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Self-Regulated Assignment Attack Strategy: Evaluating the Effects of a Classroom-level Intervention on Student Management of Curricular Activities in a Resource Context

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The purpose of this study was to evaluate the impact of a classroom-based strategy instruction package grounded in self-regulated learning. The Self-Regulated Assignment Attack Strategy (SAAS) targeted self-regulation of assignment management and related academic-behavioral variables for 6th grade students in resource support classrooms. SAAS was implemented by a special education teacher and two educational assistants in three separate classes, and this study examined implementation and efficacy using direct observation of student self-regulatory behaviors. Utilizing a multiple baseline, across-participants research design, the study revealed positive effects of SAAS on "assignment attack" and teacher-reported student behavior during resource support classes. The results demonstrated that the effect was maintained after external supports were faded and suggest improved assignment attack behavior may have contributed to improved assignment completion. A discussion of the results is provided, addressing the implementation of SAAS and considerations for educators interested in SRL strategy instruction in resource settings.

Background

Self-regulated Learning

Self-regulation refers to the capacity for modifying behavior according to internally defined standards. Self-regulation involves self-evaluation of cognitive and motivational processes that facilitate behavioral modifications based on contextual demands (Bandura, 1986). Examining self-regulation in educational context refers to studying processes that allow for cognitive flexibility while students are engaged in academic work (Boekaerts, Maes, & Karoly, 2005). Requisite in self-regulated learning (SRL) is metacognitive knowledge; students are aware of what they know or do not know and have the ability to change their behavior based on that knowledge (Dinsmore, Alexander, & Loughlin, 2008). Intact metacognition enables students to apply, monitor, and adapt self-regulated learning strategies (Boekaerts, 1997).

SRL depends largely on a student's ability to learn and apply strategies (Boekaerts & Cascallar, 2006). Self-regulatory strategies support learning by helping students balance task demands, motivational constraints, and cognitive processes (Boekaerts & Corno, 2005). For example, self-monitoring is a cognitive strategy that promotes awareness of engagement and performance during a learning task (Harris,

Friedlander, Saddler, Frizzelle, & Graham, 2005). Self-monitoring enables students to evaluate productivity and accuracy in relation to task demands (Reid, 1996). Motivational constraints such as success expectancy and intrinsic interests are known to impact student success. Self-regulated learners manage motivational factors by employing strategies such as goal setting, planning, and self-rewarding (Metallidou & Vlachou, 2010).

Self-regulated Learning and Struggling Students

Students who struggle academically often report lower metacognitive strategy use and lower perceived ability to self-regulate their learning compared to peers (Klassen, Krawchuk, Lynch, & Rajani, 2008). Students with high incidence disabilities, such as attention deficit/hyperactivity disorder (ADHD) and learning disabilities (LD), are less skilled at self-monitoring (Harris et al., 2005) and strategic planning (Sikora, Haley, Edwards, & Butler, 2002) compared to their peers. These traits contribute to unproductive and ineffective learning behaviors (Wolters, 2003).

Impairments in self-regulation are often manifested by difficulty organizing, initiating, and remaining engaged in academic work in the classroom and at home. Bryan, Burstein, and Bryan (2001) published a review of assignment management and completion problems for students identified with learning disability (LD). Their summary revealed that students with LD spend more time on assignments due to poor organization and time management compared with peers. In addition, students who struggle academically lose materials and forget assignments more frequently, resulting in less time engaged in academics (Bryan, Burstein, & Bryan, 2001). Soderlund and Bursuck (1995) examined assignment completion problems in the classroom and at home for students identified with behavior disorders. Their results indicated that assignment management difficulties included distractibility, procrastination, and difficulty starting new tasks, as measured by teacher and parent report (Soderlund, Bursuck, Polloway, & Foley, 1995).

Academic Interventions Grounded in Self-Regulated Learning

SRL behaviors predict overall academic achievement and concept mastery (Wolters, 1999). Therefore, it is important for educators to understand interventions that support development of SRL. There is a need to equip educators with instructional models that are both theoretically sound and easy to implement in complex educational settings (Schunk, 2008).

Instructional strategies directed at self-regulation skills seek to bolster metacognitive control, motivational control, and academic strategy use (Meltzer, Katzir, Miller, Reddy, & Roditi, 2004). For example, teaching self-monitoring in classroom learning contexts has been shown to improve classroom preparation (Gureasko-Moore, DuPaul, & White, 2007), on-task behavior (Harris et al., 2005), and academic productivity (Uberti, Mastropieri, & Scruggs, 2004) for students with high incidence disabilities. Similarly, interventions targeting motivational barriers often incorporate goal setting and self-efficacy enhancements, and have been associated with improved reading, writing, and classroom behavior (Schunk & Zimmerman, 2007; Wehmeyer, Yeager, Bolding, Agran, & Hughes, 2003). Finally, strategy instruction targeting planning, organization, and self-monitoring has been shown to improve at-home as-

signment management and completion (Hughes, Ruhl, Schumaker, & Deshler, 2002; Trammel, Schloss, & Alper, 1994).

A robust body of research supports the effectiveness of self-regulation strategy instruction, however, many of these strategies are implemented using individual instruction. Individualized strategy instruction may not always be feasible or efficient in some educational contexts (Boekaerts & Corno, 2005). Behavior support and academic interventions (e.g., reading remediation curricula) are frequently applied at classroom or school-wide levels and integrated into the general educational milieu (e.g., Sugai et al., 2000). SRL strategy instruction has penetrated classroom pedagogy in general education, which is thought to benefit all learners, including students with disabilities (Mastropieri & Scruggs, 2010; Paris & Paris, 2001). However, there remains a need to demonstrate how SRL strategy instruction may benefit struggling learners who require more extensive intervention than is typically offered in the classroom. This is especially true for interventions delivered to groups of students with disabilities in resource support settings where additional academic and assignment management instruction are often provided.

Meltzer et al. (2004) developed and implemented a strategy training curriculum with a large sample of students with and without LD. Classroom teachers were trained to deliver the curriculum, which included self-regulatory strategies covering the spectrum of content areas and learning strategies (i.e., literacy skills, test taking, study skills). Daily strategy instruction was provided in the classrooms for six months. All students improved strategy use and reduced difficulty in reading, writing, and spelling as measured by teachers, and the effect was larger for students with LD (Meltzer et al., 2004).

Ness et al. (2010) examined the effects of teaching students to self-monitor assignment management in a resource setting using a classroom-based organizational system. The intervention featured a homework "database" posted in a prominent place within the classroom. Students learned to record new assignments on homework "tickets" and post them on a billboard in the resource room. Students used the tickets to remember and prioritize unfinished assignments, and using single subject methodology, the researchers demonstrated a positive effect of the strategy on student assignment recall, initiation, and overall task engagement (Ness, Sohlberg, & Albin, 2010).

The present study sought to extend Ness et al. (2010) by evaluating the effects of a strategy targeting student "assignment attack" in three different classrooms. While Ness et al. (2010) demonstrated a positive effect in one classroom, it would be useful to know if a different assignment attack strategy can produce similar effects when implemented simultaneously in different contexts. The purpose of this study was to investigate whether one strategy implemented in three different resource contexts would produce contextually relevant changes in individual student behavior. A strategy instruction package based on SRL principles was designed and delivered to groups of students in resource settings. The package, called "Self-regulated Assignment Attack Strategy" (SAAS), was developed in collaboration with a special education teacher to explicitly teach students self-regulatory skills related to assignment completion (i.e., planning, organization, and self-monitoring) in the resource context. The strategy was taught at the group level, so procedural parsimony and

instructional efficiency were essential considerations in how SAAS was constructed. Additionally, this study sought to examine the maintenance of student behavior once SAAS was faded.

Our specific research questions were as follows:(1) What are the effects of the SAAS across students in different classrooms as measured by "assignment attack" ratings, teacher-reported assignment completion behavior, and assignment completion rate; (2) Will SAAS produce an effect that will be maintained once the key intervention supports have been faded?

We hypothesized that students who implemented SAAS would demonstrate improved self-regulation, as measured by direct observation of a cluster of student behaviors during in-class assignment completion and teacher report of behavior in the classroom. We also hypothesized that the effects would be maintained once external supports provided by SAAS were faded.

Method

Setting and Participant Selection

Participants were sampled from a middle school in a mid-sized Western city that housed three different resource support classes for sixth graders. There were approximately twelve students in the second period resource, and there were six students and three students in each third period resource class. The school was selected because the sixth grade special education teacher asked the first author to conduct a strategy instruction study in her classroom similar to work the researchers had conducted in a different school. She learned of this work through email communication with other special education teachers in the district. The special education teacher, who had six years of teaching experience, all in special education and in the same middle school, taught the second period resource support class. She supervised educational assistants facilitating the third period resource support classes. University IRB and school district approval were secured prior to the study. Teacher and parental informed consent were obtained in writing, and student assent was determined verbally.

The participants (N = 3) for this study were selected based on the following inclusion criteria: (1) enrolled in sixth grade; (2) qualified for special education services; (3) enrolled in general education classes, but spent a portion of their day in a resource room for help managing out-of-class assignments; (4) low academic achievement as measured by a current grade of either a D or F in at least one class prior to the intervention. These criteria were generally satisfied by all students in the resource classes, since academic difficulty was a pre-requisite for resource support.

One student from each class was nominated by the special educator as representative of students with poor organization and initiation of assignments, and these students were selected for data analysis. The nature of the primary outcome variable (i.e., "Assignment Attack") precluded simultaneous measurement of each student in the classroom. It was determined that the duration and complexity of observational data collection could result in measurement error. Therefore, one student, deemed as representative of the majority of students by the special education teacher, was selected from each class to demonstrate the impact of the intervention in three different classes.

Adam.

Adam was a twelve-year-old boy who qualified for special education based on identifications of specific learning disability and speech-language impairment. His full scale IQ was 94 according to the Reynolds Intellectual Assessment Scale (RIAS; Reynolds & Kamphaus, 2003) and he qualified for the district free/reduced lunch program. His academic supports and accommodations included a behavioral support plan, reduction of large assignments, preferential seating, extended time for reading and writing assignments, allowing healthy snacks during class, morning check-in, teacher check for comprehension, and increasing active participation.

Brett.

Brett was a twelve-year-old boy who qualified for special education based on an identification of emotional-behavior disturbance. His full scale IQ was 86 as measured by the Wechsler Intelligence Scale for Children 4th edition (Wechsler et al., 2003) and he did not qualify for free/reduced lunch. Brett's other academic supports and accommodations included providing immediate teacher feedback, repeating directions, preferential seating, re-teaching expected behaviors, and teaching self-monitoring.

Christina.

Christina was a 12-year-old girl who received study supports due to an identification of specific learning disability. Her learning disability was secondary to a diagnosis of phenylketonuria (PKU), which is an inherited metabolic disorder associated with impaired conversion of the amino acid phenylalanine. Christina's full scale IQ was 108 as measured by the Wechsler Abbreviated Scale of Intelligence (Wechsler et al., 1999), and she did not qualify for free/reduced lunch. Other academic supports and accommodations included teacher check for comprehension, breaking down lengthy assignments/projects, reducing workload, providing oral directions, sitting in close proximity to the teacher, teacher support with the homework planner, and extended time for assignments.

Dependent Variables

SRL can be difficult to measure since cognitive and motivational strategies are unique to the individual and tailored for the task at hand (Boekaerts & Corno, 2005). Traditionally, educators and researchers have used questionnaires to measure self-reported SRL constructs such as learning strategy use, motivational strategies, and environmental modifications (e.g., Cleary, 2006). This approach is efficient but does not assess the use of strategies in natural contexts, which is why some researchers have recommended using direct observation as a method of assessing SRL (Boekaerts & Corno, 2005). For this study, the researchers utilized both observation and questionnaires to measure constructs of interest.

Self-regulation behavior during assignment completion.

A rating scale was adopted to quantify observable behavior indicative of self-regulation in the resource setting. The primary outcome measure of self-regulation was a slightly modified version of the assignment attack scale used in Ness et al.

(2010). The rating scale quantified four observable student behaviors that reflected SRL in the classroom: (1) recalling assignment details; (2) gathering necessary materials; (3) initiating work; (4) task engagement. Each of the four domains were rated using a five-point scale, so the range of composite assignment attack scores was 4 to 20. Scoring criteria were defined for each domain. For example, with the "recalling assignments" domain, the lowest score (1) was operationalized as, "Teacher told student assignment or showed student the pink sheet/folder. Student had no recollection of assignment and acts like they have no work." The highest score (5) meant, "Student required no support for knowing subject and assignment details." The operational definitions for each domain were slightly modified from Ness et al. (2010) to match vocabulary and contextual variables present in the participating school (e.g., reference to the "pink sheet" above). The rating scale has not been evaluated for psychometric properties; however, it is theoretically grounded in SRL and produced reliable results in previous work (Ness et al., 2010).

Assignment completion behavior was measured using teacher-reported Homework Problem Checklist (HPC; Anesko, 1987). The teachers used the HPC to evaluate student behavior while working on assignments in the resource setting. The questionnaire consists of 20 items, and uses a 0-3 Likert-type rating scale. The HPC sampled teacher's perception of student behaviors during assignment completion in the resource room (e.g., "Refuses to do homework assignment"; "Whines or complains about homework"), homework performance (e.g., "Hurries through homework and makes careless mistakes"; "Produces messy or sloppy homework"), and homework management (e.g., "Fails to bring home assignment and necessary materials"; "Forgets to bring assignments back to class"). While the scale has not been normed, previous studies have demonstrated the internal consistency (Cronbach alpha = .91) and discriminative validity of the HPC (e.g., Anesko, 1987).

Assignment completion rate.

Assignment completion rate was measured to assess the generalized impact of SAAS in general education courses. Assignment completion rates for math and social studies were calculated based on the proportion of assignments completed divided by the total number of assignments in a one-month period near the end of the first and third academic grading periods. The special education teacher assembled assignment completion data using school-wide electronic grading software. The math and social studies teachers entered the data, and the special education teacher provided completion rates to the first author.

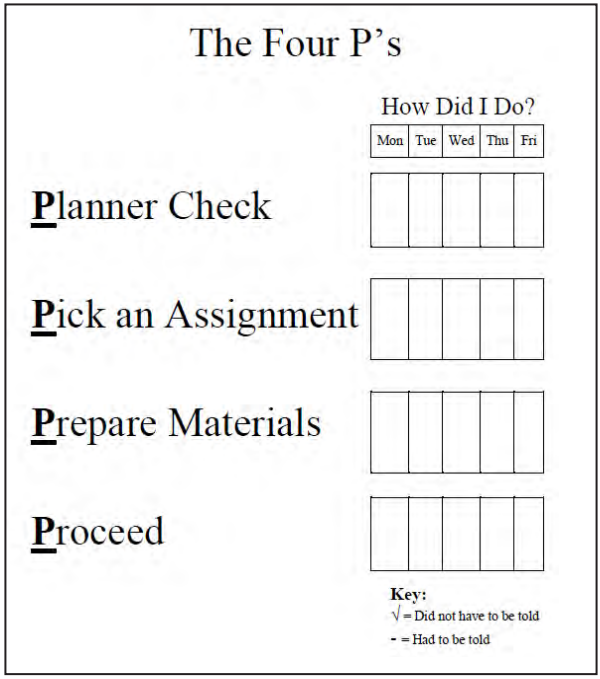
Intervention Package: Self-Regulated Assignment Attack Strategy (SAAS)

Using SRL as an intervention framework, SAAS was developed to teach students to self-regulate in-class assignment management. The strategy was conceptualized to support the planning, performance, and self-evaluation of academic work, and featured a four-step sequence specific to the resource context: (1)Planner/Pink Sheet Check; (2) Pick an Assignment; (3) Prepare Materials; (4) Proceed. SAAS featured an implementation approach utilizing external aids and purposeful self-regulation instruction to bolster strategic assignment management.

The 4 P's Checklist: External Aid for Planning, Performance, and Self-evaluation.

External supports are effective for modeling self-regulated learning processes, such as self-monitoring and self-evaluation (e.g., Harris et al., 2005). The external support for SAAS was a checklist given to students during the resource period (see Figure 1). The checklist was used to teach the four-step sequence described above. Students were instructed to review the "4 P's" checklist at the beginning of class to support goal setting and organization. Students were then prompted to refer to the "4 P's" during class to promote self-monitoring of assignment engagement. Finally, students were asked to self-evaluate their performance using the "How Did I do?" checklist corresponding to the "4 P's" at the end of the resource block. The self-evaluative portion of SAAS was used to model the cyclical nature of planning, performing, and self-evaluating learning typified by

Figure 1. **The Four P's Checklist**



Plan to fade external supports.

The components of SAAS were intended to facilitate internalization of self-regulatory processes. First, SAAS was designed as a first letter mnemonic to help students remember key behaviors. Since all four behaviors started with the letter "p", the checklist was referred to as the "4 P's". Second, the "4 P's" checklist was systematically faded until students were instructed to say the four steps "in your head" without the support of a checklist. Fading external supports using self-instruction, or "self-talk", is an effective approach for helping struggling students develop self-regulated learning

practices (Johnson, Graham, & Harris, 1997). The checklist depicted in Figure 1 was replaced with a version that included only the self-evaluation table and the letter "P" on each row. Finally, the first-letter-only checklist was replaced by teacher prompts for the students to use self-instruction.

Model self-regulation through systematic instruction.

SAAS instruction was scripted to promote consistent and effective implementation. Three instructional goals were explicitly addressed in the script. First, the teacher was prompted to teach the strategy using direct instruction principles (i.e., model, guided practice, and evaluate learning) known to facilitate self-regulated learning for students with disabilities (Butler, 2003). Specifically, the teacher was prompted to explain the four steps of the checklist, model the procedure, and assess students' understanding through questions (e.g., "Pretend I'm a student in 2nd (3rd) period and the teacher just told me to take out my homework. The first thing I do is a **Planner Check**.") Second, the teacher was prompted to lead students in a discussion about their experiences completing assignments and their need to manage this academic skill more independently in the future (e.g., "Keeping up on work not only helps you do better in school and helps lots of students feel better about how they do in school. Which assignments are easiest to remember? What assignments do you like best?") Establishing personal relevance is a powerful predictor in student acceptance and use of self-regulation strategies in classrooms (Schunk, 1998). Third, the teacher was prompted to model self-regulation processes using self-appraisal statements during strategy demonstration (e.g., "While thinking about how you did today, ask yourselves, 'Is there anything I could have done differently so Ms. … did not have to tell me what to do?'") Teacher modeling of self-appraisal statements is an effective method to teach SRL strategies (Paris & Winograd, 2001).

To promote consistent instruction across resource classes, the special education teacher delivered the scripted instruction described above. Initial instruction required two days in each class and was conducted at the beginning of each intervention phase (described below). Subsequent to the initial instructional period, the special education teacher implemented SAAS in Adam's class, while educational assistants implemented SAAS in Brett and Christina's classes. SAAS following the initial instruction period included using the 4 P's checklist and teacher modeling of self-regulatory strategies as described above.

Treatment fidelity.

SAAS was designed to target a discrete constellation of behaviors indicative of poor self-regulation. Since the strategy would be implemented in different classrooms, the researchers collaborated with the special education teacher to maximize consistent implementation across contexts. Treatment fidelity was measured by both the first author and research assistant in each classroom during the intervention and fade experimental phases. Treatment fidelity refers to the accuracy and consistency with which independent variables are delivered (Gresham, MacMillan, Beebe-Frankenberger, & Bocian, 2000). Following Gresham et al. (2000) recommendations, both fidelity of intervention delivery ("treatment delivery") and fidelity of student implementation ("treatment adherence") were measured. Intervention delivery and

adherence fidelity data were measured once a week during each phase. The outcome variable for both was total percentage.

Social validity.

Perception of SAAS as a socially valid intervention was measured to examine relationships between fidelity, student outcomes, and replication likelihood (Foster & Mash, 1999). Teacher perception of SAAS acceptability was measured using the Treatment Evaluation Inventory-Short Form (TEA-SF; Kelly, 1989). The TEA-SF consisted of four items, and the teacher rated each item using a five level scale. Also, a fifth item, an open ended question, was included, asking for teacher input in making the intervention more acceptable.

Research Design

A multiple baseline across participants design was employed to evaluate the functional relation between SAAS and changes in student behavior over time. Single subject designs have been shown to be powerful research tools for evaluating clinical practice (Horner et al., 2005). Multiple baseline designs, in particular, are useful for evaluating interventions, enabling both within and across participant data analysis using individuals as their own controls (Kennedy, 2005). The replication of effects across different participants at different points in time can be interpreted as experimental control in multiple baseline studies (Horner et al., 2005). The multiple baseline design was selected to evaluate SAAS because the nature of the dependent variable necessitated more in-depth data collection than would be possible using aggregated, classroom-level data.

The research design consisted of four phases per participant: Baseline, Intervention, Fade, and Maintenance. The purpose of the baseline phase was to measure assignment attack behavior under normal classroom conditions. To adequately define a stable, predictable pattern of assignment attack for each student, baseline data were collected until future behavior level and trend could be predicted (Horner et al., 2005). During the intervention phase, the teacher introduced SAAS into the normal classroom routine. Assignment attack data were recorded until a clear change in behavior level, trend, and/or variability was evident. The decision of whether there was an intervention effect was based on evidence that assignment attack levels in the intervention phase were outside the range of predicted levels demonstrated in the baseline. At that point, SAAS was introduced to the next classroom with assignment attack data recorded for the participating student. When there was evidence assignment attack data had changed, the external supports were modified during the fade phase. External supports were then removed, which constituted the maintenance phase.

Data Collection and Analysis

Assignment attack data were collected on a daily basis by the first author and an undergraduate research assistant. Once the special education teacher prompted the students to begin working on assignments, assignment attack observation began. As soon as the student demonstrated behaviors on the rating scale (i.e., recalling assignment, gathering materials, and initiating work), scores were assigned to each domain. At the end of the period, the whole-class engagement score was recorded.

HPC and assignment completion rates were collected pre- and post-intervention to evaluate the generalized impact of SAAS. Since students often worked on assignments that could not be completed during one resource period, daily assignment completion was not recorded. Given the small sample size, descriptive analysis of HPC raw scores and average completion rate were conducted within participants.

Inter-rater reliability refers to the stability of scores across raters (Primavera, Allison, & V, 1997). Inter-rater reliability for assignment attack was measured using the exact percentage of agreement. Agreement was calculated by dividing the number of agreements (i.e., between the first author and research assistant) by the total number of observations. The first author and research assistant observed students simultaneously in the classrooms and agreement was assessed following the observation. Exact agreement meant the same cumulative total, plus or minus two points (e.g., scores of 15 and 17 would be considered in agreement). Agreement was also calculated for each of the four domains constituting the cumulative assignment attack score. Exact agreement was defined as the same domain score, plus or minus one point.

Reliability training was completed during ten in-class observations with students not included in final data collection. Exact agreement for assignment attack scores reached 90%. Subsequently, inter-observer agreement was measured for 28% of the assignment attack observations, which were distributed across participants during each of the four experimental phases. Agreement for cumulative assignment attack was 89%. Agreement for each of the assignment attack domains was as follows: "Recall" was 93%; "Gather Materials" was 85%; "Initiation" was 85%; and "Whole-class Engagement" was 88%.

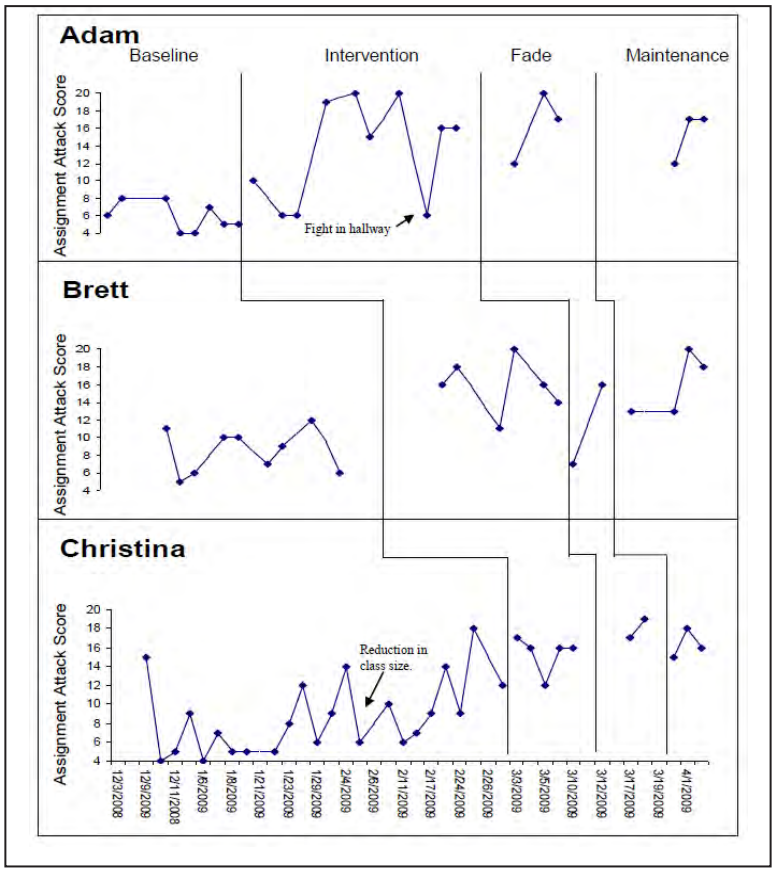
Results

This study was designed to evaluate the effects of SAAS on self-regulated assignment management in a resource setting for adolescents who qualified for special education. SAAS was implemented as prescribed by the special education teacher across three classes. Initial instruction required approximately 10-15 minutes per day. SAAS was applied to Adam's classroom first followed by Brett's and Christina's classes respectively. Subsequently, the special education teacher provided two additional instruction days for each group, once to introduce fading of the 4P's checklist and once to eliminate external supports. Approximately 60 minutes of instruction were provided for each class across all phases of the study. Data were obtained to answer research questions pertaining to student assignment attack, assignment completion behavior, assignment completion rate, and student and teacher strategy implementation.

Assignment Attack

In-class assignment attack behavior was recorded over the course of thirteen academic weeks, not counting two weeks for winter break and one week for spring break. A total of 97 data points were collected across the three participating students: 31 for Adam, 32 for Brett, and 34 for Christina. The assignment attack data are presented in Figure 2.

Figure 2. **Assignment Attack Data**



Adam and Brett revealed a clear change in level across phases with high average assignment attack during the intervention, fade, and maintenance phases relative to baseline. Christina's data revealed a high degree of variability and rising trend during the baseline phase, which confounded interpretation of the intervention effect. Replication of treatment effects was evident across participants at three different points in time, although Christina's data suggest other variables also impacted her assignment attack data.

Adam's baseline data revealed a low and stable baseline with assignment attack scores ranging between four and eight (M = 5.8). Assignment attack in the intervention and fade phases was characterized by considerable variability, ranging between six and twenty, with a slightly delayed but distinct increase in level (M = 14.1). One data point late in the intervention phase was low (6), but this should be interpreted with caution since he was involved in a fight before the class. Adam's assignment attack scores sustained the high level during the maintenance phase (M = 15.3).

Brett's assignment attack data were slightly higher in level at baseline (M =

8.4) compared to Adam's baseline. His data were also more variable, ranging between five and twelve, and there was a slight downward trend at baseline. There was some data overlap between Brett's baseline, intervention, and fade phases reflecting a high degree of variability, but there was a rapid and large increase in level for the intervention and fade phases ($M = 14.8$). Brett's assignment attack level remained high during the maintenance phase ($M = 17$).

Christina's data reflected a high degree of variability in the baseline phase, with assignment attack scores ranging from four to eighteen. Also, Christina's assignment attack began to trend up starting at the low on day nine. Despite this trend, her mean assignment attack score during baseline was 8.6, similar to Brett's baseline average. Christina's intervention and fade assignment attack levels were consistently high ($M = 16.1$) with very little variability compared to baseline, with scores ranging from twelve to nineteen.

To support visual analysis of assignment attack data, an overall effect size was calculated. Effect sizes are useful for interpreting the magnitude of a treatment effect, particularly for group research designs. However, effect size calculations in single subject research is complicated by dependence on visual analysis and a lack of clear interpretation guidelines (Parker & Hagan-Burke, 2007b). Parker et al. (2007a) propose Percentage of All Non-Overlapping Data (PAND) as a suitable effect size calculation in single subject research, as it involves visual analysis of overlapping data points and enables researchers to directly calculate the *Phi* coefficient (Parker & Hagan-Burke, 2007a). Another benefit of PAND is that *Phi* can be used for effect size and power analysis, using the same guidelines as Pearson's *r* correlation coefficient (Cohen, 1992; Parker & Hagan-Burke, 2007b).

PAND was calculated by first counting overlapping data points in the baseline and intervention phases (i.e., phases A and B) according to the procedures described in Parker et al. (2007a) for multiple baseline designs. This revealed 3 overlapping data points for Adam, 1 overlapping data point for Brett, and 3 overlapping data points for Christina, yielding a total of 7/61 (11.4%) overlapping data points. Second, *Phi* was calculated by setting up a balanced contingency table (i.e., a 2 X 2 matrix), cross-tabulating the proportion of overlapping and non-overlapping data in the baseline and intervention phases. The ratio of non-overlapping data on a percentage basis in the intervention phases (28.3/34) was subtracted from the ratio of overlapping data in the baseline phases (5.7/66) resulting in a $Phi = 0.75$, suggesting a large magnitude of change across participants (Cohen, 1992).

Assignment Completion Rate

The average assignment completion rate increased or was unchanged across participants with the exception of Adam, whose completion rate in social studies decreased. The average initial assignment completion rate in math for all three students was 88.3%, and the final average assignment completion rate for math was 89.3%. Adam's math completion rate increased 3% while Brett's and Christina's completion rates were unchanged. The average initial assignment completion rate in social studies was 78.3%, and the final average social studies completion rate was 87.3%, representing an average 9% increase. Brett and Christina's social studies assignment completion rates increased 12% and 25% respectively, but Adam's final assignment

completion rate in social studies dropped 10%. In summary, the general trend for assignment completion rate was positive, as indicated by average percentage improvement. However, there was variability across students and across classes, indicating the overall effect was minimal.

Teacher-perceived Assignment Completion Behavior

The post-intervention HPC data revealed an improvement during in-class assignment completion behavior. For this measure, lower scores indicated fewer perceived problem behaviors and higher perceived efficiency during assignment completion. The data are presented in Table 1. It should be noted that different teachers completed Christina's pre- and post-intervention HPC questionnaires, which could have affected the reliability of the scores. In summary, these data revealed improvement in teacher-perceived student behavior.

Table 1. ***Homework Problem Checklist Data***

Students (n = 3)	HPC-Teacher (max = 60)		
	Initial	Final	Change
Adam	44	42	-2
Brett	32	14	-18
Christina	25	14#	-9
Average	33.7	28	-9.7

Completed by a different teacher.

Treatment Fidelity

Treatment delivery for the special education teacher (Adam's class) ranged from 80% to 100% (M = 97%). The range of delivery fidelity for the educational assistant in Brett's class was 80% to 100% (M = 96.8%). The treatment delivery fidelity mean for the other educational assistant (Christina's class) was 100%.

Fidelity of treatment adherence ranges and average percentages were calculated for each student: Adam was 33% to 100% (M = 77.7%); Brett was 33% to 100% (M = 89.9%); and Christina was 100%. There were three instances of 33% treatment adherence between Adam and Brett. The respective teachers were provided with feedback following each of these three sessions to point out the neglected elements. It should be noted that these three instances were in the first two weeks of the respective intervention phases and researcher feedback resulted in subsequent 100% adherence. These data imply a high degree of teacher implementation and student adherence.

Social Validity

The questionnaire data indicated strong teacher endorsement of SAAS as an effective intervention. The responses indicated generally positive responses about the usability of the strategy (3/4 "agree" responses), and the teacher reported that she

intended to repeat SAAS at the beginning of next school year writing, "…I am excited to implement it (the 4P's) from the beginning of the year." She shared that she plans to extend the strategy by reinforcing student self-reflection by posting the 4P's checklist in a prominent spot in the classroom and asking students to write self-reflective statements at the end of class.

Discussion

The goal of this study was to evaluate the effects of a strategy instruction package on assignment initiation, engagement, and behavior for middle school students in a resource support setting. We hypothesized that students who implemented SAAS would demonstrate behaviors consistent with self-regulation, as measured by assignment attack observation and teacher report of behavior, and that the effects would be maintained once external supports were faded. The results supported our hypotheses and revealed positive outcomes on assignment attack and teacher-reported behavior following implementation of SAAS, but the generalized impact of these improvements on assignment completion was minimal. We demonstrated that improved student behaviors can be maintained after external supports are faded.

Improved Assignment Attack

The primary contribution of this study was the demonstration of improved self-regulatory behavior and maintenance of the effect following implementation of SAAS. Assignment attack data for Adam and Brett revealed a positive effect of SAAS on assignment attack. The assignment attack measure was designed to capture behavior indicative of self-regulation during assignment management. The overall impact of improved assignment attack was more independent management of in-class assignments, as reflected in teacher-reported change in behavior.

Christina's assignment attack level was similarly high with little variation following SAAS implementation. However, the variability and upward baseline trend limit the degree to which this change was attributable to SAAS. One plausible explanation for Christina's improved baseline data is a change in her resource class. Her group was rearranged following the start of the second academic quarter. Elective class scheduling and changes in some students' individualized education plans resulted in Christina's study support class size decreasing from six students to two or three students, depending on the day. This change in class size had the effect of reducing distractions and increasing the educational assistant's availability to provide structured learning, thereby reducing demands to self-regulate assignment attack. One solution to this problem for related studies would be selecting classes with larger, more stable student enrollment.

In previous research (Ness et al., 2010), it was evident that observable self-regulatory behavior could be improved (i.e., become less teacher-dependent) by teaching discrete strategies in a resource setting. Findings from this study provide a replication and extension of that effect by demonstrating improved assignment attack in students across three different classrooms. The present study provides evidence supporting the efficacy of incorporating self-regulation strategies into the classroom milieu, and raises questions that may be addressed in future research. Additional studies are necessary to demonstrate the utility of SAAS beyond improving

assignment attack behavior. Self-regulated learning is a broad construct, theorized to explain student motivation and cognitive control across academic tasks. Future research activities may include expanding the intervention curriculum and corresponding measures to capture the generalized impact of improved self-regulation.

Fidelity of Implementation and Acceptability in Natural Context

In their review of assessment and intervention principles grounded in self-regulated learning theory, Beokaerts and Corno (2005) illustrate how skill acquisition occurs as self-regulation skills are embedded in the classroom. A powerful benefit of classroom-based strategy instruction is peer and teacher modeling of the target skill (M. Boekaerts & Corno, 2005). This study demonstrated that the SAAS intervention package can be implemented by a busy middle school teacher with high fidelity and ease. The demonstration of implementation fidelity is critical for evaluating classroom-based interventions since naturalistic school contexts are nuanced and may contain elements that render carefully designed experimental instructional techniques invalid. Exploratory work preceding this study demonstrated that more complex, individually administered assignment management strategies are ineffective due to students' inability to manage the requisite components. The SAAS model may provide educational professionals a framework for conceptualizing and teaching self-regulation-based strategies that transcend contextual barriers.

Measuring the Impact of Assignment Attack

The assignment attack rating scale was sensitive to changes in student behaviors consistent with increased self-regulation in the resource context. The challenge in SRL measurement, however, lies in understanding how processes relate directly to academic success (Schunk, 2008). For this study, it was hypothesized that improved assignment attack would impact academic success through increased assignment completion. The assignment completion results were highly variable, culminating in relatively low overall improvement in completion rates. An alternative measure of academic achievement was considered – namely changes in assignment accuracy. It is possible that SAAS contributed to more accurate assignment completion, particularly in response to self-evaluation and progress monitoring prompts. However, assignment accuracy may be influenced by many factors outside the scope of SAAS, including quality and quantity of classroom attendance (Valiente, Lemery-Chalfant, Swanson, & Reiser, 2008). Additionally, students undertook many assignments during the resource class that could not be completed in one class, which complicated assignment completion measurement. More sensitive measures are required to understand the link between improved assignment attack and academic achievement following implementation of SAAS.

Limitations

There are several limitations of this study that should be considered when interpreting the data and evaluating the external validity of the results. First, the dependent variables were measured by the researchers and interventionists. As this was not a blinded study, the threat of measurement bias is present despite a scientific ethic to remain objective. Second, the assignment attack rating scale is sensitive to

changes in student behavior and yields reliable data. However, the validity and internal consistency of the measure are unknown, which affects the interpretability of the data. Finally, although this study presents an effect that was replicated in different settings for different students, the generalization of the findings is limited by the small sample size and should be restricted to students and settings closely matching those described in this study.

Summary

This study evaluated the impact of a SRL strategy instruction package on assignment attack for middle school students in resource support classrooms. The intervention was implemented as prescribed, validating the utility of the instructional approach. The results indicated positive effects on student assignment attack and assignment completion behavior, although the generalized effect on assignment completion rate was not clear. While additional research is necessary to examine the overall impact of improved assignment attack, the findings demonstrate that classroom-based strategies can improve self-regulation for struggling students in resource settings.

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