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*The Relationship
Between College
Students'
Executive
Functioning and
Study Strategies*

Working from a cognitive perspective, a range of studies have supported the relationship between study strategies and academic performance of college students (e.g., Peverly, Brobst, Graham, & Shaw, 2003). In particular, self-regulatory processes comprised of learner-directed activities geared toward promoting academic achievement have been linked to the use of study strategies and to the achievement of academic goals (Zimmerman, 2002). Similarly, the neuropsychological construct of executive functioning describes independent and purposive behavior as comprised of skills in goal setting, planning, organizing and executing (Lezak, 1995). The purpose of this study was to examine the relationship of executive functioning as measured by the Executive Functioning Rating Scale (Lott & Petersen, 1998) and self-regulatory processes and strategy use as measured in the LASSI (Weinstein, Palmer, & Schulte, 1987). A secondary goal was to examine the relationship of executive functioning to students' perceptions of life problems. Simultaneous multiple regression procedures indicated a good fit between the two constructs. Executive functioning was also related to students' perceptions of life problems. Implications for educators and support professionals as well as for further research are included.

College students experience academic learning problems for a variety of reasons. Too often students fail

to fully engage in academic learning, setting few or inappropriate goals, using ineffective learning strategies, and disregarding self-monitoring tactics. Planning and setting goals are related to academic performance and to retention (Schutz, White, & Lanehart, 2000-2001) as are self-monitoring strategies (Zimmerman & Paulsen, 1995). Along the same line, adjusting to multiple roles and juggling diverse tasks and responsibilities can prove overwhelming and may negatively affect learning processes, planning strategies and academic achievement (Pritchard & Wilson, 2003).

Self-regulation is a learner-directed process geared toward promoting effective academic skills; students approach learning in a proactive way and engage in self-generated thoughts, feelings and behaviors that are geared toward meeting goals (Zimmerman, 2002). Similarly, executive functioning, a construct borrowed from neuropsychology, describes independent, purposive behavior as comprised of skills in goal setting, planning, organizing needed resources, executing effective strategies, and making corrections as needed. While students' learning strategies have been linked to metacognitive skills such as self-regulation (Eshel & Kohavi, 2003; Zimmerman & Paulsen, 1995) and metacognition (Schraw, 1998), the focus has been largely on cognitive processes and behavioral correlates. By considering the role of executive functioning in its relationship to learning strategies, it is possible to more completely understand cognitive learning processes as they relate to neuropsychological functions. The goal of our study was to examine the relationship between college students' study strategies and executive functioning. Specifically, we wanted to test for relationships among executive processing, learning and self-regulatory strategies, and students' perceptions of life events and academic performance.

College Learning Strategies

Learning strategies, the tactics or plans that students employ in negotiating various academic tasks, serve to affect student learning and performance outcomes. Traditionally, research on college learning has focused on the strategies such as notetaking (Peverly, Brobst, Graham, & Shaw, 2003) and organizing and time management (Lahmers & Zulauf, 2000). Strategies may be categorized in several ways. For one, strategies vary in terms of meaning or depth. For example in revising an essay, college writers may use a meaningful strategy such as comprehensive revision or development of voice, or they may adopt a more superficial approach focusing primarily on grammar or punctuation (Lavelle & Guarino, 2003). Strategies in writing and in learning vary depending on the learner's conception of the task and on the student's intentions or

motives in negotiating the task (Biggs, 1999). Notably, Kirby (1988) has categorized strategies in terms of proximity to the task versus proximity to the learner with more global or intentional strategies linked to the learner, and more tactical or microstrategies linked more closely to the task. While the notion of strategy has served well to describe what it is that students do and think in learning, training in the use of strategies has had mixed results (Hadwin & Winne, 1996). Too often strategies are taught as independent from content with few opportunities for transfer.

Self-regulatory strategies refer to those self-directive processes through which learners transform their mental abilities into academic skills. Students monitor their own behavior in terms of their goals, and engage in self-reflective activities such as learner-generated thoughts, feelings, and behaviors as linked toward attaining goals. Students must have greater awareness of their own behavior, motivation and cognition especially in an era marked by increased distractions, stress and a broader range of demands (Zimmerman, 2002). Self-regulation is an important component of learning for college students (Pintrich, 1995).

Similarly, executive functioning is a neuropsychological concept which describes the ability to engage in independent, purposive, self-serving behavior. It is comprised of volition, planning, purposive action, and effective performance (Lezak, 1995). Volition represents intentional or self-directed action, with planning linked to the identification of the steps or elements needed to carry out intentions. Purposive action is the initiation and maintenance of complex sequences of behavior in service of plans. These functions are distinct from intelligence, although they are related to how well one can plan and organize one's life, and find the resources needed to meet goals. Executive functions comprise a set of basic brain processes along with cognitive functions, such as memory and perception, and personality and emotional variables. Significant deficits in executive functioning can serve as a hallmark of learning disability, although very minor deficits may go undiagnosed (Lezak, 1995). Executive functioning has been linked to cognitive style of college students (Clyne, 1999).

This study examined the relationship between learning and study strategies and self-regulatory processes as measured by the Learning and Study Strategies Inventory (LASSI; Weinstein, Palmer, & Schulte, 1987) and executive functioning as measured by the Executive Functioning Rating Scale (EFRS; Lott & Petersen, 1998). An additional goal was to examine the relationships of students' perceptions of stressful life and their academic performance to learning strategies and executive functioning.

Method

Participants

Eighty-one students in an introductory psychology course at a large urban community college in southern California participated in this study. Mean age was 18.3 years (range 15–42 years). Men comprised 52% of the sample and women 48% with racial/ethnic distribution observed as fairly diverse.

Procedure

During the first week of the semester, students completed the LASSI and the EFRS. Additional items were added to the EFRS to reflect demographic information, current life responsibilities, and self-perception of how well these demands are being managed. Additionally, high school GPA (grade point average) served as a measure of academic performance, along with final course grades, which were collected at the end of the semester.

Instrumentation

The LASSI is a self-report instrument designed as a diagnostic and prescriptive tool to measure students' use of learning and study strategies (Weinstein et al., 1987). The LASSI serves as a critical component in many learning-to-learn academic assistance programs by identifying strategic deficits in a number of areas that could relate to poor academic performance. Problems in any of these areas would suggest specific remediation, such as time management or anxiety management workshops, to correct strategy deficits. Scores for eight scales of the LASSI were completed in this study: Motivation, Anxiety, Selecting Main Idea, Test Taking Skills, Time Management, Concentration, Study Aids, and Self-Testing. In particular, Time Management, which assess students' application of time management skills to academic situations; Concentration, which assesses students' ability to direct and maintain attention on academic task; Study Aids, which assesses students' use of supports or resource information; and Self-Testing, which reflects students' use of reviewing or comprehension monitoring techniques (Weinstein et al., 1987), are supported as indices of self-regulatory behavior (McMahon & Luca, 2001).

The Executive Functioning Rating Scale (EFRS) is a 22-item self-report measure to identify weaknesses in students' executive functioning. Items assess difficulties in behaviors such as planning and organization, being on time, setting personal goals, meeting deadlines, task persistence, and multi-tasking. Items are rated on a 5-point Likert-scale for a total point value of 110, with a high score indicating weaker executive functioning (Petersen, Guarino, & Weller, 2001).

Results

A simultaneous multiple regression indicated that the shared variance between the LASSI and the EFRS is 33.2%, $F(8,59) = 3.71, p < .001$, indicating a good fit between the two constructs. Correlation coefficients were computed between the EFRS and LASSI subscales with a Holms sequential Bonferroni to control for Type I error. The EFRS total score was significantly related to four LASSI scales. Problems in executive functioning behaviors were positively correlated with Anxiety ($r = .34, p = .005$) and negatively correlated with Concentration ($r = -.44, p < .001$), Time Management ($r = -.39, p < .001$), and Test Taking Skills ($r = -.34, p = .004$).

Students' perception of difficulty in managing their life was positively related to problems in executive functioning ($r = .39, p < .001$) and higher levels of anxiety ($r = .275, p = .02$). Students' perceptions of difficulty in managing their life were negatively related to concentration ($r = -.34, p = .004$), and academic performance ($r = -.39, p < .001$ (high school GPA); $r = -.23, p = .04$ (final grade for current class)).

Discussion

While self-regulation has often been linked to learning strategies of college students (Zimmerman, 2002), few studies have included neuropsychological variables in examining those processes. However, our research supports that executive processing may be used to more fully understand college learning and, in particular, the role of volition and planning, thus extending traditional notions regarding the use of strategies and self-regulation. While our research is preliminary, it is important to draw implications for practice as well as to suggest possibilities for further investigations.

First of all, self-reported executive functioning was related to study strategies as measured by the LASSI, indicating support for the EFRS as a valid measure of executive functioning as well as lending insight to study strategies as measured by the LASSI. Executive functioning has been difficult to measure. While Clyne's (1999) findings supported executive functioning as measured by organizational cognitive style, Stone (2000) failed to support a relationship between procrastinating and executive functioning, citing difficulties in measuring executive functioning. While it is beyond the scope of this research to fully develop a new measure, the present study lends support to the validity of the EFRS as a measure of executive processes.

The strategies that students use, particularly self-regulatory strategies, time management, and concentration, are related to deficits in executive functioning. Both time management and concentration as the ability to

direct and maintain attention on academic tasks require self-monitoring skills. Students scoring low on executive functioning would benefit from learning techniques to manage time and to redirect attention and eliminate interfering thoughts. In particular, time management interventions should encompass practice in developing effective schedules and monitoring in order to assure completion of academic tasks and to avoid procrastination (Stone, 2000). Time management skills have been related to academic achievement (Lahmers & Zulauf, 2000) as have students' perceived control over their time (Nonis, Hudson, Logan, & Ford, 1998). Instruction in time management can also be linked to academic success (Manalo, 1996).

Executive functioning was also related to students' perceptions of life problems and to anxiety. Clearly envisioning goals and planning academic trajectories may be problematic for students overwhelmed by stress (Pritchard & Wilson, 2003). Stress may be a particular problem for minority students (Cooper, 1994), women (Horvanitz, 1986), and linked to psychopathology as it relates to academic success (Brackney & Karabenick, 1995). Stress management and stress reduction techniques should be included in supportive programming. Perception of stress in life was also related to academic achievement.

Executive functioning was linked to test taking strategies as reflective of students' test preparation skills and test taking tactics. Testing situations are stressful not only because they are evaluative in nature, but also because they usually demand careful time allocation. Clearly the strategies that students use in a test taking situation differ from those used in a more leisurely learning situation. For example, in writing an essay response as part of a test, students are more likely to try to repeat or reorganize the main points rather than to use strategies such as reflecting and revising, which are linked to using writing as a tool of learning (Lavelle & Guarino, 2003).

The literature on the efficacy of teaching learning strategies at the college level is mixed. Generally, teaching study strategies as independent from learners and content is not effective. While Tuckman (2003) supported teaching learning and motivational strategies as linked to improved academic performance, Hadwin & Winne (1996) found that studies on teaching strategies failed to support transfer. As long ago as 1969, Chickering (1969) argued for identity and autonomy as critical developmental tasks, yet when we consider student learning problems, focus is generally on skills and strategies as independent from learners and content. If we want to promote executing and self-regulatory skills, we need to first examine the role of self-definition in the process. Counselors and educators need to help students to view themselves as

proactive agents in learning. Behind self-regulation is a “self” and behind executive functioning is an “executor”, yet skills continue to be taught as independent from students and content.

Along the same line, educators and support professionals need to think about strategies, self-regulation and executive functioning, in a broader way. Langer (1990) has advanced the concept of mindfulness as a presence that learners are able to bring to learning that involves a clear and present attention and clarity in thinking.

Directions for future research include more fully examining the areas of study skill deficits and executive functioning. A replication study would be important because the sample used may not be representative of other community college students. It would also be important to incorporate a behavioral sample reflective of actual executive functioning (such as the Rey Osterreith Complex Figure Task or other complex tasks requiring planning, organization and incidental learning) in future studies to avoid the limitations of self-report data.

This study also suggests that it would be useful to explore further the relationship of executive functioning to academic problem areas such as studying and self-regulated learning. In particular, are study strategy programs less helpful to students with weaknesses in executive functioning? Do students with executive weaknesses have more difficulty when their academic work requires more self-direction? The neuropsychological literature suggests that executive dysfunction is not easy to remediate and may require strategies based more on compensation than remediation, which has important implications for modifying current remediation programs for those students with executive dysfunction.

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