This condition was not expected to surpass a shifting-goal condition because it did not emphasize the ultimate importance of outcomes to optimal performance. All goal-treatment groups were hypothesized to surpass the performance of a practice-only control group. The effect of self-monitoring on goal setting was investigated by having half the participants in each goal group self-record. It was anticipated that self-recording would enhance all forms of goal setting.

Method

Participants

A total of 90 girls from four 9th- and 10th-grade physical education classes of a single-gender parochial school participated in this study. This female population was selected because very few of these young women had previous experience with dart throwing. They ranged in age from 14 to 16 years ($M = 15.4$ years), and they came from predominantly middle-class families. Their ethnic composition was diverse: 32 Americans of European extraction, 17 African Americans, 32 Hispanic Americans, and 9 Asian Americans. All participants received a certificate and a commemorative pin for their participation in the experiment.

Task Materials

The target used in dart throwing included a wooden-framed dartboard and 25 steel-head feathered darts. The target was made of seven regular concentric circles, with a bull's-eye having a radius of 0.5 in. (1.27 cm) and each succeeding circle increasing in radius by 1 in. (2.54 cm). Each circle, or zone, was assigned a numerical value, beginning with a center value of 7 and successively diminishing in assigned values by 1 until the outermost circle had a value of 1. The target was positioned with its uppermost edge 5.8 ft (1.77 m) high, and all darts were thrown from a distance of 8.5 ft (2.59 m) from the target. Six darts were given to the participants to perform the task.

Measures

Dart-throwing skill. A test was designed to determine the dart-throwing skill level of each participant. After receiving instructions in throwing and scoring (see the *Design and Procedure* section), the girls were told to "do their best" and were given six darts to throw. Each participant's final score represented the average for six throws and thus could range between 0 and 7 points.

Self-efficacy scale. We developed a measure of self-efficacy for use in this study by following procedures outlined by Bandura and Schunk (1981). The self-efficacy measure included items regarding the participants' capability to throw darts. All items were introduced with the phrase "How sure are you that you can score at least. . ." followed by these phrases: (a) 7 with one dart, (b) 5 with one dart, (c) 3 with one dart, and (d) 1 with one dart. The participants responded using an efficacy scale that ranged from 10 to 100 points in 10-unit intervals. Written descriptions were provided beside the following points of scale: 10 (*not sure*), 40 (*somewhat sure*), 70 (*pretty sure*), and 100 (*very sure*). Each girl's score was composed of the average self-efficacy rating for the four items. Prior research (Zimmerman & Kitsantas, 1996) established the interitem reliability of this scale at .89, according to Cronbach's alpha test.

Self-reactions scale. The girls' satisfaction with their dart-throwing proficiency was assessed with a single-item scale that ranged from 0 to 100 in 10-unit intervals. Written labels were offered for the following points: 10 (*not satisfied*), 40 (*somewhat satisfied*), 70 (*pretty satisfied*), and 100 (*very satisfied*). Each participant's score indicated how satisfied she was about her overall performance.

Intrinsic interest scale. The participants were asked to rank their preference for the dart throwing in comparison with four other sports, namely volleyball, soccer, tumbling, and apparatus gymnastics. The other sports were selected from a list of those that had been studied as part of the regular physical education curriculum, and thus they were familiar to all of the girls without having been self-selected. The rank of 1 represented the most favored sport ranging to 5 for their least favored sport. Each girl's score was determined by her ranking of dart throwing.

Attribution scale. Finally, the young women in all treatment groups, including a control group, were asked to answer the following questions after 3 min of practice: "Why do you think you missed the bull's-eye on the last trial?" and "What can you do to improve your performance?" Students' written answers were grouped into one of six categories according to the believed cause of insufficiency: type of strategy, amount of effort, level of ability, amount of practice, "I don't know," or "other." The strategy category included statements referring to needed improvements in any aspect of the method of dart throwing. Intercoder agreement on these classifications was 98%.

Design and Procedure

The girls from four physical education classes were asked to participate in a study of dart throwing, and all agreed. The 90 participants were randomly assigned to one of eight experimental conditions or a practice-only control group (no goal and no self-recording), with 10 girls in each group. The experimental conditions were based on the four types of goal setting (process goal, outcome goal, transformed-process goal, and shifting process–outcome goal) and two types of self-recording (present or absent). The conditions were (a) outcome goal but no self-recording, (b) outcome goal with self-recording, (c) process goal but no self-recording, (d) process goal with self-recording, (e) transformed goal but no self-recording, (f) transformed goal with self-recording, (g) shifting goal but no self-recording, (h) shifting goal with self-recording, and (i) practice-only control group (no goal setting or self-recording). The young women were taken into separate rooms and were tested individually by an experimenter who was a female doctoral student in educational psychology. The first 10 min of the session was devoted to demonstrating the skill and explaining the scoring system.

All experimental groups and the control group were given the instructions about throwing the darts (see McClintock, 1977; McLeod, 1977). Instructions for each subskill in the dart-throwing process are presented in Table 1. The participants were then given 20 min to practice dart throwing and thus were equalized for practice time but not for throwing trials. Pilot testing revealed that strategic proficiency could be routinized in approximately 12 min and that practice periods longer than 20 min produced inattention in some participants. The following operational definition for each type of goal was adopted. Girls assigned to the outcome-goal condition were told that to do well they should try to attain the highest numeric score (between 0 and 7) during the practice period. Young women in the outcome-goal group who were also assigned to the self-recording condition were instructed to write their scores in a log after each practice trial (consisting of three throws). Girls assigned to the process-goal condition were told that to do well they should concentrate on properly executing the final two steps in every throw they attempted: (a) a vertical forearm throwing motion and (b) the finger extension toward the target. Girls in the process-goal condition who were asked to self-record were instructed to write down the step(s) that they had done correctly at the end of each practice trial in a log. Girls assigned to the transformed goal condition were told that they should determine where the dart struck the target. If the dart hit to the right or the left of the bull's-eye, they should concentrate on keeping their arm vertical (Strategy Step 1) during the next throw. If the dart hit above or below the bull's-eye, they should concentrate on their finger extension (Strategy Step 2) during the next throw. This goal-setting procedure converts throwing outcomes into strategic process adjustments. The girls in the transformed goal group who self-recorded were told to write down the strategic step(s) that were adjusted during each practice trial. Finally, girls assigned to the shifting-goal condition were instructed that to do well they

Table 1
Directions for Dart-Throwing Subskills

Subskill	Instruction
Grip	Hold the dart between your first and second finger and the thumb. Simply grasp the dart comfortably.
Stance	Stand behind the white throwing line facing the target. Stand comfortably with your feet slightly apart. If you are right-handed, the right foot should be slightly ahead of the left, touching the toe line and pointing toward the board. If you are left-handed, place the left foot forward.
Sighting	Keep your arm close to your body. Using your arm and wrist and with the elbow acting as a fulcrum, bring the dart back toward your face until it almost brushes your cheek where you find it most comfortable to stop.
Throw	Keep all the other parts of your body still when you throw. Your head must be held steady and you must not jerk the throw. Try to develop a smooth vertical throw using the wrist and elbow as pivots. Hold your elbow steady and keep it parallel to the floor. Your wrist should be loose and laid slightly back. Use only the forearm and wrist to throw in a vertical motion. The throw need not be hard, but it must be crisp. The dart should get to the board quickly with as little trajectory as possible.
Follow through	After you release the dart, simply allow your arm to continue in its natural motion. Let your hand, with your fingers fully extended, follow the dart as it moves toward the target.

should concentrate first on properly executing the final two steps in every throw they attempted: (a) throwing and (b) following through. After approximately 12 min when the girls had achieved automaticity (i.e., they had thrown three sets of darts without missing a strategic step), they were told to shift their goal to trying to attain the highest numeric score (between 0 and 7) during the remaining practice period. Girls in the shifting-goal condition who self-recorded were asked first to write down the step(s) that they had gotten right at the end of each practice trial in a log. After they shifted their goal to the highest numeric score, they were asked to write their outcome scores in a log after each practice trial. Girls in the practice-only control group were given the same initial instructions as experimental participants but practiced dart throwing without setting goals or self-recording for 20 min.

When practice was completed, all experimental groups, including the control group, were posttested for dart-throwing proficiency, self-efficacy, self-reaction, intrinsic interest, and attributions. The experimenter began and terminated each section and recorded the posttest scores.

Results

The data for each dependent measure were analyzed by using a 4 (types of goal setting) × 2 (levels of self-recording) factorial analysis of variance (ANOVA). Post hoc comparisons were conducted by using Tukey tests. The goal groups and control group were compared by using t tests. We expect all goal groups to surpass the control group on each dependent measure. Table 2 displays the means and standard deviations of all measures for each experimental condition.

Factorial Analyses

For the dart-throwing measure of skill, there was a significant main effect for goal setting, $F(1, 82) = 148.98$, $p < .01$, and for self-recording, $F(1, 82) = 46.53$, $p < .01$; however, no significant interaction between goal setting and self-recording is found. According to Tukey tests, girls with a process goal ($M = 4.89$) surpassed the dart-throwing proficiency of those given an outcome goal ($M = 3.53$; $p < .05$). In addition, the dart-throwing skill of girls with a shifting goal ($M = 6.00$) exceeded that of girls with either a process goal or a transformed goal ($M = 5.28$; both $ps < .05$). Although the dart-throwing skill of girls with a transformed goal surpassed that of girls with a process goal numerically, this difference did not attain significance ac-

Table 2
Dependent Measure Means and Standard Deviations for Each Experimental Group

		No self-recording experimental group				Self-recording experimental group			
Dependent measure	Control	Product goal	Process goal	Transform goal	Shifting goal	Product goal	Process goal	Transform goal	Shifting goal
Dart skill									
M	2.63	3.28	4.55	4.97	5.75	3.78	5.23	5.60	6.25
SD	0.26	0.59	0.31	0.24	0.24	0.52	0.41	0.33	0.20
Self-efficacy									
M	44.75	47.25	61.75	71.50	77.25	57.25	70.25	77.00	89.75
SD	5.33	9.61	7.91	3.57	10.17	12.27	4.16	8.56	8.38
Self-reaction									
M	41.00	48.00	68.00	73.00	83.00	60.00	75.00	74.00	91.00
SD	8.17	12.30	16.19	12.52	9.49	10.80	8.43	7.34	11.00
Intrinsic interest									
M	4.30	4.10	2.90	2.20	1.80	3.90	2.50	2.10	1.50
SD	0.82	1.10	0.74	0.92	0.79	1.10	0.70	0.74	0.70

Note. Intrinsic interest rankings reverse the usual order, 1 = *first* and 5 = *last.*

cording to Tukey criteria. Girls who self-recorded (M = 5.22) attained greater dart skill than those who did not self-record (M = 4.64).

The ANOVA for self-efficacy yielded similar results. There was a significant main effect for goal setting, $F(1, 82) = 48.23$, $p < .01$, and for self-recording, $F(1, 82) = 22.88$, $p < .01$, but no significant interaction between these variables. According to Tukey tests, girls with a process goal (M = 66.00) were more self-efficacious than those with an outcome goal (M = 52.25), and girls with a shifting goal (M = 83.50) were more self-efficacious than those with either a process goal or a transformed goal (M = 74.25; both $ps < .05$). Girls with a transformed goal displayed significantly higher self-efficacy than those in the process-goal group ($p < .05$). Girls who self-recorded (M = 73.56) displayed greater self-efficacy than those who did not self-record (M = 64.44).

With regard to self-reactions, there was a significant main effect for goal setting, $F(1, 82) = 30.30$, $p < .01$, a significant main effect for self-monitoring, $F(1, 82) = 8.09$, $p < .01$, but no significant interaction between the goal-setting and self-monitoring components. According to post hoc tests, girls with a process goal (M = 71.50) expressed greater satisfaction with their dart throwing than those with an outcome goal (M = 54.00; $p < .05$). Girls with a shifting goal (M = 87.00) displayed more positive self-reactions than those with a process goal or a transformed goal (M = 73.50; both $ps < .05$). Girls with a transformed goal displayed numerically higher self-reactions than those in the process-goal group, but this difference did not reach statistical significance. Girls who self-recorded (M = 75.00) reported greater satisfaction than those who did not self-record (M = 68.00).

Finally, the relative effects of goal setting and self-recording on intrinsic interest were also assessed. The ANOVA conducted indicated a significant main effect for goal setting, $F(1, 82) = 27.41$, $p < .01$, but no significant main effect for self-recording and no significant interaction between the goal setting and self-recording components. According to post hoc tests, girls with a process goal (M = 2.70) preferred dart throwing more than those given an outcome goal (M = 4.00; $p < .05$). Girls with a shifting goal (M = 1.65) rated dart throwing significantly higher than those given a process goal ($p < .05$). Girls with a transformed goal (M = 2.15) preferred darts more than did girls with a process goal. Although girls who shifted goals rated darts more highly than girls with a transformed goal, the differences did not reach significance according to Tukey criteria.

Control Group Comparisons

The performance of girls in the practice-only control group was compared initially with the outcome goal non-self-recording group. The control group displayed significantly less dart skill, $t(18) = -6.25$, $p < .01$, but statistically comparable self-efficacy, self-reactions, and intrinsic interest. When compared with the outcome-goal group that also self-recorded, control participants displayed significantly less dart skill, lower self-efficacy, and less positive self-reactions, smallest $t(18) = -2.95$, $p < .01$. However, the intrinsic interest of the control group was statistically comparable. Girls given a process goal, a transformed goal, or a shifting goal (regardless of self-recording) displayed significantly greater dart skill, higher self-efficacy, more positive self-reactions, and higher intrinsic interest than control girls, smallest $t(18) = -4.00$, $p < .01$.

Correlational Analyses

To examine relationships among independent and dependent measures further, a Pearson correlational analysis was performed. Goal setting was converted into a metric variable by ranking the conditions according to their hypothesized effectiveness: namely 0 = *control group,* 1 = *outcome goal,* 2 = *process goal,* 3 = *transformed goal,* and 4 = *shifting goal.* The obtained correlation coefficients are presented in Table 3. Goal setting was highly predictive of self-efficacy as well as the other variables. Self-efficacy was not only highly predictive of dart-skill performance but was also highly predictive of positive self-reactions and intrinsic interest in pursuing dart throwing.

Outcome Attributions

The girls' attributions for failing to hit the bull's-eye are classified in Table 4 into one of six categories: type of strategy, amount of effort, level of ability, amount of practice, "I don't know," or "other." Because self-recording did not affect the girls' attributions, these data are combined within goal-setting groups. Inspection of these frequencies reveals that participants in the control and the outcome-goal groups attributed their imperfect performance most frequently to ability deficiencies. Girls in the outcome-goal self-monitoring group attributed outcomes to effort as well. In contrast, girls in the other experimental groups, which emphasized process goals in some way, attributed their deficiencies primarily to strategy choice or execution. These attributional differences between process and nonprocess experimental groups were significant, $\chi^2(5, N = 90) = 105.66$, $p < .01$.

To determine the predictiveness of these three main at-

Table 3
Correlations Between Independent and Dependent Variables

Variable	1	2	3	4	5
1. Goal setting	—				
2. Self-recording	.42**	—			
3. Dart skill	.72**	.26*	—		
4. Self-efficacy	.68**	.15	.81**	—	
5. Self-reactions	.62**	.24*	.75**	.78**	—
6. Intrinsic interest	−.58**	−.23*	−.75**	−.74**	−.65**

Note. Intrinsic interest rankings reverse the usual order, 1 = *first* and 5 = *last.*
* $p < .05$. ** $p < .01$.

Table 4
Attributions for Each Goal-Setting Group (Combined for Self-Recording Condition)

Group	Attributional source					
	Strategy	Effort	Ability	Other	Practice	Don't know
Control	0	2	4	1	1	2
Outcome goal	1	5	8	1	2	3
Process goal	12	1	0	1	4	2
Transformed goal	13	0	0	1	4	2
Shifting goal	17	0	0	0	3	0

tributions to other outcomes, Spearman correlations were conducted by using the presence or absence of each attribution and the metric value of the other measures, and these results are presented in Table 5. Each person's single attribution was coded in (or not) the nominal categories of ability, effort, or strategy. Girls who made attributions regarding their failure to hit the bull's-eye to strategy insufficiency displayed significantly higher levels of self-efficacy, higher dart-skill acquisition, more positive self-reactions, and significantly greater intrinsic interest in the game of darts. In contrast, girls who attributed their dart-throwing failure to inability or inadequate effort displayed significantly lower levels of self-efficacy, dart skill, self-reactions, and intrinsic interest in darts.

Discussion

The findings provide support for a social cognitive phase description of complex skill development (Zimmerman & Bonner, in press). After initial skill training through modeling and imitation (the first two phases of the model), girls who focused during self-directed practice on process goals first (Phase 3) and then shifted to outcome goals (Phase 4) displayed the strongest self-efficacy beliefs, the highest dart skill, the most positive self-reactions, and the greatest intrinsic interest in this game. Conversely, girls who prematurely focused on outcome goals displayed the lowest level of self-efficacy, dart skill, self-reactions, and intrinsic interest of all treatment groups. However, this outcome-goal group was superior statistically to the practice-only control group on the dart-skill measure. Participants who focused on a process goal but failed to shift to an outcome goal scored intermediately on all dependent measures. Clearly the way that these girls set goals for themselves and self-recorded goal attainment during self-directed practice had a substantial impact on their subsequent dart skill. These goals also significantly enhanced the girls' self-regulatory beliefs and processes, namely, their self-efficacy perceptions, their self-reactions, and subsequent intrinsic interest in this skill. The finding that a process goal was more effective than an outcome goal replicates those reported in earlier research on dart skill (Zimmerman & Kitsantas, 1996) as well as research on academic writing (Schunk & Swartz, 1993).

Girls who set a transformed goal scored intermediately between those with a shifting goal and those with an outcome goal on all dependent measures, just like the girls who set a process goal. The transformed goal group was expected to surpass the simple outcome group because it enabled learners to convert performance outcome information into process adjustments, but it was not predicted to surpass a shifting-goal condition because it did not emphasize the ultimate importance of outcomes to optimal performance. The results provided support for this account. No predictions were made regarding the effectiveness of a transformed goal relative to a process goal, but girls in the former group did report significantly greater self-efficacy and intrinsic interest than the latter group. It appears that preparing learners to interpret specific features of outcomes, such as horizontality and verticality of throwing errors, in terms of appropriate strategic process adjustments does increase perceived effectiveness and intrinsic interest. It is noted that the transformed group did display numerically greater dart skill and more positive self-reactions, but these differences did not reach significance according to conservative post hoc tests.

Evidence that self-recording additively enhanced the effects of all forms of goal setting on dart-skill attainment, self-efficacy beliefs, and self-reactions is concordant with the presence of a self-oriented feedback loop that underlies self-regulation (Zimmerman, 1989). This loop involves a cycle in which students monitor the effectiveness of their learning methods or strategies in reaching their goals and react to this feedback in a variety of ways, ranging from covert changes in self-perceptions to overt changes in skilled behavior. Changes in self-reactions, efficacy beliefs, and, of course, dart skill indicate that self-recording significantly enhanced that self-regulatory cycle. These self-feedback results parallel earlier research on external feedback by Schunk (1983), who found increases in both

Table 5
Correlations Between Attributions and Other Dependent Variables

Dependent variable	Attribution		
	Strategy	Ability	Effort
Self-efficacy	.42**	−.43**	−.23*
Dart skill	.55**	−.46**	−.32**
Self-reactions	.41**	−.34**	−.26*
Intrinsic interest	−.39**	.35**	.36**

Note. Intrinsic interest rankings reverse the usual order, 1 = *first* and 5 = *last*.
$^{*}p < .05$. $^{**}p < .01$.

students' mathematical skill and perceptions of self-efficacy. Evidence of changes in self-reactions and self-efficacy beliefs suggests development in not only the girls' metacognitive and motoric functioning but also in their core self-referential system (McCombs, 1989; Pintrich & Schauben, 1992; Zimmerman, 1995).

The advantages of process goals and self-recording on both motoric tasks and academic tasks, such as reading and writing, indicate the generality of these effects. It can be asked whether the benefits of a phase shift from process goals to outcome goals will also generalize to academic tasks. There is reason to believe that this will be the case. For example, students aspiring to become writers ultimately need to aim beyond emulating the basic processes of exemplary models; they need to discover their own unique "voice" or effective ways of expressing themselves. This will require them at some point in the learning process to focus on writing outcomes, such as the reactions of readers of their work. It is suggested that after students master fundamental techniques, such as organization and grammar, they can benefit from shifting their writing goals to outcomes without detriment as did dart-skill learners. Students who remain relatively insensitive to writing outcomes will be unlikely to attain the highest levels of writing mastery.

The motivational implications of the girls' changes in self-perception were evident in their enhanced intrinsic interest in pursuing darts as an avocational activity. The correlations between self-efficacy perceptions and intrinsic interest ratings were very large, and they provide additional evidence that intrinsic motivation emerges from increases in self-perceived competence (Deci, 1975; Harter & Connell, 1984; Zimmerman, 1985). It is worth mentioning that a number of girls who reported high levels of intrinsic interest spontaneously mentioned their plans to buy a dartboard for use at home. Ultimately, these motivational implications of optimal goal setting and self-monitoring may be more important than the attained level of motoric competence because if learners are unwilling to continue efforts toward mastery, whatever success they achieved will be short-lived.

It was expected that participants in the outcome-goal non-self-monitoring group would exceed their classmates in the practice-only control group on all dependent variables. The girls in the control group displayed numerically lower performance on all measures, but only the difference in dart skill proved to be statistically significant. To explore this finding further, the girls in the control group were debriefed after completing the study regarding whether they had spontaneously set goals for themselves during their practice, and 9 of the 10 girls reported setting outcome goals. This finding reveals that experimental attempts to control students' covert use of self-regulated learning strategies may not be effective when a particular strategy is widely used.

This study is one of the first to demonstrate that self-regulated strategy process goals influence the types of attributions that students make. Zimmerman and Martinez-Pons (1992) hypothesized that (a) use of self-regulated learning strategies will prompt students to attribute negative performance outcomes to strategic sources instead of ability, effort, or other sources and (b) strategy attributions will preserve self-efficacy beliefs much longer than ability or effort attributions. Failure attributions to inability directly imply the futility of future attempts to learn because they are internal and uncontrollable (Weiner, 1986), and attributions to insufficient effort are either not encouraging when little progress is evident or not credible when high levels of effort are being expended already. In contrast, failure attributions to poor strategy implementation or choice will sustain hope until the learner's strategic repertoire is exhausted (Anderson & Jennings, 1980; Clifford, 1986; Zimmerman & Martinez-Pons, 1992). The present results confirm these two hypotheses. First, girls who adopted a process goal did attribute their deficient performance more frequently to a strategy than girls who adopted an outcome goal or performed without a goal. Second, girls who made strategy attributions displayed not only significantly higher self-efficacy beliefs but also more positive self-reactions and greater dart skill than girls who made inability or inadequate effort attributions for dart-throwing failures. It appears that attributions to self-regulated learning strategies improve students' beliefs about their potential to learn and their intrinsic interest in mastering the task.

In conclusion, these findings support the social cognitive assumption that students need social guidance during the initial phases of learning complex skills to prepare them to engage in optimally effective self-regulated practice. When students are left to their own discovery methods, they tend to focus on performance outcomes, attribute them to uncontrollable personal sources (i.e., ability) of causation, fail to perceive their chances for future success favorably, and fail to profit metacognitively and motorically from practice experiences. Mistakes are not only more probable but are also more likely to lead to less positive personal feelings about the eventual acquisition of the skill. Clearly a nonsocial approach to complex skill acquisition exposes learners to unnecessary risks. In contrast, when socially validated learning strategies are modeled and adopted as process goals to guide self-directed practice and self-monitoring, students more frequently make attributions to controllable (strategy) personal sources and experience gains in self-perceptions of efficacy and intrinsic motivation to pursue the skill further.

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