

**THE EFFECTS OF THE THREE JARS GAME ON 9<sup>TH</sup> GRADE STUDENTS'  
ACADEMIC PRODUCTIVITY AND SOCIAL INTERACTIONS IN SPANISH II CLASS**

By

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**CERTIFICATION OF PROJECT WORK**

We, the undersigned, certify that this project entitled, *The Effects of the Three Jars Game on the Academic Productivity and Social Interactions of a 9<sup>th</sup> Grade Spanish II Class*, by *Kelly Palmer*, Candidate for the Degree of Master of Science in Education, Department of Curriculum & Instruction, is acceptable in form and content and demonstrates a satisfactory knowledge of the field covered by this project.

  
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## **Abstract**

Homework is an educational strategy used to improve student understanding of content taught in class. It provides a means for students to further their knowledge through additional, independent practice. Many studies have shown that completing homework correctly has a positive effect on student learning. The problem is that large numbers of students in many classes are not doing their homework and many of those who do complete it incorrectly. The present study showed how the Three Jars intervention package containing group contingencies, small competing teams, and mystery motivators, was used to improve the homework completion, homework accuracy, and decrease negative social behavior rates for a 9th grade Spanish classroom. The Three Jars produced immediate and sustained positive results that improved students' Spanish homework grades. Intervention effects were replicated across subsequent experimental phases and the teachers and pupils rated intervention goals, procedures, and outcomes quite favorably. Implications for future research and practice are discussed.

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## Introduction

How academically productive are students each day in school? How much of the work that is assigned do they complete regularly and how accurately do they finish their work? It would seem that such questions would interest educators, in particular, those responsible for helping children learn every day. Yet, there does not appear to be much empirical literature on academic productivity. The literature that does appear often focuses on productivity in one's professional career or becoming successful in higher education (e.g., Goldstein, 1979; Levin & Stephan, 1991). Academic productivity is discussed, however, in the homework literature. Here productivity is defined as measures of work completed and the accuracy of what was done (e.g., Lynch, Theodore, Bray, & Kehle, 2009; Reinhardt, Theodore, Bray, & Kehle, 2009; Theodore, Dioguardi, Hughes, Aloiso, Carlo, & Eccles, 2009). Work completion can also be conceptualized as (a) percentage of assigned work that was completed (e.g., Jimmy completes 6 of 10 math problems = .6 completion); and (b) percentage of students in class who complete and turn in assignments. The former measure focuses on the "how much assigned work does a particular student complete, while the latter addresses "how many students are doing their homework in class"? The accuracy of student work may be even more important. The old adage that "practice makes perfect" is true only if individuals are practicing correctly; otherwise, they are practicing errors. It should be noted that both completion and accuracy have been linked to subsequent academic success in the homework literature (Cooper, Robinson, & Patall, 2006; Hattie, 2009; Theodore et al., 2009).

While there is a strong and logical connection between academic productivity and success, there are equally strong research lines that suggest that a lack of academic productivity leads to numerous adverse educational outcomes including but not limited to failing grades,

grade retention, referral to remedial and special education programs, and sometimes dropping out of school (e.g., Heward, 2009; Eckert, Coddling, Truckenmiller, & Rheinheimer, 2009).

One interesting set of classroom-based interventions are called group contingencies. Litow and Pomroy (1975) first defined group contingencies as temporal arrangements in which common consequences (e.g., rewards) are based on the behavior of: (a) one person in the group, (b) a part of the larger group, or (c) each member of the group meeting performance criteria. They further described *independent* group contingencies as situations in which each individual student receives rewards if s/he meets performance criteria. One example of independent group contingencies is common, norm-based student grading systems. All students in class have the same expectations for a specific grade and each student is responsible for their own performance. The *interdependent* group contingency, in contrast, was described by Litow and Pumroy as a strategy where students earned rewards if *every* member of the group or a specified sub-group reached certain performance levels; students were interdependent on one another to gain rewards. Finally, *dependent* group contingencies are in effect when the performance of one or a few determines access to rewards for the entire group (Litow & Pumroy, 1975). For example, everyone earns 3 minutes of free time if Eric refrains from fighting on the playground. All three group contingencies were shown to: (a) reduce inappropriate classroom behavior and (b) increase academic achievement (e.g., McKissick, Hawkins, Lentz, Hailly, & McGuire, 2010; Skinner, Skinner, & Burton, 2009; Theodore, Bray, & Kehle, 2004). Moreover, group contingencies are inexpensive, easy to use, and generally well-accepted by teachers and students (Heering & Wilder, 2006).

Given the importance of consistent work completion and the potential effectiveness of group contingency interventions, the present study was conducted. This study looked at the

effects of the three jars game, an intervention package composed of (a) interdependent and dependent group contingencies with randomized components and (b) between-team competition and public posting of pupil performance in a 9th grade Spanish II class. Three opaque jars containing paper slips were used to randomize: (a) target behaviors (work completion versus accuracy), (b) criteria (80% to 100%), and (c) rewards. Included among unknown rewards were a series of mystery motivator paper slips (Rhode, Jenson, & Reavis, 1993). This research partially replicates studies by Reinhardt et al. 2009 and Theodore et al. 2009). The primary research question was: What effects will the three jars game have on the in class work completion and accuracy rates of 9th grade Spanish II students in Western New York? Students were also asked how they felt about the three jars game. More specifically, they were asked to rate the three jars game in terms of the importance of its goals; acceptability of procedures; and satisfaction with intervention outcomes. Before describing the methodology, a brief illustrative review is provided of the following topics: (a) group contingencies, (b) randomization of contingency components, and (c) mystery motivators.

***Group Contingencies.*** Group contingency interventions were used successfully in classrooms for many years because they are inexpensive, time efficient, easy to implement, and generally well-liked by teachers and students (Heering & Wilder, 2006; Skinner et al., 2009). Research showed that all three group contingency programs (i.e., independent, dependent, and interdependent) were equally effective in improving pupils' academic and behavior performance in general and special education classrooms (e. g., Baer & Richards, 1980; Hansen & Lignugaris-Kraft, 2005; Hulac & Benson, 2010; Lynch et al., 2009; Theodore, Bray, & Kehle, 2004; Thorne & Kamps, 2008; Skinner et al., 2009). However, each contingency type (i.e., independent, dependent, and interdependent) had their own advantages and disadvantages based on subject

and setting variables (Baer & Richards, 1980).

Skinner, Cashwell, and Dunn (1996) described *independent* group contingencies as requiring the *same* criteria for reinforcement for all students; however, the rewards are given individually based on the *independent* performance of each student. Independent group contingencies are used quite frequently in norm-based grading systems and common classroom and behavior management plans. While research shows that independent group contingencies are quite effective and perceived as fair by students, teachers, and parents, concerns were raised that they were not efficient, time-saving interventions for routine classroom management (Skinner et al., 1996). Some additional negative side effects associated with independent group contingencies included: (a) legal and ethical issues, (b) lying or stealing to get rewards, (c) diminished performance in other academic domains, (d) variable reward strength among pupils and (e) the creation of a *class system* (i.e., winners and losers) in the classroom (Skinner et al., 1996). Given the potential negative side-effects of independent group contingencies, many researchers have recommended the use of interdependent and dependent group contingencies.

*Dependent* group contingencies are interventions in which all group members are rewarded based on the performance of one or a few other members (Litow & Pumroy, 1975). For example, it can be the performance of the randomly-selected targeted student(s) who determines whether or not the whole class earns rewards (Heering & Wilder, 2006; Theodore, Bray, Kehle, & DioGuardi, 2003). Since student's peers are involved in the intervention as part of the process for behavioral change, student socialization and cooperation are improved as a result of the intervention (Theodore et al., 2003). Dependent group contingency interventions have practical advantages for classroom teachers as well. Because all-or-none of the students receive access to reinforcement, this should reduce interpersonal student conflicts (Campbell &

Skinner, 2004). Research has also shown that dependent group contingencies increase on-task behavior in general and special education classrooms (e.g., Hansen & Lignugaris-Kraft, 2005; Tankersley, 1995), increase homework completion and academic achievement (e.g., Lynch et al., 2009; Reinhardt et al., 2009; Theodore et al., 2009), and reduce disruptive pupil behavior (Heering & Wilder, 2006; Kelshaw-Levering, Sterling-Turner, Henry, & Skinner, 2000).

Finally, *interdependent* group contingencies are those in which all group members are rewarded based upon their collective performance (Litow & Pumroy, 1975). For example, the class earns a pizza party when they read 100 books independently; all students get homework passes when the class average on math quizzes is at least 80%; and pupils receive one free question on an upcoming test when everyone in class completes designated work assignments. Under interdependent contingencies, pupil access to positive consequences depends on them and their peers. Students are interdependent and must work together if everyone is to benefit. Because all-or-none of the group receives consequences, these contingencies are fairly easy to implement (Skinner et al., 2009). Interdependent group contingencies are also critical elements of educational interventions with strong empirical support (e.g., cooperative learning, [Johnson, Johnson, & Holubec, 1991; Slavin, 1991]; Class Wide Peer Tutoring, [Greenwood, Maheady, & Delquadri, 2002]; Peer Assisted Learning Strategies, [Fuchs, Fuchs, Mathes, & Simmons, 1997]; and the Good Behavior Game [Tingstrom, Sterling-Turner, & Wilczynski, 2006]).

Given their reported effectiveness, ease of implementation, and social acceptability, one might expect more wide-spread use of group contingencies in school. Yet, this may not be the case. There are some issues that may limit the use of group contingencies (Sharp & Skinner, 2004; Skinner et al., 2009). First, it can be difficult to find consequences that are equally exciting or motivating to everyone in class. Some students, for example, may find eating lunch with the

teacher to be highly motivating, others may be less enthralled, and some others might even prefer to eat alone. If consequences do not interest students, then they will not work hard to earn them. Second, it is challenging to set appropriate criteria for an entire class of students. Goals may be set too high for some, yet too low for others. Those with high goals may not expend much effort because goals are perceived as unattainable, while the latter may not work hard because such effort is not necessary for success. Third, some students and teachers may view interdependent and dependent contingencies as unfair; well-behaved and higher performing pupils, in particular, may not earn positive consequences because their peers performed poorly. They may scapegoat or intimidate their offending classmates. Finally, there are also a few students who may sabotage group contingencies to prevent classmates from winning. They may intentionally misbehave or perform poorly just so nobody wins. There are at least two ways to prevent or minimize these concerns: (a) randomizing contingency components and (b) keeping them unknown or a mystery to students (Hulac & Benson, 2010; Skinner et al., 2009).

***Randomization.*** Randomization was used initially to keep students attentive and engaged in class (Kehle, Madaus, Baratta, & Bray, 1998). The first experimental analysis of group contingencies with randomized components was conducted by Kelshaw-Levering et al. (2000). They compared the effects of interdependent group contingencies with two variations on the disruptive behavior of 12 second grade students. In one variation, the teacher randomized rewards using an opaque jar that contained the names of a variety of potential incentives (e.g., free time, extra recess, and special snacks). Students were told that they must receive 36 or fewer checkmarks in order to select a reward from the jar. The teacher then marked disruptive behaviors using a simple monitoring checklist. At the end of class, the teacher counted the marks and if the total was 36 or less, then the teacher selected a student to pull a paper slip out of the

reward jar. The reward was then given to the entire class. If the criteria were not met, then students were told that they couldn't pick a reward today but that they should try harder next time.

In the second variation, all contingency components (i.e., target behaviors, criteria, target students, and rewards) were randomized by using four opaque jars. The first jar was labeled "behaviors" and contained paper slips with the names of target behaviors (e.g., talk outs, out of seat, and off task) and reward criteria or the word "all" indicating that all behaviors were monitored. The second jar was labeled "whole class or individuals". This jar determined whose behavior(s) were evaluated against the criteria. If whole class was selected, then all disruptive behaviors were counted. However, if an "individual" paper slip was selected, then the teacher picked from the third jar labeled, "names" that contained paper slips with all children's names. If "individual" was selected from the second jar and "Maria" chosen from the third, then her performance was checked against the target behavior and criteria. If the class or individual met the criteria, then a randomly selected student was chosen to pick from the rewards jar (Jar #4). On days when criteria were not met, students were told that they could not choose from the rewards jar and they were encouraged to try harder the next time. Both jar conditions produced immediate and noticeable improvements in pupil behavior, with the four jars generating more consistently low disruptive behavior rates. Additional studies (e.g., Popkin & Skinner, 2003; Theodore et al., 2004; Theodore, Bray, Kehle, & Jenson, 2001) essentially replicated the positive effects of using a series of jars to randomize contingency components.

***Mystery Motivators.*** In a related study, Murphy, Theodore, Aloiso, Alric-Edwards, and Hughes (2007) appeared to be the first to use interdependent group contingencies with "mystery motivators" (i.e., randomly selected unknown rewards). The researchers used the intervention

package to improve the behavior of nine pre-school children in a Head Start program. Students had a number of inappropriate behaviors (e.g., touching others, moving around, and being off-task) during instructional rug time that interfered with teaching and learning. The teacher posted classroom rules (i.e., keep hands and feet to self; sit and stand appropriately; and stay on task) and told students that if everyone received five or fewer checks on their monitoring sheets, then the entire class could select one of 12 picture cards from the mystery box. Researchers found that the intervention produced immediate improvements in all target students' disruptive behavior rates. A number of other studies have combined group contingencies in various ways and included mystery motivators to (a) improve pupils' homework completion and accuracy rates (Madaus, Kehle, Madaus, & Bray, 2003; Moore, Waguespack, Wickstrom, Witt, & Gaydos, 1994); decrease a range of disruptive pupil behaviors (Mottram, Bray, Kehle, Broudy, & Jenson, 2002; Theodore et al., 2004); and enhance interpersonal interactions among students at primary and secondary levels (Musser, Bray, Kehle, & Jenson, 2001). Moreover, researchers reported that the group contingencies were more effective when components (e.g., target students, behaviors, and rewards) were randomized and unknown to students.

Given the relative effectiveness of the three jars game and mystery motivators in improving a variety of academic and non-academic pupil outcomes, the present study was designed. The focus of this investigation was on academic productivity; more specifically, the amount and accuracy of in class work completed by a class of 9<sup>th</sup> grade Spanish II students. In addition, pupils feelings about the goals, procedures, and outcomes associated with the three jars game were assessed using a consumer satisfaction survey. It was hypothesized that the three jars game will produce important improvements in pupils' work completion and accuracy rates and that students will rate the intervention positively.

## **Method**

### **Participants and Settings**

The study was conducted in a small (434 students) rural high school in Western New York. According to New York State Report Card (2011-2012), 30% of the school population was eligible for free or reduced lunch. This study took place in a 9<sup>th</sup> grade Spanish classroom comprised of 19 students (10 males and 9 females). Seventeen pupils were Caucasian and two were African-American. Students ranged in age from 14 to 15 years old. There were no students with identified special needs in this particular class. However, the class was selected based on existing baseline data that showed inconsistent work completion and accuracy and average Spanish grades that were below expectations. In addition, the class engaged in a number of disruptive behaviors (e.g., name-calling, inappropriate noises and gestures, and talking without permission) particularly during small group activities. The goal was to improve the class' work completion and accuracy, as well as the interpersonal interactions that pupils engaged in during small group activities. The intervention was implemented with the entire class during regularly scheduled, 40-minute Spanish classes, but data were collected only on those students with informed consent.

The classroom teacher was a Caucasian female with three years of teaching experience in this district. She also served as the primary investigator in this study. In addition to her normal instructional duties, she also: (a) prepared all study-related materials, (b) trained pupils to use the three jars game, and (c) collected and analyzed findings. A second classroom teacher, a Caucasian female with seven years of teaching experience, assisted in implementation by: (a) introducing the three jars game to students and obtaining informed consent, (b) observing 20% of intervention sessions and conducting fidelity assessments, and (c) scoring independently 25% of

pupils' randomly selected permanent products to calculate inter-scoring agreement levels for completion and accuracy.

The classroom environment included five groups of four desks each laid out in a half circle, centered on the teacher's front table (instructional post). Two white boards were hung on perpendicular side walls and were used for daily instruction. An overhead projector located on the ceiling projects daily power-points and videos. The classroom bulletin board located in the back of the room contained the target behavior chart and mystery motivators and the three jars sat on a tall filing cabinet next to the bulletin board. A table with chairs, used for cooperative learning activities and visitors was located in front of the bulletin board. The teacher's desk created an L shape with the jars post. A round table and chairs paired with a bookshelf made the classroom library of additional reading material and language reinforcement games. The back wall of the classroom was entirely windows. The instructor had access to technology through her desktop, laptop, projector, overhead projector, and REDcat sound system, but additional technology for student use was not available in the classroom.

### **Dependent Variables**

The primary outcome variable in this study was pupils' in class work productivity. Productivity was defined further into (a) percentage of students who complete in class work daily and (b) the accuracy of the completed work. Two additional secondary dependent variables were pupils' interpersonal behavior (e.g., pro-social and disruptive) during small group activities and students' satisfaction ratings of the three jars game. Work completion was defined as the percentage of students who completed daily *in class* work assignments. Typical reinforcement assignments included in daily practice included reading probes with comprehension questions, listening tasks in the target language, teacher-student and student-student question and answering

practice in the target language, peer-tutoring with vocabulary cards, journal writing, etc. To be considered “completed”, students were required to make a written attempt at each item on the assignment. If students turned in a completed work assignment a (+) was entered on the daily scoring sheet; if they failed to complete an assignment a (-) was entered next to their assigned number on the work productivity data collection form (see Appendix A). *Percentage completed* was calculated by dividing the number of pluses by the number of pluses and minuses X 100%. The second target behavior was *work accuracy*. Percentage correct was calculated as the number of correct or acceptable responses divided by the number of correct and incorrect times 100%. Completion and accuracy data were aggregated at the class level and plotted on simple line graphs across baseline and intervention conditions. To ensure that data were being collected accurately and reliably a second adult independently scored pupils’ work in terms of completion and accuracy during 25% of randomly selected sessions. Independent scorings were compared on an *item-by-item* basis; and if both scorers rated an item the same way (e.g., completed and/or percent correct), then that item was marked as an agreement (A). If scorers rated an item differently (e.g., one complete and one incomplete OR different totals for percent correct), then it will was marked as a disagreement (D). Inter-scorer agreement was calculated as the percentage of items in agreement divided by the number of agreements and disagreements times 100%. Inter-scorer agreement levels averaged .92 for work completion (range = .88 to .98) and .95 for accuracy (range = .90 to 1.00).

The third dependent variable was the frequency of pro-social and disruptive behavior during small group class activities. The teacher/investigator monitored and recorded the frequency of four target behaviors: (a) *positive comments* (e.g., way to go, great job, and thanks for helping), (b) *positive gestures* (e.g., pat on back, thumbs up, and smiles), (c) *material sharing*

(e.g., students showing and explaining work and materials to other team members), and (d) *disruptive behavior* (e.g., any negative physical or verbal behaviors directed toward others) using a behavior monitoring sheet (see Appendix B). Observational data were collected on randomly selected target student(s) as determined by selected paper slips from the second jar in the three jars game. Daily observational data were plotted on simple line graphs across experimental phases.

The fourth dependent variable was pupil responses to a 20-item, Likert-type consumer satisfaction survey completed *independently and anonymously* by students immediately after the study ended (see Appendix C). Students were asked to rate the three jars game in terms of: (a) importance of goals, (b) acceptability of procedures, and (c) satisfaction with outcomes. Student responses were aggregated and presented as means per item in a tabular display.

Dependent variables were chosen because work completion and accuracy of work completed correlates to student proficiency of second language acquisition. In addition to individual assessment, daily probes for listening, speaking, and asking and answering questions with peers in the target language, is crucial to second language acquisition and satisfying LOTE and Common Core curriculum standards. Frequent disruptions, lack of motivation, and negative behaviors, hinder proficiency. Therefore, pro-social behavior was also monitored.

### **Independent Variable**

The primary independent variable was the three jars game. The game consisted of interdependent and dependent group contingencies with randomized components (i.e., target behaviors, criteria, students, and rewards) and between-team competition and public posting of pupil performance. The contingency components were randomized using three opaque jars as first described by Kelshaw et al (2000). The first jar was labeled “what” and included 45 paper

slips with the following information written on them (a) one paper slip with “80%”; (b) two paper slips with “85%”; (c) three with “90%”; (d) four slips with “95%”; and (e) five with “100%”. Fifteen slips were made for work completion and a comparable number for work accuracy. Fifteen paper slips were also included for “pro-social behavior” during small group activities (a) five slips read “1 pro-social behavior per student”; (b) five had “2 pro-social behaviors per student”; and (c) five had “3 pro-social behaviors per student”. The first jar, therefore, was used to randomize target behaviors and criteria and determine which behaviors were monitored during class.

The second jar was labeled “who” and contained 26 paper slips. Two paper slips had the words “whole class” written on them; one paper slip each read Team 1, Team 2, Team 3, Team 4, and Team 5; and one slip each had 19 different pupil name written on it (N= 19). These paper slips randomized target students and determined whose performance was monitored against the target behavior and criterion. Finally, the third jar was labeled “wow” and it contained 25 paper slips containing the names of potential rewards. Prior to starting the game, pupils were asked to identify possible prizes for winning the three jars game. Students voted on reward choices. The investigator wrote the names of acceptable prizes on paper slips and allowed students to select from that jar when they met criteria. Five paper slips contained the words “mystery motivators”. On days, when these paper slips were selected, the class could choose one of 10 highly decorated envelopes displayed on the classroom bulletin board (Rhode, Jenson, & Reavis, 1993).

To ensure that the three jars game was being implemented as intended a 10-item fidelity of implementation checklist was developed (see Appendix D). This protocol listed all the steps necessary for implementing three games with accuracy and spaces to mark “Present” or “Absent”. Fidelity of implementation was assessed during 20% of randomly selected

intervention sessions by having the second adult observe a three jars session and record the presence and absence of each procedural step. Fidelity was then calculated as the number of steps present divided by the number present and absent times 100%. Fidelity coefficients averaged .95 with a range of .9 to 1.0. This suggests that the intervention was implemented with a high degree of integrity over the course of the investigation.

As an additional intervention component, a target behavior chart was created to track group progress and to promote secondary competition among groups. A chart was made with group numbers 1 to 5 written on the y-axis and dates written on the x-axis. At the end of the chart, three columns were labeled *total group points* for work completion, work accuracy and pro-social behavior; *total group average* for Chapter 4A; and combined total points earned. The chart was used to provide individual teams with information about their ongoing progress in Spanish II class. The teacher used data collection sheets to transcribe check marks into points for teams. For example, if team received a positive pro-social behavior, students were given a point for their team. If they were given a minus, they were docked one point. Each assignment completed was worth one point and each assignment meeting the daily work accuracy requirement was given a point. At the end of the daily class, teacher would add to chart for dates respective box and calculate points. She would add previous box scores each day so students knew their group's standing. Finally, the group average score for Chapter 4A was found and percentage was transcribed into points. For example, if the collective average of all four students in a group was an 89% for Chapter 4A, then 89 points were awarded to that team. Points were added for work completion, accuracy, and pro-social behavior and the team with the most points won the weekly competition. Prize for winning group was determined by teacher as a mystery motivator.

## **Experimental Design and Procedures**

The study used an A-B-A-B single case research design to examine the effects of the three jars game on pupils' in class work productivity in a 9<sup>th</sup> grade, Spanish II class. This particular design is capable of establishing functional relationships by showing that pupil performance changes, when and only when, an intervention is given and taken away (Kennedy, 2005).

**Baseline.** During initial baseline sessions, the investigator used her “typical” or normal instructional routine in Spanish II. The teacher used Languages Other Than English (LOTE) and Common Core Spanish curriculum throughout the course of the investigation. The first portion of the lesson consisted of daily cooperative learning vocabulary activities using peer tutoring. For example, students were placed into tutoring pairs and given two minutes to quiz one another on important Spanish vocabulary. The investigator moved about the room collecting data on pro-social and disruptive behaviors. Teacher initially verbally praised pro-social behavior and would give one warning for disruptive behavior before deducting participation points from student. Immediately following, students performed the Hazlo Ahora (bell-ringer type assessment) individually. Work was collected, scored for completion and accuracy and recorded. The teacher then completed the lesson by including activities involving new language and content, provided guided practice for students, and allowed pupils to work independently or small groups, depending of the activity type and goal of assessment. Just prior to formal data collection for intervention, students were trained to play the three jars game during a 25-minute practice session. Each jar was displayed and sample paper slips were drawn to explain how the game was played. The investigator provided positive and negative examples of target behaviors and explained criteria for individuals and team. A brief role-play was conducted and the teacher solicited students' ideas for a reward menu and for more lucrative mystery motivator prizes.

**Three Jars.** A typical three jars session proceeded as follows. First, students were assigned initially to small, heterogeneous learning groups (i.e., four member teams that included high, average, and low performers) which are part of typical classroom practice. The investigator then reviewed the game chart and highlighted important target behavior(s) for playing the jars game. Target behaviors included (a) work completion; (b) work accuracy; and (c) pro-social behavior during group work. She selected a paper slip from Jar #1 labeled “what?” to determine which target behavior and criterion was monitored during class. She wrote the information on her monitoring sheet but did not share this information with students. Next, the investigator selected a paper slip from Jar #2 labeled “who?” and entered the information on the monitoring sheet. Again, students were *not* told which target behavior(s), criteria, or whose performance was being monitored. Daily work assignments (e.g., peer tutor flash cards, speaking tasks, independent readings, vocabulary and grammar quizzes) were given and the investigator moved about the class to monitor and record pupil performance. At the end of class, she announced whether the class met or did not meet the daily criterion. If the criterion was met, then a student was selected randomly to pick a paper slip from Jar #3 labeled “wow!” The reward was given at the earliest and most convenient time. If the criterion was not met, then the investigator simply said, “we didn’t reach the criterion today but you have another chance tomorrow” and made a smooth transition into the next learning activity. After intervention data stabilized, the three jars game and related materials were removed.

**Baseline.** Baseline conditions were re-introduced by announcing that the three jars game would not be played for the following week. The investigator said that they were going to see how well everyone behaved without the game. Typical instructional routines were followed. Students continued to work in small cooperative learning groups and the investigator moved

randomly throughout the classroom providing positive and corrective feedback as need. In class assignments remained essentially the same in terms of length and difficulty. After the second baseline data stabilized, the three jars game was re-introduced to the class.

**Three Jars.** All game-related materials were displayed when students re-entered the classroom for the final study phase. Jars and mystery motivator envelopes were displayed prominently and the target behavior chart was reviewed again at the beginning of each class. Students were told that the game was back in effect and that she would be monitoring the class' performance on work completion, accuracy, and pro-social behavior. Intervention procedures were followed as described in the earlier section. Immediately after the final intervention session, students completed the consumer satisfaction surveys anonymously and independently.

## **Results**

Findings related to the effects of the three jars game on students' in class work completion rates can be seen in Figure 1. As depicted, work completion rates for in class assignments were quite low. On average, about 55% of the students were completing assigned work each day. Class means ranged from a low of 47% of the class completing work to a high of 63% on the first day. Baseline data were stable for the most part, with 80% of data points falling within 15% of the baseline average. When the three jars game was implemented, the percentage of students completing in class work assignments increased immediately and noticeably to an average of 96% (range = 89% to 97%). This represented over a 40% increase in the number of pupils completing in class assignments. Again, class performance was quite stable and there were no overlapping data points across the first two experimental phases. When the three jars game was removed, the mean percent of students completing in class assignments dropped to 78% (range = 68% to 97%). While this was about 23% higher than initial baseline sessions, it

was still almost 20% below first intervention levels. There was one overlapping data point (i.e., first day of baseline II) between intervention I and baseline II. Finally, when the three jars game was put back into effect, pupils' work completion rates increased immediately and noticeably. During the second intervention phase, for example, 91% of the class completed their in class assignments (range = 84% to 97%). Although this was slightly lower than initial intervention levels, these data showed a 13% increase in the percentage of students completing in class assignments daily. There was only one overlapping data point across the final two experimental phases.

Findings relevant to the impact of the three jars game on student accuracy on in class work assignments can be seen in Figure 2. As shown, the class also had fairly low accuracy scores on daily in class Spanish assignments. During initial baseline, for instance, the class average was about 70% or the equivalent of a C- overall grade. Accuracy scores were also quite stable with a range of 61% to 77% and all data points falling within a 15% range of the mean. When the three jars game was implemented, there was an immediate and substantial increase in the class' average on in class assignments. The mean percent correct rose to 86% with a range of 78% to 92%. This represented a 16% increase in the class' average or the equivalent of about one and a half letter grades (i.e., C- to B). There were no overlapping data points across the first two experimental phases and an accelerating trend was present initially during the first intervention condition. When three jars were removed, the class' percentage correct fell to a mean of 80% with a range of 74% to 89%. Again, the second baseline accuracy scores were approximately one letter grade higher than first baseline, but about 6% lower than the first intervention condition. When three jars were put back into effect, the class accuracy rates on daily Spanish assignments increased once again to an average of 94% (range = 87% to 100%). Again, there was only one

overlapping data point between the final two experimental phases.

Data were also collected on the frequency of pro-social and disruptive behavior that was recorded during daily small group activities across all experimental phases. These data can be seen in the form of bar graphs (see Figure 3). For this analysis, daily behavior totals were aggregated and presented by condition. As seen in Figure 3, students engaged in about three times as many disruptive ( $M = 9$ ) as pro-social ( $M = 3.4$ ) behaviors during initial baseline sessions. However, when the three jars game was introduced, these ratios were almost reversed. During three jars sessions, for example, students exhibited an average of 7.1 pro-social behaviors (i.e., more than double baseline rates) per day compared to a mean of 3.8 disruptive behaviors. When baseline conditions were re-established, disruptive behavior rates increased once more to a mean of 6.8 while pro-social behaviors fell to an average of just under four (3.9) per session. Finally, when the three jars game was put back into effect, pro-social interaction rates increased to a mean of 6.5 while disruptive behavior fell to an average of 3.3 per session.

Student responses to consumer satisfaction survey items were aggregated and can be seen in Table 1. As shown, students rated most if not all intervention goals highly. They reported that it was very important for students to complete work assignments and cooperative group activities ( $M = 4.8$ ), although they rated the importance of getting along with others a bit lower ( $M = 3.8$ ). Students also found most components of the three jars game to be acceptable. They provided the most favorable ratings for “using jar #3 to find out what rewards were earned” and “picking a mystery motivator” ( $M = 4.9$ ), followed by “playing the three jars game” ( $M = 4.6$ ), and “using jar #1 to determine which behavior was monitored” ( $M = 3.9$ ). The lowest rated procedural component was “using jar #2 to figure out whose behavior was monitored” ( $M = 3.5$ ). Students also seemed to be quite satisfied with outcomes associated with the three jars game. They noted,

for example, that three jars helped them to complete in class assignments ( $M = 4.8$ ) and that the game should be used in other classes ( $M = 4.3$ ). In general, they felt that their performance was better in Spanish II when three jars were in effect ( $M = 4.3$  versus  $3.3$ ) and that the game was fair to everyone in class ( $M = 3.7$ ). The lowest rated item was “could three jars be harmful to other students” ( $M = 2.2$ ).

### **Discussion**

The present findings showed that the three jars game, an intervention package consisting of interdependent and dependent group contingencies with randomized components, produced immediate and significant improvements in a 9<sup>th</sup> grade Spanish II class’ academic productivity. When the three jars game was implemented the percentage of students completing in class assignments increased from 67% to an average of 93%. Almost everyone in class was completing their work when the three jars game was played. More importantly, the accuracy of pupils’ work also improved. The class average, for example, under teacher-led instruction was 75% (C). However, when three jars were in effect the mean percentage correct rose to 90% (A-) or the equivalent of a one and a half grade increase. These results are highly consistent with previous research that showed that interdependent and dependent group contingencies: (a) improved academic performance (Lynch, et al., 2009; Popkin & Skinner, 2003; Reinhart et al., 2009; Sharp & Skinner, 2004; Theodore et al., 2009), (b) reduced disruptive behavior (e.g., Christ, & Christ, 2006; Kelshaw-Levering et al., 2000; McKissick et al., 2010; Theodore et al., 2004; Theodore et al., 2001), and (c) facilitated room-to-room transitions (Campbell & Skinner, 2004). Current findings extend the external validity of the three jars game to a new student population, geographic location, and content area (i.e., Spanish II). Moreover, the present data provide initial evidence that three jars can be used to increase in class as well as homework

completion and accuracy.

Additional findings indicated that the three jars game also improved students' interpersonal interactions during small cooperative group activities. It was noted, for example, that the ratio between positive and negative interactions were reversed when the three jars game was in effect. Students used more pro-social behaviors and reduced their use of negative or disruptive interactions. It should be cautioned, however, that these changes may have also been influenced by the addition of public posting and between-team competition to the intervention package. As such, it is difficult at this time to determine the relative contributions of individual components to its overall effectiveness. Future research should examine the use of the three jars intervention with and without these additional components (i.e., component analyses) to gain better insight into the intervention's role in changing social interaction patterns (Kennedy, 2005).

The present findings also suggested that a *functional* relationship existed between the three jars and pupils' work completion and accuracy. When three jars were used more students completed assignments and had higher grades across all but a few sessions. When the game was removed, pupil performance on both outcomes decreased immediately and noticeably. These findings are quite important. When told that they could earn rewards for meeting randomly selected target behaviors and criteria, students responded positively by completing more work at higher accuracy levels. Identifying class-wide interventions that are effective for all, feasible to implement, and socially acceptable is very important in an era of evidence-based practice (Cook, 2011; Cook & Cook, 2010; Detrich, Keyworth, & States, 2008).

The three jars game also seemed to be feasible and socially acceptable to both teachers and pupils. The teacher investigator thought this intervention was incorporated into her daily lesson plan seamlessly. This intervention did not take significant time away from class although

the data collection process and tallying sheets was unwanted at times when teacher did not want her research clip board in hand. The teacher was motivated to use this intervention by observing student motivation do get work done and try harder than previously observed. She did not want to take away the intervention at any point in the research study. Other students, not assigned to this class period inquired about the Three Jars game and wanted the intervention incorporated in their class period, which also motivated the instructor, as she felt may have been partly result of Three Jars reputation from participating students. The students seemed to really enjoy playing the game and showed much enthusiasm and anticipation when awaiting results. The investigator liked the intervention as well. She felt it was easy-to-use, effective, and highly motivating. She even noted that she might continue to use it after the study. These findings are consistent with previous research that showed positive consumer satisfaction evaluations for jars-related studies (Kelshaw-Levering et al., 2000; Skinner et al., 2009). The investigator also felt that the three jars game was fair, took little time and effort to use, and produced improvements in pupils' Spanish II performance. Students were equally positive about intervention goals, procedures, and outcomes. They rated completing in class assignments and doing better in Spanish II class as very important. They also liked most if not all procedural components (in particular, earning rewards) and were satisfied that the intervention helped them to do better in class. Anecdotal comments recorded on the consumer satisfaction surveys included (a) "we should do this for longer time period, it makes me work harder"; (b) "I think every class should do this. It is very rewarding"; and (c) "Being in a group with people that I normally don't talk to made it weird but helped me connect more".

Although present results are positive and encouraging, there are some important study limitations to consider when interpreting these findings. First, the study was conducted with

only one group of students (N =19), in one geographical location, and in one narrow facet of the academic curriculum (i.e., in class work completion and accuracy). Generalizations to other grade levels, geographic settings, and subject areas are not warranted at this time. Second, the study was conducted for a relatively short duration (4 to 5 weeks) and no generalization and maintenance data were collected. It is not appropriate to conclude, therefore, that the same effects would be obtained over a longer time period and/or that benefits would generalize to other areas of pupils' Spanish II performance (e.g., homework completion and accuracy, quiz and test grades, and participation rates in class) and/or be sustained in the absence of the intervention. As such, future research should include longer intervention durations and explicit generalization measures for examining potential "spillover effects".

The present results are limited as well because the investigator also served as primary data collector and evaluator. Although procedures were used to monitor fidelity of implementation (i.e., fidelity assessments) and inter-scorer agreement levels, one cannot rule out potential experimenter bias effects at this time. Future research should utilize independently-trained data collectors to the maximum extent possible. Similarly, study implications are clouded a bit by the addition of public posting and between-team competition to the intervention package. While these components did not appear to have an adverse effect on pupil performance, it is difficult to determine how much these particular elements contributed to intervention effectiveness. Finally, present findings are limited somewhat by the presence of a few overlapping data points. Although students did noticeably better when the three jars game was in effect, there were also a few instances where intervention means were slightly lower than one or two baseline sessions. This suggests merely that intervention effects were not *always* better than teacher-led instruction. On the positive side, many teachers would welcome a classroom-based

intervention that gets more students to complete their in class assignments and at higher accuracy levels.

In summary, this study examined the effects of the three jars game on the work completion and accuracy rates of a 9<sup>th</sup> grade, Spanish II class in a rural school district in Western New York. Present findings indicated that the three jars game increased both the percentage of students completing Spanish II assignments each day and the accuracy with which they did so. In addition, pupils' social interactions seemed to improve when they were playing the three jars game. These improvements were made with a minimum of teacher time and effort and with generally high levels of pupil satisfaction. Obviously, much more work must be done on the three jars game. First, there is a need for additional replications. Can the game be used effectively in other subject areas and at different grade levels? What other academic, behavioral, and interpersonal outcomes can be improved by using the three jars game? Will teachers continue to use three jars after formal contact with researchers is gone? Will students ever get tired of playing the three jars game? These questions among many others should be addressed by future practitioners and researchers. In an era of evidence-based practice and teacher accountability, educators need classroom-based interventions that are powerful enough to improve all pupils' performance and yet be easy enough to use and fun for pupils and teachers alike.

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Figure 1 shows the percentage of students completing in class assignments across experimental phases.

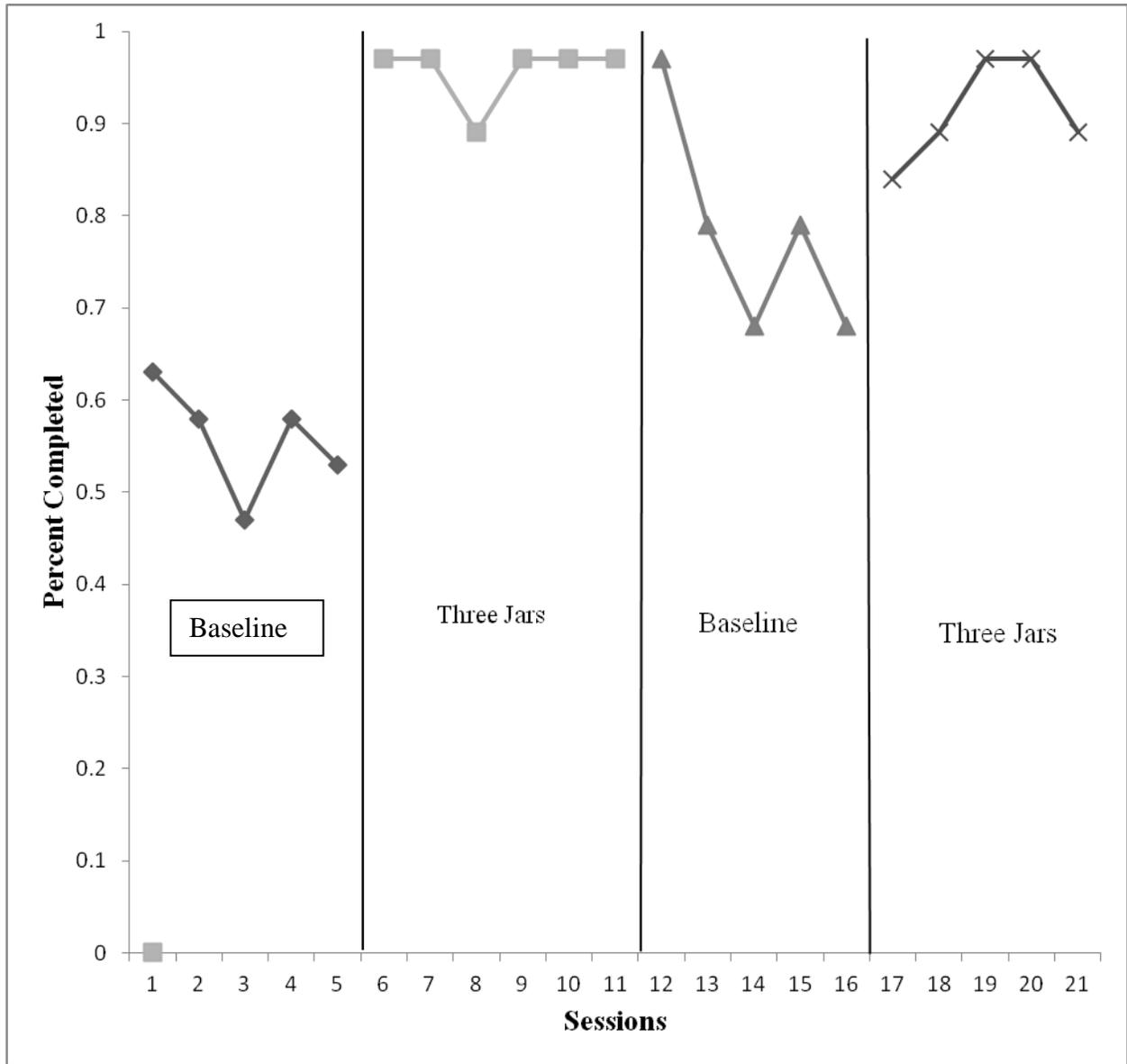


Figure 2 shows the accuracy of student work on in class assignments across experimental phases.

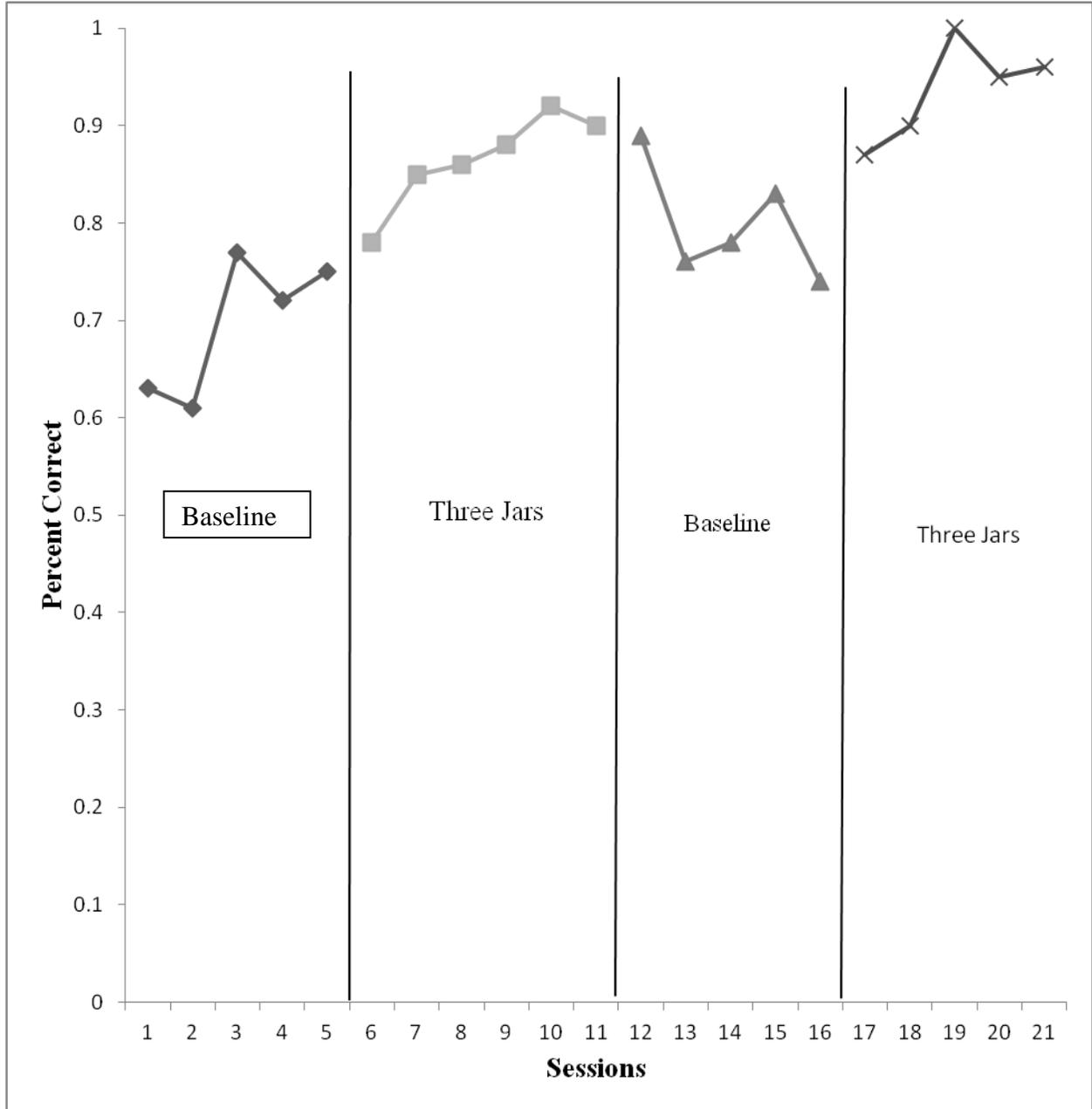


Figure 3 shows the frequencies of pro-social and disruptive behavior during small group activities.

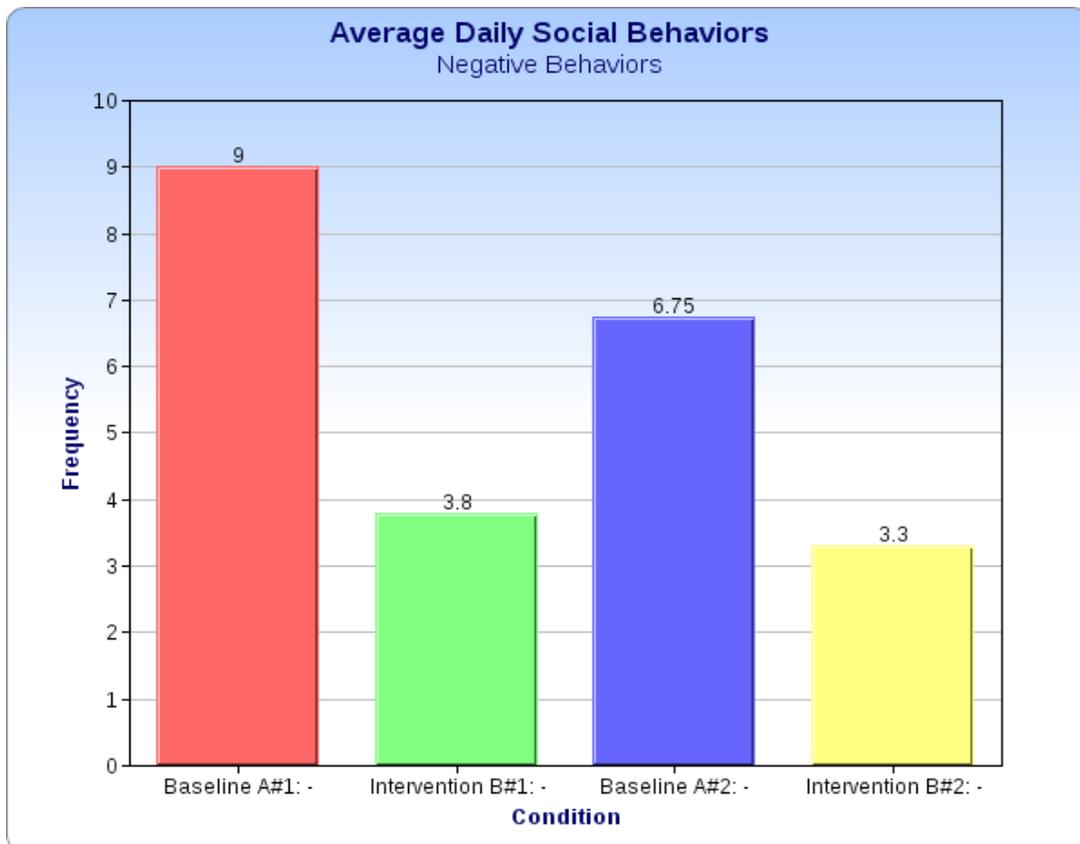
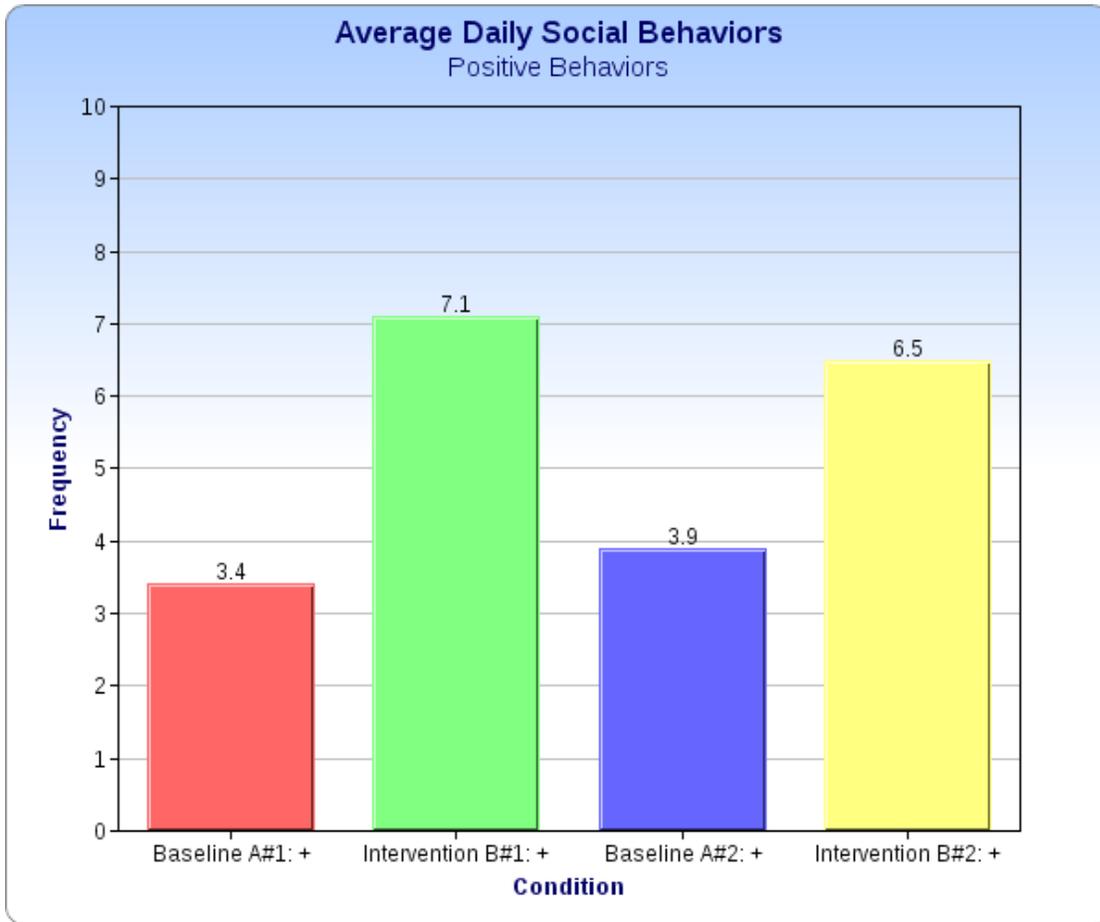


Table 1. Mean consumer satisfaction ratings by 9<sup>th</sup> grade Spanish II pupils.

Items	Mean
How important is it for you to do well in <b>Spanish II</b> class?	4.6
How important is it for <b>other students</b> in your class to do well in Spanish II class?	4.4
How important is it for students to <b>complete work assignments</b> and <b>cooperative learning activities</b> in Spanish II class?	4.8
How important is it for students <b>to get along well</b> with one another?	3.8
How important is it for students to <b>stay on task</b> during Spanish II class?	4.5
How much did you like <b>cooperative learning activities</b> each day?	3.5
How much did you like <b>using Jar #1 to determine which goal/behavior</b> was monitored each day?	3.9
How much did you like <b>using Jar #2 to figure out whose behavior</b> was monitored each day?	3.5
How much did you enjoy <b>using Jar #3 to find out what rewards the class earned</b> that day?	4.9
How much did you like <b>playing the three jars game?</b>	4.6
How much did you like <b>picking one of the mystery motivator</b> envelopes?	4.9

How satisfied are you with your <b>overall performance</b> in Spanish II class?	3.3
How satisfied are you with your performance <b>when using three jars</b> ?	4.3
How much did the three jars game <b>help you to learn Spanish content better</b> ?	3.8
How much did the three jars game <b>help you to complete in class assignments</b> ?	4.8
How much did the three jars game help you to <b>get along better with others</b> ?	3.5
Does 3 Jars seem like something that <b>should be done</b> in other classes?	4.3
Could 3 Jars <b>be harmful</b> to other students?	2.2
How <b>fair</b> was 3 Jars to everyone in class?	3.7
Did other students think that <b>you were smarter</b> after using 3 Jars?	2.9

## Appendix A

### Data Collection Sheet

#### Work Completion and Accuracy

Date: \_\_\_\_\_ Condition: \_\_\_\_\_

Directions: Place a + next to student's number if work assignment was completed. Enter the percent correct next to pupil's number

<b>Students</b>	<b>Work Completed</b>	<b>Percent Correct</b>
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

<b>16</b>		
<b>17</b>		
<b>18</b>		
<b>19</b>		
<b>Average</b>		

## Appendix B

### Observation and Monitoring Sheet for Small Group Activities

Date: \_\_\_\_\_ Condition: \_\_\_\_\_

Directions: Make a slash mark each time that the target student(s) engage in each of the following types of behavior

Students	Interpersonal Behavior			
Team A	Positive Verbal Comments (e.g., good work, you got it, and thanks for helping)	Positive gestures (e.g., pat on back, smile, and thumbs up)	Material sharing	Negative comments and gestures directed toward others
1				
2				
3				
4				
Team B				
1				
2				
3				
4				
Team C				
1				
2				
3				
4				
Team D				

<b>1</b>				
<b>2</b>				
<b>3</b>				
<b>4</b>				
<b>Team E</b>				
<b>1</b>				
<b>2</b>				
<b>3</b>				
<b>4</b>				
<b>Totals</b>				

## Appendix C

### Consumer Satisfaction Survey

#### Three Jars

##### Directions:

Please read each item aloud to your students and ask them to *circle the number* that best represents their feelings about that particular item. Emphasize the importance of completing the rating *individually and privately*.

##### ***I. Importance of Instructional Goals***

###### **1. How important is it for you to do well in Spanish II class?**

1	2	3	4	5
Not at all		somewhat important		very important

###### **2. How important is it for other students in your class to do well in Spanish class?**

1	2	3	4	5
Not at all		somewhat important		very important

###### **3. How important is it for students to complete homework assignments and cooperative learning activities Spanish class?**

1	2	3	4	5
Not at all		somewhat important		very important

###### **4. How important is it for students to get along well with one another?**

1	2	3	4	5
Not at all		somewhat important		very important

###### **5. How important is it for students to stay on task during Spanish class?**

1	2	3	4	5
Not at all		somewhat important		very important

##### ***II. Acceptability of Instructional Procedures***

###### **6. How much did you like cooperative learning activities each day?**

1	2	3	4	5
Not at all		OK		Liked it a lot

7. **How much did you like using Jar #1 to determine which goal/behavior would be monitored each day?**

1	2	3	4	5
Not at all		OK		Liked it a lot

8. **How much did you like using Jar #2 to figure out whose behavior would be monitored each day?**

1	2	3	4	5
Not at all		OK		Liked it a lot

9. **How much did you like using Jar #3 to find out what rewards the class earned that day?**

1	2	3	4	5
Not at all		OK		Liked it a lot

10. **How much did you enjoy playing the # Jars game?**

1	2	3	4	5
Not at all		somewhat		Liked it a lot

11. **How much did you like picking one of the mystery motivator envelopes?**

1	2	3	4	5
Not at all		some		Liked it a lot

### *III. Satisfaction with Strategy Outcomes*

12. **How satisfied are you with your overall performance in Spanish class?**

1	2	3	4	5
Not at all		somewhat satisfied		very satisfied

13. **How satisfied are you with your performance when using 3 Jars?**

1	2	3	4	5
Not at all		somewhat satisfied		very satisfied

14. **How much did the 3 Jars Game help you learn Spanish content better?**

1	2	3	4	5
Not at all		some		a lot

**15. How much did 3 Jars help you to complete class assignments?**

1	2	3	4	5
Not at all		some		a lot

**16. How much did 3 Jars help you to get along better with others in class?**

1	2	3	4	5
Not at all		some		a lot

**17. Does 3 Jars seem like something that should be done in other classes?**

1	2	3	4	5
Not at all		maybe		definitely should

**18. Could 3 Jars be harmful to other students?**

1	2	3	4	5
Not at all		maybe		definitely could

**19. How fair was 3 Jars to everyone in class?**

1	2	3	4	5
Not fair at all		Somewhat fair		Very fair

**20. Did other students think that you were smarter after using 3 Jars?**

1	2	3	4	5
Not at all		some did		everyone did

**Additional Comments/Suggestions:**

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## Appendix D

### Three Jars Intervention Package

#### Fidelity of Treatment Record

Investigator: \_\_\_\_\_ Date: \_\_\_\_\_

Observer: \_\_\_\_\_

Time session began: \_\_\_\_\_ Time session ended: \_\_\_\_\_

**Directions:** Observe the investigator as s/he implements the intervention and use the scoring code below to note the presence and/or absence of each tutoring component.

**Scoring Code:**

+	Behavior demonstrated
-	Behavior not demonstrated
NA	Not applicable

#### **General Implementation**

- \_\_\_\_\_ 1. Students are seated in small, heterogeneous groups.
- \_\_\_\_\_ 2. Target behaviors (work completion, work accuracy, and pro-social behavior(s) in groups are defined, posted, and reviewed.
- \_\_\_\_\_ 3. Three labeled jars are visible in class; Jar #1 “Goals”, Jar #2 “Who?”, and Jar #3 “Rewards.”
- \_\_\_\_\_ 4. At the beginning of class, teacher selects a paper slip from Jar #1 to identify the target behavior.
- \_\_\_\_\_ 5. Teacher selects paper slip to identify whose performance will be monitored.
- \_\_\_\_\_ 6. Teacher monitors pupil performance during class (moves around room and records pupil behavior).

\_\_\_\_\_ 7. Teacher checks work completion, accuracy, and pro-social behavior during small groups.

\_\_\_\_\_ 8. Teacher announces if class met daily criterion.

\_\_\_\_\_ 9. Students pick paper slip from Jar #3 if criterion is met.

\_\_\_\_\_ 10. Students do not pick from Jar #3 if criterion is not met.

**Total \_\_\_\_\_/10 (Please record the number of behaviors observed plus the number of NA)**

\_\_\_\_\_ % **Procedural fidelity**

*Anecdotal*

*Comments:* \_\_\_\_\_

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