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ABSTRACT

This paper presents study results concerning the nature of successful academic performance, specifically examining to what extent self-regulated learning played a role in successful academic performance at the college level. (Self-regulated learning is defined as the integration and utilization of cognitive, metacognitive, motivational, perceptual, and environmental components in the successful resolution of academic tasks.) Study participants were college students (121 female and 39 male) enrolled in classes in the college of education at a medium-sized midwestern university. The self-reporting inventory questionnaire assessed metacognition, learning strategies, motivation, contextual awareness/sensitivity, and environment utilization/control. Study results showed that a substantial relationship exists between self-regulated learning and grade point average. Also, data suggested that the ability to self-regulate the learning process increases with age and academic experience. Appendices contain a description of the subscales of the Self-Regulated Learning Inventory with sample items, and the dimensions of the self-regulated learning model. Contains 15 references. (GLR)

Self-Regulated Learning and Academic Achievement in College Students

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Self-Regulated Learning and Academic Achievement in College Students

Learning is a complex process, one which many students, despite years of schooling, still find mysterious (Thomas & Rohwer 1986). What distinguishes the successful student from her less successful peers? A growing body of literature supports the notion that optimal academic performance is strongly tied to the degree of self-regulation the learner is capable of exercising (Borkowski, et. al., 1990, Jones & Idol 1990, Zimmerman & Pons 1986, Zimmerman, 1990). Although the self-regulated learning perspective is not, from a theoretical position, a unified one, according to Zimmerman (1990 , p.4), "a common conceptualization of these students has emerged as metacognitively, motivationally and behaviorally active participants in their own learning." In other words, self-regulated learners are purposive and goal oriented (proactive rather than simply reactive), incorporating and applying a variety of strategic behaviors designed to optimize their academic performance. While many students, barring those who are totally tuned out, are, to varying degrees, active in the manner just described, self-regulated learners appear to be both more keenly aware of the relation between specific behaviors and academic success and more likely to systematically and appropriately employ such behaviors (Zimmerman & Pons 1986). They also exhibit greater flexibility in adapting to the variable and sometimes uncertain demands that exist in the classroom, particularly at the high school and college levels. Nevertheless, the component skills that comprise self- regulated learning need not, in our opinion, be viewed as either exotic or as something above and beyond "the basics." They are in all likelihood <u>the</u> basic skills that underlie all forms of successful learning (Resnick & Klopfer 1989). In any event, given the degree of success that self-regulated learners have been reported to enjoy, it follows that understanding the behaviors and processes that underlie self-regulated learning, as well as designing instruction in ways likely to facilitate self-regulation of the learning process, represent important goals for educational researchers and designers.

Our own research, at this juncture, has not been primarily theoretically motivated. However, after reviewing the literature surrounding this topic, we found it useful (and to some extent, necessary) to impose an organizational structure, in the form of a model, on the various and tangled dimensions of self-regulated learning as reported. Our working model of self-regulated learning presently consists of five dimensions: **Metacognition** (MCS), **Learning Strategies** (LSS), **Motivation** (SES), **Contextual Sensitivity** (CSS) and **Environmental Utilization/control** (ECS) (see Appendix A for our model and examples of our categorization scheme). Most of the various self-regulated strategies reported in the literature (see, for example, Pintrich, Smith & McKeachie 1989, Weinstein, Zimmerman & Palmer 1988, Zimmerman and Martinez-Pons 1986) fall into one or another of the categories we have constructed. Contextual sensitivity, we should note, although implicit in much of the published literature, is not an area typically identified explicitly as an independent aspect of self-regulated learning. However, the theme that cognitive processes are contextually bound, or "situated" (Brown, Collins & Duguid 1989, Jenkins 1974, Rogoff & Lave 1984) is becoming increasingly general in the contemporary literature on learning and cognition, particularly as it occurs in educational settings. We therefore decided to define it as a separate dimension in our working model of self-regulated learning.

In brief, in developing our model, we reasoned, following Zimmerman (1990), that the self-regulated learner must be able to both internally regulate, monitor, evaluate and modify, when necessary, the learning process, and be alert to and utilize or manage contextual (external) factors such as course and instructor demands, where and when to study, who, when and where to go to for assistance, etc. It is also evident that motivational factors mediate the utilization of both cognitive and environmental resources (Borkowski, Carr, Rellinger & Pressley 1990). Individuals high in self-efficacy, for example, are more likely to use cognitive and metacognitive strategies and to seek appropriate (instrumental) forms of assistance when needed (Karabenick & Knapp 1991, Schunk 1991). At the same time, there is a positive relationship between a sense of personal control over learning outcomes and subsequent motivation (Dweck 1989, Schunk 1991) to undertake learning related challenges. Despite the many elements that enter into it, there is, as we shall see, reason to believe that self-regulated learning is a unified process which involves the integration and utilization of cognitive, metacognitive, motivational, perceptual and environmental components in the successful resolution of academic tasks.

Having devised a model of its components we felt was both economical and intuitively compelling, we set out to determine if, and to what extent, self- regulated learning (thus defined) plays a significant role in successful academic performance at the college level. We chose to do this by employing a self-report inventory, of our own design, composed of five subscales consistent with our model of self-regulated learning. We opted to develop such an instrument because (1) to our knowledge no instrument of its kind existed, and (2) because we believed that such an instrument could prove valuable as a research tool and would be more efficient and cost-effective than interviewing. In what follows, we first describe the development of our questionnaire. We then report what it has revealed to us, thus far, about the nature of successful academic performance, particularly at the college level.

Method

Development of the Self-Regulated Learning Inventory. Our first step in the creation of a self-regulated learning inventory involved the generation of an item pool. We decided to review the literature and to construct our items on the basis of findings that reported strong relationships between learner generated activities and academic success. The result was a pool of approximately 100 items. We then reviewed and analyzed the items eliminating those that were too much alike and rewriting those that were either too complex or too vague. This left us with a pool of seventy-one items all of which were included in our first instrument. Although the items represented five subscales we decided to present them randomly as a single test. A five point Likert scale format was chosen as most appropriate for this type of instrument.

A pilot run was conducted to see if directions were clear and sufficient, how long it took to respond to the inventory and if the items as written were clear and comprehensible. As a result, a formal set of instructions was composed. It was determined that time to complete the inventory ranged from 20-30 minutes (see appendix B for sample items).

Subjects. Our subjects were all students enrolled in classes in the college of education at a medium size mid-Western University. Unfortunately, the majority of education majors continue to be female. Thus, our sample contains an imbalance in terms of males (39) and females (121). In terms of ethnic composition, 145 of our subjects were White, 10 were Black, 2 were Hispanic and 3 were of Asian descent. With respect to class standing, 51 were sophomores, 58 were juniors, 35 were seniors. Our sample also included 14 graduate students and 2 non-degree students. The mean age of our subjects was 22.8 years. In total, the inventory was responded to by 166 students. Only 160 cases were actually analyzed due to the failure of some students to properly report requested information and/or respond to items.

Procedure. The inventories were administered in every instance by one or the other of the authors. Having obtained prior permission from class instructors, we passed out the inventories and read a prepared set of instructions. Classes ranged in size from thirty to ten. Although participation was entirely voluntary, no student refused to fill out the inventory.

Results

We first report on findings that relate to the technical properties of the inventory. Table 1 shows the result of an analysis of internal reliability of the inventory and its subscales.

Table 1

Reliability Coefficients

	MCS	LSS	SES	CSS	ECS
Alpha	.77	.83	.77	.64	.79

We are encouraged by these results, although by no means satisfied. An analysis of test-retest reliability, with an 8 week delay between times of testing, revealed a correlation of .78, a result we also take to be encouraging.

Our evidence with respect to validity at this point is mixed. That is, our items were constructed on the basis of findings in the literature related to the construct we set out to measure. An analysis of the correlation between scores on the inventory and GPA, our measure of academic achievement, revealed a significant correlation both for the inventory as a whole and for each of the subscales (see Table 2). This result corresponds to findings as reported in the supporting literature and provides evidence of concurrent validity.

Table 2

GPA and Scores on the Inventory

	MCS	LSS	SES	CSS	ECS	SRLTOT
Correlation	.41**	.47**	.48**	.31*	.39**	.54**

* $p < .01$, ** $p < .001$

The result of a factor analysis revealed that two factors account for the largest percentage (30.4) of the variance: A general factor represented by items from every subscale (in all, 52 of the 71 items) which we labelled self-regulated learning and a self-efficacy factor represented by 13 of the 15 items from that subscale. These two items, as noted, account for the main portion of the variance. The fact that a single factor loads highest is in line with the findings of Zimmerman & Martinez-Pons (1988). However, a number (18) of other factors, small but statistically significant, also appeared. While this complicates our ability to draw clearcut conclusions with respect to construct validity, we found some of these factors to be suggestive in terms of potential areas of inquiry requiring further investigation. For example, it would appear that some students are instructor based learners while others are text based learners. It would also appear that further work on the inventory will need to be undertaken to insure that its items represent fewer, and more distinct factors.

As noted, we selected student GPA as our measure of academic achievement. While scores on the inventory subscales in each case correlate significantly with GPA, the largest correlation obtained (see Table 2) was between GPA and total score (SRLTOT). Analysis of the data with respect to the variables of class, age, and sex revealed a significant correlations between both sex (.19 $p < .01$) and age (.31 $p < .001$) and total score on the inventory. The correlation between class and score on the metacognitive subscale was also significant (.21 $p < .01$). Table 3 shows the mean scores for males and females on the inventory and its subscales.

Table 3

Sex X Inventory Score (mean scores)

	MCS	LSS	SES	CSS	ECS	SRLTOT
MALE**	57.2	61.2	51.4	34.4	35.1	239.3
FEMALE*	57.8	65.4	54.6	36.2	36.6	250.6

** N= 39
* N= 121

Table 4 shows the correlations between scores on the inventory and its subscales and the variables class, sex and age.

It can be seen that females outscore males on total score as well as all subscales but metacognition. While these differences are, in most instances, statistically significant, we hesitate in drawing any firm conclusions due to the small number of males in our sample. We also found, as noted, a significant correlation (.31, $p < .001$) between age and total score. Older subjects tended to score higher. This result is, in part, due to the fact that the graduate students in our sample, though few in number, generally scored higher ($M = 268.1$) on the inventory than other groups (overall $M = 247.9$). The fact that only metacognition showed a significant correlation with class is somewhat misleading. That is, although there were only 14 graduate students in our sample, their

Table 4

Correlation Coefficients

	Class	Sex	Age
MCS	.21*	.05	.28**
LSS	.07	.21*	.26**
SES	.12	.19*	.26**
CSS	.01	.12	.09
ECS	.08	.12	.28**
SRLTOT	.13	.19*	.31**

* p< .01, ** p< .001

mean age was 32 (mean age overall being only 23). Thus the graduate students were both the highest scorers and the oldest students.

Discussion

Our results lead us to conclude both that self-regulated learning is an important component in academic success and that it can be measured via a self-report instrument. The results of our analysis of the data indicate a substantial relationship exists between self-regulated learning and GPA. This result is in line with published research on self- regulated learning (Zimmerman & Martinez-Pons 1986, 1988, Zimmerman 1990). Encouraging as these results may be, however, we also note that although total score on the inventory and GPA did reveal a highly significant correlation, there arose some problems with the use of GPA as a criterion. For example, some students, although not scoring high in terms of self-regulation, appear nevertheless to maintain a high GPA by either avoiding or dropping difficult courses. Hence their scores may actually have served to lower the degree of relationship. Unfortunately, we were unable to obtain sufficient information to allow us to determine which students actually dropped which and how many courses. We plan to gather this information in a follow up study. It should be noted as well, that although the correlation between score on the inventory and GPA was found to be highly significant much of the variance in student performance is left unexplained.

The fact that total score showed the highest correlation with performance is in line with the work of Zimmerman & Martinez-Pons (1988), who also found that self-regulated learning treated as a single, overarching factor, showed the strongest correlation with achievement. However, factor analysis of the data suggests that degree of self-regulated learning may be mediated by "learning style" factors not yet clearly understood. The fact that graduate students score highest suggests the greater presence of self-regulated learning in this population. While this is not entirely surprising, the small number of graduate students in our sample makes this finding suggestive only. In general, it can be concluded that self-regulation is a significant element in successful college student performance and that many students could profit by forms of instruction that emphasize and promote both the understanding and use of the component skills and attitudes of which self-regulated learning is comprised. The data also suggests that the ability to self-regulate the learning process increases with age and academic experience.

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Appendix A
Dimensions of Self-Regulated Learning
A Working Model

A. Metacognition

Definitions

1. Regulation of cognition
   a. Planning/deciding
   b. Monitoring
   c. Evaluation/checking
2. Knowledge about cognition
   a. Knowing **what** to do
   b. Knowing **how** to do
   c. Knowing **when** to do
   d. Knowing **where** to do
3. Self-reflective awareness

Types

1. Metacomprehension
   a. Text processing
   b. Listening skills
2. Metamemory
   a. General strategy knowledge
   b. Metamemory acquisition procedures
   c. Specific strategy knowledge

B. Learning Strategies

Definitions

1. Plans organized to facilitate successful learning
2. Skills specific to achieving learning goals
3. Procedures that accomplish academic goals

Types

1. Text processing strategies
   a. Underlining main ideas
   b. Summarization
   c. Using imagery
2. Lecture/discussion processes
   a. Notetaking
   b. Graphic representation
   c. Recasting

C. Motivation

Definitions

1. Awareness of the relationship between effort and outcome
2. Sense of mastery/competence
3. Desire to learn

Types

1. Causal attributions
2. Locus of control
3. Self-efficacy
4. Epistemological Beliefs

D. Contextual awareness/sensitivity

Definitions

1. Ability to gauge task demands
2. Ability to balance task demands with personal resources
3. Ability to judge the relationship between learning task and assessment

Types

1. Cue sensitivity
2. Congruence assessment

E. Environment utilization/control

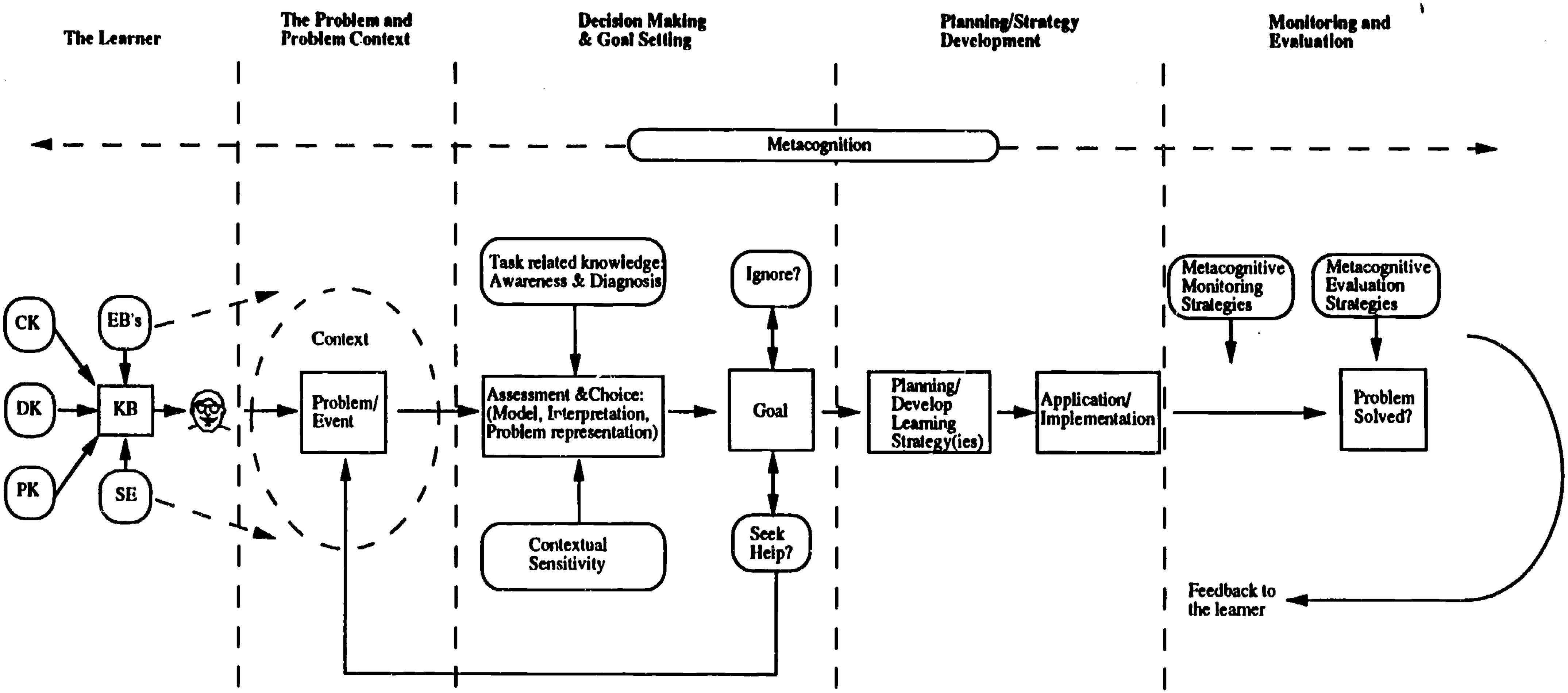
Definitions

1. Knowing where to find assistance
2. Planning and scheduling
3. Establishing a learning environment

Types

1. Help seeking
2. Goal setting
3. Staging

Appendix A (continued)
Self-Regulated Learning Model



Key:
CK=Conditional Knowledge
DK=Declarative Knowledge
PK=Procedural Knowledge
EB's=Epistemological Beliefs
SE=Self-Efficacy
KB=Knowledge Base

Appendix B
Subscales of The Self-Regulated Learning Inventory with Sample Items

I. Metacognition Scale

1. After studying, I mentally review the material to get a sense of how much have remembered.

2. When reading a text, or reviewing my notes, I periodically pause and ask myself: Am I understanding any of this?

II. Learning Strategy Scale

1. When preparing for an essay-type exam, I try to put the material I am studying into my own words.

2. When I need to remember a list of items or names, I actively recite or rehearse them until I can recall them from memory.

III. Motivation Scale

1. I prefer courses that are moderately challenging to easier ones.

2. If I have a good instructor, I do well. If I have a poor instructor, I do poorly. It's that simple.

IV. Contextual Awareness/Sensitivity Scale

1. The type and demands of a particular course have a lot to do with the kind and amount of studying I engage in.

2. I try to determine what a particular instructor is looking for in terms of performance on the part of students and adapt my approach to the course accordingly.

V. Environment Utilization/Control Scale

1. When I study, I make sure I have enough time and a quiet place to go.

2. If I find I do not understand material, or concepts, covered in a text, or course, I try to get help from someone who does.