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Developing Self-Regulation Skills: The Important Role of Homework

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hHistorically, homework has been an essential aspect of the American educational system because teachers assign homework to enhance students' learning outcomes. According to Cooper, *homework* involves tasks assigned to students by schoolteachers; these tasks are meant to be carried out during noninstructional time (Bembenutty, 2011). Researchers have conducted extensive research to study the relationship between homework and achievement. In a review article, Cooper, Robinson, and Patall (2006) found that most research investigated the relationship between homework time and achievement; the results showed weak to modest gains at the middle and high school levels and no statistically significant gain at the elementary level. This suggests that homework benefits primarily the higher grades. However, time on task is only one aspect of homework behavior, and it does not capture the quality of time, such as studying attentively in a quieter environment (Plant, Ericsson, Hill, & Asberg, 2005). In addition, Plant et al. (2005) found that the amount of study time was a significant predictor of cumulative GPA only when the quality of study time and prior performance were considered.

Summary

The article evaluates the relationship between homework and self-regulation from the elementary grades to college. It reveals that quality measures of homework such as managing distractions, self-efficacy and perceived responsibility for learning, setting goals, self-reflection, managing time, and setting a place for homework completion are more effective than only measuring the amount of time spent on homework. During homework completion, students engage in self-regulation by motivating themselves, inhibiting distractions, using strategies to complete homework, managing time, setting goals, self-reflecting on their performance, and delaying gratification. As a result, self-regulation and homework are related and the findings show that from elementary grades to college, skilled learners engaged in the above self-regulatory behaviors during homework activities. Self-regulatory behaviors develop gradually over time with repeated practice. Evidence from experimental studies shows that students can be trained to develop self-regulation skills during homework activities. It is important to continue with training studies at all grade levels so that students can become aware of the relationship between homework activities and these self-regulation processes such as goals, self-efficacy, self-reflection, time management, and delay of gratification. Evidence from correlational studies showed that students' self-regulation skills and motivational beliefs correlate positively with homework activities. Homework assignments that are adequately challenging and interesting help struggling and at-risk students develop motivation and self-regulation skills and achieve success. Teachers can help students develop these behaviors by using homework logs. Data from the logs can help teachers show students their strengths and help them overcome their weaknesses.

Apart from the time dimension, a number of researchers speculated that homework assignments would enhance the development of self-regulation processes and self-beliefs, which include goal setting, time management, managing the environment, maintaining attention, and self-efficacy (Pintrich, 2000; Trautwein & Köller, 2003). *Self-regulation of learning* involves learners setting goals, selecting appropriate learning strategies, maintaining motivation, and monitoring and evaluating academic progress (Zimmerman, 2000). However, little research exists on how homework facilitates the development of self-regulation processes. Students who engage in self-regulatory processes while completing homework are generally more motivated and are higher achievers than those who do not use these processes (Bembenutty, 2009; Bempechat, 2004). Further, investing greater effort in homework is associated with higher achievement (Trautwein, 2007; Zimmerman & Kitsantas, 2005).

To address this research deficit, this article examines how homework completion is associated with the development of various self-regulatory behaviors. The research questions are: Do homework assignments facilitate the development of self-regulation skills? Does research evidence support this relationship at various grade levels? Does homework play a role in facilitating the development of self-regulation skills for elementary, middle/high school, and college students?

The review begins with a definition and discussion of the importance of homework as well as self-regulation. Second, it explores the relationship between homework and self-regulation processes from a social cognitive perspective. Third, the method section describes the criteria used to select various studies. Fourth, the authors analyze the method, results, strengths, and weaknesses of the selected studies at the elementary level, middle/high school level, and college level. Finally, this review ends with a discussion of educational implications and suggestions for future research.

Homework and Its Importance

Although formal definitions of homework can vary, Cooper (1989) defined homework as “tasks assigned to students by school teachers that are meant to be carried out during non-school hours” (p. 7), or teacher-assigned tasks to engage students in independent and effective studying (Cooper et al., 2006). Recently, Cooper has modified his definition of homework to indicate that it involves tasks to be carried out during noninstructional time (Bembenutty, 2011). Implicit in this definition is that students must manage homework assignments by engaging in various self-regulation processes such as planning, managing time, finding a suitable place to work, and motivating themselves.

Some critics claim that homework does not improve study skills, promote self-discipline and responsibility (Kohn, 2007), or enhance students’ academic achievement (Kralovec & Buell, 2005). However, meta-analytic studies reveal that the standardized mean differences on tests between students who completed homework versus those who did not ranged from $d = .39$ to $d = .97$, implying a positive relationship between homework and achievement (Cooper et al., 2006).

In addition to its effect on academic achievement, homework provides students with opportunities to engage in a range of self-regulation processes. A longitudinal study with fifth-grade students showed that doing homework fosters self-regulation skills and reading achievement (Xu, Benson, Mudrey-Camino, & Steiner, 2010). Although teachers set goals and expectations for homework, students must independently complete homework by practicing self-regulatory behaviors such as planning, inhibiting distractions, persisting at difficult assignments, organizing the environment, overcoming unwanted emotions, and reflecting on what they have learned (Boekaerts & Corno, 2005; Xu, 2008a). Children who complete homework outside of school often develop an aptitude for academic work through extra practice and are responsible for regulating their own behavior (Corno, 2000), making homework a classic form of self-regulated learning (Trautwein & Köller, 2003).

Self-Regulation and Its Importance

From a theoretical perspective, *self-regulation* is a proactive process whereby individuals consistently organize and manage their thoughts, emotions, behaviors, and environment in order to attain academic goals (Boekaerts & Corno, 2005; Zimmerman, 2000). Students become self-regulated by setting goals, selecting and using strategies, monitoring performance, and repeatedly reflecting on learning outcomes over a lengthy period of time (Zimmerman, 2008). Self-regulation operates through three areas of psychological functioning that are essential in learning: cognitive (e.g., learning strategies), motivational (e.g., self-efficacy, task value), and metacognitive (e.g., self-monitoring and self-reflection; Bandura, 1993; Hong, Peng, & Rowell, 2009; Trautwein & Köller, 2003). These three areas of self-regulation operate cyclically wherein mastery of a task depends on beliefs in one's capabilities and expectations of success. *Self-efficacy* is the belief about one's capability to learn or perform effectively (Bandura, 1986). Self-efficacious students believe that homework completion would lead to successful learning outcomes. High self-efficacy and high expectations of success would lead to persistence, using different strategies, or seeking help when faced with difficult homework tasks. Self-regulated learners monitor their work, which provides internal feedback on progress. Self-reactions to successful outcomes enhance self-efficacy and expectations of further progress (Zimmerman, 2000). A recent meta-analysis study concerning the relationship between self-regulation and academic achievement from elementary to secondary grades revealed an average effect size of 0.69, $p < .01$, implying that self-regulated learning significantly enhanced students' academic achievement (Dignath & Büttner, 2008).

Self-regulation skills, such as time management, setting goals, effort and persistence in completing difficult tasks, and self-monitoring one's performance, are not only important to academic success, but are also key components in the lives of

successful professional writers, athletes, artists, and scientists (Zimmerman, 1998). Educators are aware of the importance of self-regulation skills in learning. In the early grades, teachers play a major role in regulating students' learning by setting goals, managing their time on tasks, and instilling beliefs of effort and expectations for assignments that are completed in the classroom. However, as students advance to higher grades, teachers gradually reduce that support and expect students to incorporate these self-regulation processes in assignments that are done independently, such as homework (Zimmerman, 2002). In the absence of the teacher, students take responsibility to self-regulate their learning and decide where, when, how, why, and what to do with the assigned homework (Zimmerman, 1998).

Homework and Self-Regulation

Self-regulation researchers seek to answer the question, how do students become self-directed in managing their learning? Homework is generally done at home independently, either with or without supervision. As mentioned earlier, self-regulation operates through three components: motivational, cognitive, and metacognitive. The motivational domain of self-regulation implies that students believe in their capabilities and value homework as a task that would enhance learning. Valuing the task and having high self-efficacy for the assignment can enhance one's persistence when faced with difficulties.

The cognitive component of self-regulation relates to the strategies students use to complete homework and process the information more effectively. Strategies vary depending on the homework task. For example, writing an essay requires brainstorming ideas and making an outline before writing. By contrast, solving fraction problems requires a different set of strategies.

The third component of self-regulation is metacognition, wherein students set goals and monitor their progress as they complete homework assignments (Pintrich, 2000). Students engage in metacognition when they reflect on why they do not

understand a text or a problem during homework completion and use strategies such as rereading the text or seeking help in solving the problem. Clearly, homework behavior is closely associated with these three components of self-regulation. Students' self-beliefs, expectations of success, task value, strategy use, and self-monitoring influence homework behavior and learning (Trautwein & Köller, 2003).

Homework and Self-Regulation: Empirical Evidence

In selecting publications for this review, we restricted our search to correlational and experimental studies specifically using the search terms “homework” and “self-regulation.” Second, the articles had to be published between the years 1986 to 2010. The date 1986 was selected based on Bandura's publication of *Social Foundation of Thought and Action: A Social Cognitive Theory*, which pioneered research on self-regulation. The authors searched the following online databases for the pertinent literature: Educational Resources Information Center (ERIC), Academic Search Complete, PsycINFO, PsycArticles, and Education Research Complete. From a list of 62 articles, 5 articles meeting the above criteria were selected (see Table 1).

Elementary School Level

An intervention study conducted by Stoeger and Ziegler (2008) sought to improve 219 fourth-grade students' time management skills, self-efficacy, and self-reflection of their learning during homework activities. Among the 17 teachers who volunteered to participate in the study, 9 teachers were randomly assigned to receive training in time management skills and the remaining 8 teachers were assigned to the control group. The researchers used a slightly modified version of a classroom intervention of self-regulated learning developed by Zimmerman, Bonner, and Kovach (1996). This model is social cognitive in approach wherein

Table 1

A Summary of Reviewed Studies on Homework and Self-Regulation Processes

Authors	N; Student grade level	Self-regulation processes	Major empirical findings
Stoeger & Ziegler (2008)	219 fourth graders	Time management, self-efficacy, and self-reflection	Significant training effects for all three self-regulation processes
Xu (2008b)	633 eighth graders	Structuring the environment, managing time, motivating one's self, managing emotions, inhibiting distractions	Positive correlations among the five variables; high-achieving students performed significantly better on these measures compared to low-achieving students
Zimmerman & Kitsantas (2005)	179 high school females	Self-efficacy for learning and perceived responsibility	Bi-directional effects of both variables; both predicted GPA, but perceived responsibility was higher
Kitsantas & Zimmerman (2009)	223 college students	Self-efficacy for learning and perceived responsibility	SAT scores predicted quality of homework, self-efficacy for learning perceived responsibility; self-efficacy was a better predictor of grades compared to responsibility
Bembenutty (2009)	58 college students	Self-efficacy, delay of gratification, self-regulation of learning, goals, intrinsic interest, time management	General goals correlated with self-efficacy, specific goals correlated with midterm exam, time management correlated with homework completion, midterm math study correlated with intrinsic interest, general study correlated with midterm grade, homework completion, and delay of gratification

self-regulation is viewed as an interaction among personal, behavioral, and environmental processes (Bandura, 1993; Zimmerman, 2000). The model has five modules: time management, comprehension and summarization skills, note taking, test preparation skills, and writing skills. However, Stoeger and Ziegler (2008) chose only to use the time management module.

Classes were randomly assigned to a training group or a control group for a total of 5 weeks. Teachers conducted the training in class and data were collected using various scales: time management (e.g., "Prior to every learning unit, I establish a specific period of time for it."), self-reflection (e.g., "When I am studying math and a specific point seems to be confusing and unclear, I change my methods in order to get a better grip on the major difficulties."), self-efficacy (e.g., "In math I am sure I will keep getting more answers correct."), helplessness (e.g., "I cannot think clearly in school."), willingness to exert effort (e.g., "I spend a lot of time at home doing math exercises."), motivational orientation (e.g., "One of my goals is to master a lot of new skills this year."), interest (e.g., "Mathematical skills are important to me."), and academic outcomes (e.g., daily math exercises and math homework assignments, daily journal entries, and self-assessments).

Over the course of the training program, students worked through the self-regulated learning cycle four times. First, students self-evaluated and monitored their learning abilities, and they became more cognizant of their strengths and weaknesses. Next, with the teachers' guidance they set specific, attainable goals, and used appropriate strategies to achieve them. Finally, students implemented the strategy, monitored their work, and engaged in self-reflection to evaluate their learning.

To examine the effectiveness of the training, Stoeger and Ziegler (2008) used 2 x 2 repeated measures analysis of variance. The results revealed a significant main effect of time on time management ($F = 2.27, p < .05$), self-efficacy ($F = 6.94, p < .05$), self-reflection ($F = 6.70, p < .05$), learning goal orientation ($F = 16.41, p < .001$), performance avoidance goal ($F = 7.36, p < .01$), perception of helplessness ($F = 26.35, p < .001$), and math achievement ($F = 6.54, p < .05$). There were significant interac-

tions between condition and time: time management ($F = 2.27, p < .05$), self-efficacy ($F = 16.01, p < .001$), self-reflection ($F = 4.20, p < .05$), willingness to exert effort ($F = 7.11, p < .01$), learning goal orientation ($F = 6.10, p < .05$), perception of helplessness ($F = 17.17, p < .001$), and math achievement ($F = 11.84, p < .01$).

To determine how students' performance changed over the 5 weeks, the authors used hierarchical linear modeling. This method evaluates hierarchically organized data where various variables represent different levels of analysis. Students in this study, level one, are nested within classes, level two (Raudenbush & Bryk, 2002). The results showed that students correctly answered a mean of 7.48 of the 10 items on each of the 5 hand-outs across the 5 measuring points, indicating a linear increase of .87 exercises weekly. There were also significant differences in the growth curves among the students. The three variables (time management, learning goal orientation, and self-efficacy) relate significantly to individual linear growth rates. They explained 19.28% of the variance in the weekly math assignments, 53.82% of the variance in performance growth over the 5-week period (linear trend), and 61.11% of the variance in a gradual decrease of performance (quadratic trend) toward the end of the study. Students with high learning goal orientation, high self-efficacy, and good time management skills gained most from the training.

This experimental study was well designed. The participating classes were assigned randomly to a treatment or a control group. Teachers were also assigned randomly to a treatment and control group and they were trained rigorously to implement the treatment. Second, the researchers implemented a self-regulation intervention during classroom hours and homework activities and found significant results of time management on self-efficacy and self-reflection, indicating that it is possible to use homework activities to train students to develop self-regulation skills. The effect sizes were small and medium and it is possible that the changes could have occurred due to increased attention. However, Stoeger and Ziegler (2008) suggested this was unlikely because students and teachers in the control group also knew

from the beginning that they were participating in a study and would be assessed.

Limitations of the study should be noted. The effectiveness of the 3-day teacher training was not evaluated. Moreover, the instructional styles of the teachers may not have been in alignment with self-regulatory learning.

In sum, this study demonstrates that self-regulated training can be successfully implemented in the elementary classroom and with homework activities to help students learn time management skills, develop self-efficacy, and self-reflect on their performance. Ormrod (2006) reported that children in grades 3–5 have demonstrated improved competency in focusing attention, using self-evaluation, and working on short assignments independently.

Middle/High School Level

Self-efficacy is a key motivational component of self-regulation, and it has been studied extensively in the context of academic achievement and performance. In a meta-analysis of 36 academic self-efficacy studies, Multon, Brown, and Lent (1991) found the unbiased effect size estimate (r_u) was .38 ($p < .001$) for academic performance (i.e., self-efficacy beliefs accounted for 14% of the variance in students' academic achievement).

Zimmerman and Kitsantas (2005) examined the mediational role of self-efficacy for learning and perceived responsibility beliefs between students' homework reports and their academic achievement. Additionally, they tested the reliability of an instrument to measure the quantity and quality of students' homework, self-efficacy for learning, and perceived academic responsibility. Participants consisted of 179 high school girls from a parochial school who had 3 hours of homework daily. The students' ages ranged from 14 to 19 years, with a mean age of 16 years. The measures were a personal data questionnaire and a homework survey that measured: the quantity (e.g., "How much time do you spend on homework every day?") and quality of homework (e.g., "Do you have a regular time to study?" "Do you have a regular place to study?"), the student's self-efficacy for learning (e.g., "When

you are feeling depressed about a forthcoming test, can you find a way to motivate yourself to do well?”), and the student’s perceived responsibility for learning (e.g., “Going through motions without trying” or “Not taking notes in class”). The Self-Efficacy for Learning Form (SELF) had self-efficacy items for reading, note taking, writing, test taking, and general studying. A factor analysis of SELF items indicated a single large factor, implying that students who felt self-efficacious about one aspect of performance (e.g., note taking) felt likewise about the other four.

Correlational data show that all six variables predict student GPA at the end of the academic semester. GPA correlated ($r = .57$) with the National Educational Development Test (NEDT). This demonstrates that teacher-assigned grades are significantly related to the standardized test necessary for high school entry. The researchers also used path analysis to test the mediating relations among NEDT, quality of homework, self-efficacy for learning, perceived responsibility, and GPA. The results indicate a good fit, $\chi^2 = 0.64$, $p > .42$ (NFI = .99, CFI = .99, and RFI = .99), suggesting that homework influenced students’ self-beliefs. Specifically, the results show that the direct effect of the girls’ prior achievement (NEDT) on their GPA was small ($p = .18$), but the indirect effect was larger ($p = .39$), indicating most of the variance in prior achievement is mediated through homework-related variables in the model. The effect of homework quality on GPA ($p = .45$) is mediated through the students’ self-efficacy and perceived responsibility beliefs. Self-efficacy is mediated via perceived responsibility ($p = .32$). Zimmerman and Kitsantas (2005) also tested the reverse hypothesis in a second model, but the fit was poor. In a third path model, they reversed the causal arrow, with perceived responsibility predicting self-efficacy. These results also revealed a good fit, signifying that causality can flow in either direction between these two variables.

The contribution of this study is that the quality of homework correlated with the quantity of homework ($r = .75$). This implies students who study more also use self-regulatory strategies, such as having a regular place and time to study, estimating the time needed to complete their assignments, setting task priorities, and

completing their daily assignments successfully. The SELF scale had 57 items. Due to its single factor structure and high reliability ($\alpha = .99$), Zimmerman and Kitsantas (2005) proposed that future studies could employ a shorter version of this scale while maintaining the same effectiveness. Finally, although the second model was nonsignificant, the third model showed that causality between self-efficacy and perceived responsibility can occur bi-directionally (i.e., each belief predicts the other as well as unique variance in the students' GPA).

This study has a few limitations. More experimental research is necessary to resolve the issue of causality, as path analysis methods do not provide a direct test of causality. Second, the school was an academically selective parochial school and placed emphasis on homework as a means of learning. The results may not generalize to less selective schools or to schools that place less emphasis on homework completion. Third, the implications of the findings for coeducational schools are unknown.

In another study of eighth-grade students, Xu (2009) examined whether student achievement and school location influence how students engage in homework management strategies. The participants were 633 rural and urban students. School location and its influence on homework management was an important consideration in this study. According to Arnold, Newman, Gaddy, and Dean (2005), rural students tend to have lower educational aspirations than nonrural students. This disparity may ultimately influence homework completion and use of homework strategies.

The Homework Management Scale (HMS), which consisted of 22 items, measured the following homework strategies: arranging the homework environment (e.g., "Find a quiet area."), managing time (e.g., "Remind myself of the available remaining time."), handling distraction (e.g., "Start conversations unrelated to what I'm doing."), monitoring motivation (e.g., "Praise myself for good effort."), and controlling emotion (e.g., "Tell myself to calm down"). The validity of the HMS scores was examined within the framework of structural equation modeling. Data from rural middle schools ($n = 699$) confirmed the five factor structure,

which was cross-validated with data from urban middle school students ($n = 482$). For these two samples combined, reliability coefficients (Cronbach's alpha) for scores on the five subscales ranged from .71 (managing time) to .82 (monitoring motivation; Xu, 2008b).

The results showed that the correlations among the homework subscales ranged from .11 ($p < .01$) between monitoring motivation and handling distractions to .63 ($p < .001$) between monitoring motivation and controlling emotions. A one-way, within-subjects ANOVA revealed a significant difference among the five homework subscale scores, $F = 47.15$, $p < .001$. Bonferroni post-hoc comparisons also showed that the middle school students reported significantly more effort on handling distractions and arranging the homework environment than managing time. Moreover, they reported more effort on managing time compared to monitoring motivation or controlling emotions. To compare the effects of school location (rural vs. urban) on the HMS subscales, univariate tests showed statistically significant effects on one subscale, monitoring motivation, $F = 4.317$, $p = .038$; urban middle school students reported being more self-motivated during homework compared to their rural counterparts. Regarding student achievement (i.e., letter grades are ranked as high = A and low = C), univariate tests showed statistically significant results on all five dependent measures. High-achieving students reported more frequently arranging the homework environment ($F = 34.739$, $p < .001$), managing time ($F = 43.727$, $p < .001$), handling distractions ($F = 16.986$, $p < .001$), monitoring motivation ($F = 7.503$, $p < .006$), and controlling their emotions ($F = 9.642$, $p < .002$) when compared to low-achieving students.

This study has multiple strengths. The author recruited a student sample from rural and urban settings with diverse cultural and socioeconomic backgrounds to study homework behavior and self-regulation processes. Second, the homework scale was cross-validated with a rural and urban sample of middle school students and found to be a good measure of five self-regulation strategies. Previous findings support student achievement and the use of self-regulation strategies during homework completion

(Zimmerman & Kitsantas, 2005). Third, urban middle school students were more motivated during homework compared to rural students. Xu (2009) suggested that rural youth may be more hesitant about graduating from high school and going to college; therefore, they may place less emphasis on homework and academics.

This study has some limitations as well. First, it is based on self-reported data. Second, it is a correlational study and evidence of causality is not available. Finally, it is possible that other predictor variables such as parental monitoring may have an effect on homework management strategies.

As students progress to higher grades, it is important that they develop the self-regulatory skills that would enhance academic achievement. Both studies at the middle/high school level utilized validated scales, which measured an array of self-regulated behaviors during homework. Zimmerman and Kitsantas (2005) found that girls' homework practices are predictive of their self-efficacy beliefs and perceptions of responsibility to learn. The mediational role of these two self-beliefs may be important for educators interested in increasing the impact of homework assignments. Finally, Xu (2009) extended previous research on homework and achievement by using a scale that measured five aspects of self-regulation. These two studies indicated further that it is important to measure the quality of students' self-regulatory processes when completing homework, as opposed to the quantity of time they spend.

College Level

Extending the research accomplished with high school girls, Kitsantas and Zimmerman (2009) conducted a study with 223 male and female college students. The hypotheses were the quality and quantity of students' homework would predict their grade in an educational psychology class, and the effect of homework on students' grades would be mediated by self-efficacy and perceived responsibility beliefs.

The four measures included SAT scores to assess the effects of prior achievement; a homework survey with two scales: Quantity of Homework (e.g., “How much time do you spend on homework every day?”) and Quality of Homework (e.g., “Do you have a regular place to study?”); and the Self-Efficacy for Learning Form (SELF) with 19 items (e.g., “When you are feeling depressed about a forthcoming test, can you find a way to motivate yourself to do well?”). The Cronbach alpha reliability for the abridged SELF scale is .91, its predictive validity for teachers rating students’ self-regulation in the classroom is $r = .52$, and the effect size is large, $d = 1.2$. The final measure, the Perceived Responsibility for Learning Scale, had 18 items (e.g., “Who is more responsible for a student remembering information from assigned readings?”).

The results showed that all of the variables correlated with each other. The final path model showed a good fit with a $\chi^2 = 1.34$, $p < .25$ (NFI = 0.99; CFI = 1.00; and RFI = 0.96). SAT scores significantly predicted the quality of students’ homework, self-efficacy for learning, and perceived responsibility. Although there was no direct effect of SAT scores on grades, there was an indirect effect ($p = .28$), which implies that most of the variance in prior achievement was mediated via homework-related variables in the model. The direct effect of homework quality on grades was large ($p = .47$), but the direct effect of self-efficacy for learning (SELF) on grades was medium ($p = .26$; Cohen, 1988). Additionally, there were significant paths from SELF to perceived responsibility ($p = .38$), from quality of homework to SELF ($p = .54$), and from homework to perceived responsibility ($p = .09$).

The researchers tested a second model with perceived responsibility predicting self-efficacy. They found a fit nearly identical to the first model, signifying that the prediction may flow in either direction. Finally, they tested a third model because homework quality and the two self-beliefs were assessed simultaneously. The two self-beliefs were the causal variables, homework was the mediating variable, and grade was the outcome variable. This

model was a poor fit, demonstrating that homework experiences influenced students' self-beliefs and not the reverse.

This study extended previous work with high school girls to both male and female college students and showed that the quality of students' homework is significantly related to improvement in study habits. Second, the data indicated that homework is important at the college level as well. The results show significant mediational roles for self-efficacy for learning and perceived responsibility of homework on course grades. Third, self-efficacy for learning is a better predictor of the college students' grades compared to perceived responsibility ($r = .58$ vs. $r = .40$), whereas the results were the reverse with the high school girls ($r = .68$ vs. $r = .86$). The researchers suggested that as the college students were in their junior year, they were more likely to assume responsibility for their work compared to high school students. Moreover, the instructors did not monitor the college students' homework completion, whereas the high school students were required to turn in homework regularly for evaluation. Fourth, this study also showed that a shorter scale of the original 57-item scale (Zimmerman & Kitsantas, 2005) sufficed to measure the same variables and yielded compelling results regarding the mediating effects of self-regulatory processes on achievement and homework responsibility.

This study has a few limitations. The data are correlational; therefore, it is not possible to infer causal results. Furthermore, there were no data on instructional support for students to complete their homework, and it is possible that instructional support at the college level may lead to enhanced self-regulated behaviors and motivational beliefs.

Another homework study at the college level examined various relationships between students' homework behaviors and their reported use of self-regulatory strategies, self-efficacy, outcome expectancy beliefs, intrinsic interest, willingness to delay gratification, and grades (Bembenutty, 2009). The participants were 58 at-risk college freshmen. At-risk students often fail to do their homework because of a lack of adequate resources and also a lack of self-discipline. These at-risk students may receive

interventions to help them avoid failures, but these programs do not develop the motivational beliefs and self-regulatory behaviors necessary for academic success (Bembenutty, 2009).

In this study, the measures were academic delay of gratification (e.g., "Go to your favorite movies and then cram for the math midterm exam." vs. a delayed option, "Postpone going to the movies until after you have taken the math midterm exam.") and self-efficacy (e.g., "I am sure I can learn all the material for the math midterm exam."). Bembenutty (2009) examined outcome expectancy (e.g., "Doing well on the math midterm exam will help me to attain my future career goals."), intrinsic interest (e.g., "I find studying math very motivating."), and self-regulation of learning (e.g., "How often do you set specific goals to guide your efforts while doing the practice problems for the math midterm exam?").

Bembenutty (2009) also examined homework measures, which included frequency of math homework completion (e.g., "How often do you complete your homework assignments for the math course?"). He examined students' homework activities with open-ended questions (e.g., "Where do you usually study for the math course?" and "How often do you do your studying for the math midterm exam with the television on?"). In addition, students completed a Homework Log to report homework activities. The researcher obtained midterm and final course grades from the instructors.

Results indicated that hours of studying math weekly is positively correlated to intrinsic interest ($r = .30$) and hours of studying for all classes is positively correlated to math homework completion ($r = .28$), delay of gratification ($r = .38$), and midterm exam grade ($r = .29$). Students' grade expectations for the midterm are positively and significantly related to math homework completion ($r = .35$), self-regulation ($r = .43$), self-efficacy ($r = .45$), intrinsic interest ($r = .49$, $p < .01$), midterm exam grade ($r = .46$), and final exam grade ($r = .44$). No significant relationships existed between studying with the television on and students' motivational beliefs and self-regulation of academic performance. These findings suggested that students' self-efficacy to learn and master the course

material is related to the time they spent on homework tasks and the grade they expect for the midterm. Willingness to delay gratification and use of self-regulatory strategies are important factors in students' homework activities.

From the homework log data, Bembenutty (2009) examined whether students set general or specific goals. The results showed that general goals were significantly related to self-efficacy ($r = .27$), suggesting that students who set general goals had high self-efficacy beliefs for doing well on the midterm exam. However, specific goals were significantly associated with midterm exam grade ($r = .29$). Time management accuracy (planned study time minus the actual study time) was positively related to math homework completion ($r = .43$) and midterm exam grade ($r = .28$).

This study has numerous strengths. First, the results show it is possible to incorporate an array of self-regulated behaviors in homework activities and help at-risk college students. Second, the findings on goal setting are consistent with existing literature that supports the correlation between setting specific goals and higher academic achievement (Zimmerman, 2000). Third, the use of the homework log reveals how students managed their time, inhibited distractions, delayed gratification, and increased self-satisfaction during homework completion.

Although the sample size was adequate to determine relationships among the variables, a larger sample size would improve the power of statistical analysis. Second, only math was evaluated. It is important to evaluate other subject areas in the future to assess the motivational and self-regulatory behaviors. Finally, the population was at-risk students at a 2-year college; therefore, the results may not generalize to traditional achieving and high-achieving students at both 2- and 4-year colleges.

In summary, these two studies at the college level add to those at both elementary and middle-high school level to demonstrate that during homework activities regular-achieving students and at-risk students engage in a myriad of self-regulatory behaviors and motivational beliefs to help them complete the assignments.

Educational Implications

Findings of these studies indicate that teachers should take into account their students' age, their grade level, and the subject matter before assigning homework. For elementary school students, assignments that are shorter and easy to complete would help create favorable attitudes toward school and learning. The duration and complexity of homework can change as children advance to higher grades. Thus, teachers should have clear goals and expectations for homework completion, and these should be communicated to students and their parents.

Corno (2000) suggested that teachers can make homework more engaging by discussing the assignments with their students and using homework to build on children's knowledge. To help students develop time management skills and self-reflection, teachers can use a homework checklist with items such as (a) the time students started and completed homework, (b) how they motivated themselves during homework completion, and (c) how they avoided distractions. Moreover, teachers can use homework logs where students can record their behaviors during homework completion. Teachers can use the information from the logs to show students their strengths and help them overcome possible weaknesses.

At the middle and high school level, teachers can model and provide students with explicit instructions on how to engage in effective homework behaviors, such as organizing the workspace, setting priorities, managing time, expending effort, avoiding distractions, monitoring motivation, and managing unwanted emotions (Xu, 2009). Moreover, teachers should design engaging and interesting homework activities to boost students' self-efficacy and responsibility for learning; otherwise, students may not be motivated to complete them.

Families in rural settings should pay particular attention to their children to help them maintain motivation during homework. Schools can establish partnerships with parents and can involve them more in their children's academic success. Parental involvement in homework may promote the development of cog-

nitive, affective, and behavioral strategies such as goal setting, planning, time management, attentiveness, and responsibility, all of which are necessary in homework completion and academic achievement (Bempechat, 2004; Zimmerman, 2000).

Homework completion is significantly influenced by students' self-regulatory behaviors and motivational beliefs (Bembenutty, 2009). At the college level, assigning and encouraging students to complete homework can improve their self-efficacy beliefs for learning, thereby enabling them to take more responsibility for their academic achievement. Instructors should use questionnaires and homework logs to help struggling at-risk students manage time, inhibit distractions, delay gratification, and remain motivated during homework activities. Assignments that are tailored to the interest and achievement level of struggling students may enhance motivation, effort, and achievement.

Future Research

Researchers should continue to investigate students' homework behavior across the spectrum from elementary school to college. Self-regulatory measures should be studied in elementary grades to understand the behaviors students engage in while completing homework and how homework impacts achievement. Apart from the fourth-grade study, the other four studies were correlational. More intervention studies would complement the present research. The issue of causality can be addressed by assigning teachers and students to different treatments in carefully designed studies.

Apart from mathematics, reading, and language arts, there is a need for homework research on foreign languages and the sciences. Consideration of these academic subjects would facilitate studying self-regulation processes students engage in while learning, such as strategy use, monitoring performance, and self-beliefs.

Finally, greater research is needed in training teachers and parents to facilitate homework completion. Such instruction can

help children and struggling adolescents develop a range of self-regulatory behaviors and improve academic performance. Using empirically validated self-regulatory scales such as SELF and HMS, teachers can develop profiles that can serve as a basis for the development of self-regulatory behaviors during homework experiences.

Conclusion

The primary goal of this article was to investigate the role of homework on the development of self-regulation processes. The findings showed positive relationships between homework activities and self-efficacy, self-reflection, responsibility for learning, maintaining focus, managing the environment, inhibiting distractions, delaying gratification, and managing time. The second objective was to examine evidence across various grade levels through college. The experimental study with fourth graders showed that students can be trained to develop these self-regulation skills. Finally, the studies at the middle/high school and college levels showed a positive relationship between homework and a range of self-regulation skills, implying that homework facilitates the development of self-regulation skills and enhances learning.

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