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Effects of a Guided-Notes Intervention Program on the Quiz and Note-Taking Greek History Performance of High School Students with Learning Difficulties in Cyprus

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Abstract

The effects of guided notes (GN) in the English-speaking population are well documented. Limited empirical research has examined the effectiveness of GN with other non-English–speaking students. Hence, the present study investigated the effects of a GN intervention program on the academic performance of five students with learning difficulties during history class in a high school setting in Cyprus. An experimental reversal ABAB design was utilized to assess students' quiz and note-taking performance. Condition A consisted of regular classroom instruction, whereby the teacher lectured on historical events and students took their own notes. Condition B consisted of students completing GN while the teacher presented the history topic with PowerPoint slides. Students' learning performance was measured by (a) the number of correct responses on timed quizzes the following day and (b) the completeness and accuracy of notes taken during history instruction. Results evidenced a strong functional relation between students' academic performance and the GN program for all students. Student quiz performance improved by 23.5% to 33.5% during intervention. Similar findings were noted for note-taking performance. Positive social validity outcomes from the teacher

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and students support the practicality of the program. Implications for practice are discussed.

Keywords: guided notes, active student responding, high school students, low-academic performance, non-English–speaking students

Instruction in secondary schools usually takes the form of traditional teacher-led lectures. Secondary teachers teach content-specific subjects with abstract vocabulary and difficult learning concepts, and students are asked to record and learn main ideas for assignment completion and quiz and exam performance (Boyle, 2012). Learning from lectures requires students to multitask by listening, comprehending content, remembering, and writing down key points (McLeskey, Rosenberg, & Westling, 2010; Stringfellow & Miller, 2005). Hence, having effective and efficient note-taking skills is important for secondary students. Taking notes during lectures serves at least two important functions: a process function and a product function (Heward, 1994). While the lecture is going on, taking notes requires the student to listen and engage actively by recording important points. This encoding function may help students remember material presented because they are attending to and interpreting content as it is presented (Titsworth, 2004). When the lecture is over, the notes serve in the product function. They are a written record of what the student learned during the lecture and can now be used to review the material, which can help lay the foundation for new learning and assist the student in studying for upcoming quizzes or exams. Given these two very important functions, it is not surprising that students who take good notes tend to perform better. Indeed, several studies have shown that students' note-taking quality predicts their academic performance (Kobayashi, 2006; Peverly et al., 2007; Peverly & Sumowski, 2012).

The Educational Context of Cyprus

Secondary schooling in Cyprus is mandatory for students aged 11 through 14 years. Students who choose to proceed to upper secondary schooling (i.e., Lyceum) attend a three-year high school program in order to graduate and enter university. Almost all students tend to move to the high school level regardless of achievement status. Students who have been screened as functionally illiterate in elementary school upon entering secondary education either receive remedial instructional support for being academically at risk or are provided special education services after having been diagnosed with a disability (Petridou & Karagiorgi, 2016). However, the limited instructional support they receive during their secondary school years seems inef-

fective in closing their academic deficit gaps. Although there are no national student data to support such claims due to the absence of a nationwide accountability mechanism for monitoring student and teacher performance on a systematic basis (Karagiorgi & Nicolaidou, 2010), the Cyprus' Ministry of Education reports annual data only for students with and without disabilities who participate in high-stakes testing during their graduation year (Ministry of Education and Culture [MOEC], 2014a). According to the latest MOEC's report on student performance (2014–2015), Year 3 students showed below average performance in content areas such as history (9 out of 20 points, *SD* = 4.3), modern Greek (9.48/20, *SD* = 4.54), math (10.88/20, *SD* = 5.82), biology (10.07/20, *SD* = 5.94), and physics (10.53/20, *SD* = 5.48) (MOEC, 2014b). No disaggregated data are reported for students with identified learning disabilities (LD).

The increasing number of students entering high school and the limited instructional support students with LD or at risk receive in high school settings place an urgent need to start working with classroom teachers to enhance academic instruction for these students. Secondary teachers in Cyprus use lecturing as their primary instructional method. However, given that students with learning difficulties experience extra challenges during lecture, methods to support their learning during lectures must be identified.

Secondary Students and Guided Notes

Note-taking interventions and student performance. During lectures, secondary students with LD as well as academically at-risk students experience challenges in note taking (Boyle, 2012; Sweeney et al., 1999). Boyle, Forchelli, and Cariss (2015) noted that secondary students with LD reported cognitive difficulties in note taking related to understanding the teacher during lectures, writing fast enough, and deciding what information to record. In her experimental study, Oefinger (2014) compared the note-taking performance of secondary students with and without LD and found that adolescents without LD significantly outperformed students with LD on measures related to the quality of note taking, handwriting speed, quiz performance, and listening comprehension. Given that note taking requires the integration of several complex skills, many of which are difficult in and of themselves for students academically at risk, it follows that these students are likely to struggle generating complete and accurate notes from lectures without instructional support.

Researchers examined the effectiveness of various note-taking interventions with students with and without disabilities at the university (e.g., Austin, Lee, & Carr, 2004; Hughes & Suritsky, 1994;

Musti-Rao, Kroeger, & Schumacher-Dyke, 2008), secondary (e.g., Boyle & Weishaar, 2001; Lazarus, 1993), and elementary (e.g., Jimenez, Lo, & Saunders, 2015; Patterson, 2005) levels. Their effectiveness has been examined widely for English-speaking students (e.g., Konrad, Joseph, & Eveleigh, 2009) and less for non-English–speaking students (e.g., Akinoglu & Yasar, 2007; Narjaikaew, Emarat, & Cowie, 2009). Researchers also investigated the impact of note-taking interventions for students with and without disabilities (e.g., Boon, Burke, Fore, & Spencer, 2006) and students academically at risk (Hamilton, Seibert, Gardner, & Talbert-Johnson, 2000). The main outcome variables in these studies were exam/test/quiz performance and note-taking accuracy.

In all various research studies, note-taking intervention techniques vary in content and design structure. For instance, Boyle and Rivera (2012) in their research review identified three major instructional approaches for secondary students with LD and other mild-to-moderate disabilities (e.g., developmental delays, emotional and behavioral disorders, attention-deficit/hyperactivity disorder). One technique is strategic note taking in which students receive written prompts on their note-taking paper to record a specific number of key lecture points, identify and document newly introduced vocabulary terms, and provide a summary of the lecture topic. Another researched strategy is the directed note-taking activity, which introduces in an explicit instructional manner the recording of key lecture concepts. Specifically, this technique requires students to divide their note-taking page into halves, whereby the left column is used for recording the key terms and the right column includes definitions, examples, and supplemental information for each key concept. The teaching of this note-taking activity is supported with the use of self-questioning and the model-lead-test approach. While students take notes on their paper, they are asked to impose questions to themselves at the beginning, middle, and end of the lecture about the key concepts. The model-lead-test approach gives the opportunity for students to see their teacher performing the note taking of key terms (modeling), to receive guided practice to record the lecture terms, and to practice independently the note-taking skills across lectures.

The last note-taking technique described by Boyle and Riviera (2012) was guided notes (GN). The GN are "teacher-prepared handouts that 'guide' a student through a lecture with standard cues and prepared space in which to write the key facts, concepts, and/or relationships" (Heward, 1994, p. 304). Several research literature reviews have revealed that GN is an effective instructional tool to assist instructors in delivering content via lecture (e.g., Haydon, Mancil,

Kroeger, McLeskey, & Lin, 2011; Konrad, Joseph, & Eveleigh, 2009; Larwin, Dawson, Erickson, & Larwin, 2012). Kobayashi (2006) in his literature review provided six types of interventions identified for assisting students with and without disabilities on improving note-taking skills and learning. In his meta-analysis, Kobayashi (2006) found that teacher-prepared notes produced the largest intervention effects compared to other note-taking techniques and these effects were stronger for students with and without disabilities at the secondary level. He reasoned that GN provide a structured outline that directs student attention to write down key ideas.

Guided Notes and Research Evidence

Within English-speaking population. Intervention studies on GN have incorporated various elements. Some researchers utilized GN with slides (e.g., Austin et al., 2004); others combined GN with response cards (e.g, Musti-Rao et al., 2008) while others integrated multimedia and textbook materials in student GN (Mastropieri, Scruggs, Spencer, & Fontana, 2003). Konrad, Joseph, and Itoi (2011), as well as Heward (2001), suggested that GN can be used with other effective teaching strategies such as graphic organizers (e.g, story maps, word webs, Venn diagrams), choral responding and/or response cards (pre-printed and write-on). For instance, Mastropieri and colleagues (2003) examined the differential effects of peer tutoring and GN. In the GN conditions they included a variety of teacher- and student-instructional materials. Teacher-made GN consisted of multimedia, vocabulary, matching items, fill-in-the-blank items, and short-answer items. Results showed that students who had participated in peer-tutoring condition presented higher performance than those who had been in the GN condition in content-area exams. Nonetheless, student interview responses were favoring both strategies.

According to Heward (2001), when designing the GN, teachers may include content presented in overhead transparencies or PowerPoint slides. So far, intervention studies on GN have used transparencies extensively (Austin et al., 2002; Hamilton et al., 2000; Sweeney et al., 1999) and fewer PowerPoint slides (e.g., Austin et al., 2004; Musti-Rao et al., 2008). Austin and colleagues (2004) found that when university instructors had used slides with or without GN, student note-taking performance was higher than when traditional lecture (no slides) had been implemented. Similar findings were noted in Musti-Rao et al.'s study in which student quiz performance was higher under GN condition with PowerPoint slides than in traditional lecture with slides. None of the published research so far has examined the use of GN with PowerPoint slides at the high school level,

and no research has incorporated slides as part of the GN strategy. Additionally, the positive impact of graphic organizers on the reading comprehension of students with LD is well documented (Kim, Vaughn, Wanzek, & Wei, 2004). Despite recommendations made by Heward (2001) and Konrad and colleagues (2011) to enrich GN with graphic organizers, we did not identify any published intervention study that incorporated graphic organizers in GN. The current study addresses both literature needs by developing a GN intervention program that utilized graphic organizers along with multimedia for academically at-risk high school students.

Konrad, Joseph, and Eveleigh (2009) reviewed eight published studies on GN and found them to be effective for improving exam performance and note-taking accuracy for students with high-incidence disabilities, as well as students academically at risk in late elementary through university graduate level. They also noted that students reported a preference for GN over taking their own notes, which may be particularly important when student motivation is a concern. Subsequent reviews of GN found similar results (Haydon, Mancil, Kroeger, McLeskey, & Lin, 2011; Larwin, Dawson, Erickson, & Larwin, 2012).

Within non-English–speaking population. The three research reviews above included studies only with English-speaking student populations. Due to the international aspect of this study, a separate, thorough literature search was conducted to identify additional studies on GN interventions with non-English–speaking students. Three research studies of note-taking interventions were found in total with non-English student populations ranging from elementary to university level. The first study investigated the impact of GN on the perceptions and test performance of 1,002 first-year university students in an introductory physics course in Thailand (Narjaikaew et al., 2009). Researchers found a medium effect size on students' understanding of electromagnetism for the experimental group and a small effect size for the control group in pre-post measures. Follow-up interviews with participants in the experimental condition revealed that GN helped students understand electromagnetism better, but they would prefer having additional details and exercises. In the second study, researchers randomly assigned 81 sixth-grade Turkish elementary students into a note-taking intervention condition (i.e., mind mapping) and a conventional teaching approach during science class (Akinoglu & Yasar, 2007). Researchers trained elementary students in the experimental group to use the mind mapping technique and asked them to develop mind maps at the end of each science lecture

for over a 7-week period. Results showed that the experimental group significantly outperformed the control group in exam performance, presented better attitudes toward science classes, and had fewer misconceptions about science education. The latest study (Shimamune, Nagatomi, & Yagi, 2015) examined the effects of GN on the quiz performance of two male students with intellectual disabilities in a junior high special needs school in Japan. Utilizing a single-subject design, students attended classes with traditional lectures and lectures with GN. During GN implementation, students were required to listen to the teacher's lecture and circle correct responses on multiple-choice questions. Results showed that accurate and complete note-taking responses increased during the GN condition.

Although the effects of GN among English-speaking students in U.S. schools are well documented and synthesized, research on GN with non-English–speaking students is limited. Based on the three international studies found, only two of them utilized GN and none of them focused on a general education high school setting with academically at-risk students. Thus, the purpose of the present study was to investigate the effects of a GN intervention package on the academic performance of five Greek-speaking high school students with LD and academically at risk for school failure in a history class in Cyprus. Specifically, we sought to answer the following questions:

1. What are the effects of the GN program on history quiz performance of high school students with and without disabilities?
2. What are the effects of the GN program on the students' history note-taking performance?
3. What are the students' and teacher's perceptions of the goals, procedures, and outcomes of the GN program?

Method

Participants and Setting

The study took place in an urban Lyceum (i.e., upper secondary school) with 650 students in Cyprus. Upon study approval from the Cyprus Ministry of Education, the school principal and his staff were invited for research collaboration. The principal discussed the proposal with his staff and a history teacher expressed interest in collaborating with the research team. The teacher taught history in several classes. However, he recommended a particular class with a number

Table 1
Demographic Characteristics of Target Participants

Student	Gender	Disability	Age	Teacher-Developed Curriculum-Based Assessment	Test-A Percentile Score
George	Male	No	15:6	70% (14/20)	28.75
Maria	Female	No	15:3	60% (12/20)	17.75
Manos	Male	LD	15:1	65% (13/20)	17.75
Iasonas	Male	No	15:9	65% (13/20)	26.25
Andreas	Male	No	15:1	75% (15/20)	23.75

of students he had identified as exhibiting low performance. The class included 22 students in Year 1 Lyceum. Researchers requested parental consent by sending out consent letters and forms to all parents/guardians. Seventeen signed consent forms were returned and researchers utilized four selection criteria to define the sample: (a) low academic performance in history based on teacher-developed curriculum-based assessments, (b) parent and student written consent for participation, (c) eligibility for special education services or remedial instructional support, and (d) reading performance below the 30th percentile on the standardized Greek reading assessment "Test-A" (Padeliadu & Antoniou, 2008). Test-retest reliability indices ranged from 0.74 to 0.87 for the above reading assessment categories, and internal consistency reliability as measured by Cronbach alpha was 0.85. The instrument's construct validity indices ranged from 0.75 to 0.88.

As a result, five students were included. Only one student was diagnosed with LD and he was receiving special education services, whereas the remaining students were receiving remedial instruction due to learning difficulties. Table 1 presents participants' demographic characteristics.

The history teacher was the primary implementer of the intervention and the typical classroom instruction. He had 22 years of teaching experience in public (18 years) and private (4 years) schools. The history class was taught in 45-min instructional blocks three times a week (Mondays, Thursdays, and Fridays). The experimental study lasted 12 weeks.

The classroom setting maintained traditional character in its seating arrangements, with student desks placed in three rows facing the two black-and-white chalkboards. Each row consisted of four-to-five desks and students sat in dyads in each desk.

Dependent Variables and Data Collection

Quiz performance. Quiz performance was defined as the number of correct responses students provided on a 15-item quiz during a 10-min assessment at the beginning of each history class. Each quiz covered material presented during the previous class and consisted of six multiple-choice items, six true/false items, and three open-ended questions. The maximum number of possible points for each quiz was 20. Each multiple-choice and true/false question was worth one point, two of the open-ended questions were worth three points each, and the remaining open-ended question was worth two points. A response was recorded correct when it was in agreement with what the teacher had presented in class and the information had been included in the history course materials (book, handouts, lecture notes).

Note-taking performance. Note-taking performance was defined as the number of complete and correct main ideas students wrote in their notes during the teacher's instruction. At the beginning of each week, the teacher shared with the researchers 20 main ideas found in the National History Curriculum and considered them to be key objectives for this grade level. The main ideas included historical events, chronological periods, and facts related to the lesson's topic. A main idea consisted of one or more words and students had to record them to receive a full point. No complete sentences were necessary to receive points for key ideas. For instance, in the history unit of Minoan civilization, one key idea for students to record was that this civilization arose in the Aegean Bronze Age on the island of Crete. This key idea consisted of two parts: location (Crete) and chronological period (Aegean Bronze Age). If students recorded the entire idea either in single words (e.g., "Minoans: Aegean Bronze Age, Crete) or in full sentence ("Minoans lived on the island of Crete and they arose during Aegean Bronze Age"), they received one point. If they recorded one of the two key parts (e.g., "Minoan civilization arose on the island of Crete" or "Minoans – Crete"), they received a half-point. The maximum points earned for note-taking were 20. Students were asked to record the key ideas in their history notebooks during baseline and in their GN during intervention phase.

Research Design and Data Analysis

An experimental single-subject reversal design was selected to investigate the effects of a GN program on the students' quiz and note-taking performance. The reversal design, also known as an ABAB design, allowed researchers to exert experimental control by introducing, withdrawing, and re-introducing the intervention over

the course of the study. Experimental condition A represented typical classroom history instruction; condition B was the implementation of the GN program. Due to the nature of this design, each condition was introduced twice to determine any causal links between student performance and intervention. This design was selected in lieu of other designs (e.g., multielement) in order to examine the GN package as a whole across and within experimental conditions.

Materials

Guided notes. These were experimenter-developed lesson notes following the format suggested by Heward (2001). Specifically, each set of GN consisted of pre-planned key ideas and target objectives that the history teacher had shared with the third author prior to each class lesson. The third author met with the teacher on a weekly basis for planning and content development purposes. After each meeting, the third author prepared the GN on a word processor based on the teacher's 20 main ideas and included these structural components: (a) lesson objectives, (b) fill-in-the-blank sentences to record main ideas and key terms, (c) short answers to provide additional examples and explanations on course content, (d) graphic organizers and pictorial prompts to develop content connections, (e) structured writing activities for enhancing student understanding (e.g., matching items, recall), and (f) a legend with symbols. The symbols (★, ☛, ✎, ➔) served as visual cues for students to actively respond to the teacher's history lesson. For instance, the symbol "★" asked students to write the definition of a historical term, the "➔" prompted students to study more carefully the particular main idea, the "☛" reminded students to think and provide additional examples for the key topic presented, and the "✎" gave the opportunity to students to participate and complete in-class activities. These symbols were not included in the teacher's PowerPoint slides. After the researcher developed the GN, she met again with the teacher to share the GN and elicit feedback and approval about the final course content. After the teacher's approval, the GN were copied and distributed to students during each history class during intervention phase.

PowerPoint lessons. In addition to developing GN, intervention also consisted of PowerPoint lessons. Given the teacher's limited technological knowledge in developing his course content on PowerPoint, the third author worked closely with the teacher to develop the lesson content electronically. Each presentation consisted of lesson objectives, main ideas, video clips, and pictures allowing the teacher to teach his subject matter more effectively and efficiently. The content included in the PowerPoint was the same as the one in the GN.

Quizzes. The quizzes were developed in collaboration with the history teacher, who provided the quiz content based on his daily class objectives. The researcher typed the quizzes and provided a draft to the teacher for approval prior to its test administration. Information included in the quizzes addressed the grade-level target objectives of the National History Curriculum, and it could be obtained through history book readings and lecture notes. Students would have to read carefully the assigned chapter pages and study well the lecture notes in order to be able to complete the next-day quiz. Additionally, efforts were made to establish quiz equivalency over sessions by maintaining equal representation of question categories and consistent quiz points per question category. Open-ended questions required students to list two-to-three main ideas introduced in class. For each main idea recorded correctly, one point was awarded. For example, the two open-ended questions, which were worth three points, prompted students to list three main ideas.

Procedures

After obtaining teacher consent for collaboration, the research team implemented the lecture and GN program procedures. Based on the reversal design, each of the above experimental conditions was implemented in an alternating manner based upon student's responding on quiz and note-taking evaluations. The research team proceeded to the intervention condition only when student data showed a negative trend or low stable steady level of performance in baseline. Likewise, intervention was withdrawn after student behavior changed positively for at least five consecutive sessions. These a priori research decisions for phase change were necessary to establish internal validity in our experiment.

Baseline: Lecture. The first experimental phase was the typical classroom instruction during history class period. The teacher began each session by prompting students to open their books to the assigned pages and have their notebooks ready to record the key ideas of the lecture. Next, he lectured on the day's topic focusing on the 20 pre-determined main ideas he wanted his students to understand. Students were instructed to take notes while listening to the lecture. On occasion, while lecturing, a student asked a question related to the topic. On other occasions, the teacher stopped and asked students to write some of the main points he was emphasizing. Besides these instances, students were expected to keep up with their own note taking while the teacher was talking. Occasionally, the teacher distributed supplemental handouts to students to be completed in class and worksheets for homework. At the end of each lecture, the teacher

reminded students to study for their upcoming quiz. At the beginning of the next class, the teacher administered the 10-min quiz and after its completion, began his lecture on the day's topic. At the end of each class, the third author collected the student quizzes and student notes for recording. Student notes were copied and returned back to them the same day with no feedback provided. Also, students did not receive feedback on the quizzes.

Intervention: A GN intervention package. The research team developed the components of the intervention package based on the instructional design principles of active student responding (Heward, 1994; 2001), and then the third author trained the teacher to deliver the intervention. The GN intervention consisted of: (a) PowerPoint slides representing main ideas from history curriculum chapters, (b) videos embedded in slides demonstrating key terms (e.g., Minoan civilization, Archaic written language), and (c) GN with cues, short answers, fill-in-the-blanks, graphic organizers, and embedded group or individual brief in-class activities (e.g., matching, listing, answering questions) for additional opportunities to respond to history content. Teacher training consisted of describing the use of each intervention component during instruction, demonstrating the delivery of slides and GN to students, and providing opportunities for the high school teacher to ask questions before delivering the intervention to students. During the first day of the intervention, the researcher co-taught the lesson with the teacher using the slides and showed the students how to complete their GN, how to look for specific cues on their notes, identify information from the slides, and actively respond to the history instruction. For the remaining intervention sessions, the teacher conducted the remaining sessions. Each history class began with the teacher stating the day's topic via PowerPoint, reminding students about classroom expectations during the completion of GN, and prompting students to follow carefully the visual cues on the handouts and take part in class discussion. At the end of each session, the teacher reminded students about the upcoming quiz. As in baseline, the researcher collected student notes and quizzes for data collection purposes. Student notes were again copied and returned to students the same day with no feedback provided.

Social Validity

Student questionnaire. An 11-item questionnaire was constructed asking students to read statements and choose their response by using a 4-point rating scale (1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Agree Strongly). Students were asked to rate statements that focused on the impact and structure of the intervention on their

history knowledge, lesson review, history performance, and their ability to generalize to other subjects. Additionally, two open-ended questions were included prompting students to share their thoughts about what they would change in the GN intervention package and what they liked most about GN.

Teacher questionnaire. An 8-item questionnaire was developed prompting the teacher to read and respond to the statements using the same 4-point rating scale. The teacher was asked to rate the effectiveness, feasibility, and generalizability of the intervention. Furthermore, the teacher was asked to evaluate the extent to which he would use this strategy again, and if he would recommend it to other colleagues. The teacher was also encouraged to provide additional thoughts on the open space provided at the end of the questionnaire.

Interobserver Agreement Reliability

Two secondary observers participated from 66.6% to 75% of sessions across all conditions to record the dependent measures. The percentage of interobserver agreement (IOA) was calculated by dividing the number of agreements with the sum of agreements and disagreements and multiplied by 100. Results of the IOA for quiz performance showed that the mean percentage of agreement was 95% (range: 75–100%) and 100% in baseline and intervention, respectively. The mean percentage of agreement for note-taking performance was 100% across both conditions.

Procedural Integrity Assessment

Two integrity assessments were conducted to evaluate teacher and student behaviors. The first assessment included a 12-step checklist to evaluate teacher behaviors and a second 11-step checklist assessed student behaviors during intervention. Student behaviors included getting materials ready, completing GN, maintaining continuous eye contact on the slide for at least five seconds, completing structured activities, responding to teacher questions/instructions, etc. Teacher behaviors pertained to getting slides ready for instruction, prompting students to look at the cues on the GN, handing out the GN to class, following the slides sequence, etc. Both lists are available upon request from the first author. A third independent observer attended at least 30% of intervention sessions and assessed participant behaviors by recording the occurrence or non-occurrence of those steps. If any steps had not been observed, the observer would mark the step as "not observed." Researchers did not provide any type of feedback to the students or teacher during or after observations to avoid any confounding variables in the study. The teacher's mean

integrity performance was 85% (range: 83.3–91.7%). For students, mean percentage of integrity was 96.4% (range: 91–100%).

Observer Training

Observer training consisted of two types: (a) training two research assistants for documenting IOA reliability of the dependent variables and (b) training a third data collector to assess the procedural integrity of GN. Only the two IOA observers were kept completely blind about the study's specific research questions and experimental procedures. The third data collector was informed only about the intervention's general scope, and no details were provided about the specific research questions. Specifically, the research team conducted the following steps for training the two observers: (a) definitions and detailed descriptions of dependent variables were presented, (b) data collection sheets were shared and a list of recording rules for student quizzes and course notes was described, (c) practice opportunities were provided on both variables (corrective feedback and modeling of the correct recording rules were delivered immediately to the observers), and (d) training was terminated if the two observers met the mastery criterion 90% of IOA agreement with the third author across three consecutive meetings. Continuous discussion was held between the observers and the third author to provide clarifications on the data recording.

The second training focused on training the third observer on assessing the intervention implementation using the two procedural integrity checklists. The training steps included the following: (a) The student and teacher integrity checklists were presented and described to the observer. (b) Two practice opportunities with the checklists were provided in the classroom setting, where the students and teacher were having a history class using GN. Both the researcher and the observer were sitting at the back of the classroom to avoid any lesson disruptions, observing and recording any steps on the assigned checklists. During observations the researcher provided immediate corrective feedback using low voice volume so that lesson instruction was not hampered. (c) More analytical feedback and discussion about checklist recordings took place immediately after the observation session. During both consecutive practice sessions, the researcher provided continuous feedback and ensured that the observer was fluent and confident in observing and assessing the GN implementation prior to the start of procedural integrity assessment. We did not include procedural data collected during practice sessions in the overall fidelity outcomes.

Results

Quiz Performance

Figure 1 shows the results of student quiz performance across experimental conditions. All students evidenced higher quiz scores during the GN program than during traditional lecture. Based on the graphic display, George had a mean score of 9.0 (*SD* = 2.6) and 8.0 (*SD* = 3.6) out of 20 during lecture phases one and two, respectively. Upon entering intervention conditions one and two, his means increased to 14.7 (*SD* = 1.2) and 13.8 (*SD* = 1.3) points, respectively. Thus, George presented mean percentages of change over baseline one and two 28.4% and 28.8%, respectively. Session 3's data point is considered an outlier because the teacher had a teaching evaluation by the school inspector on that day and thus he had planned a well-structured lesson plan and had delivered handouts to students with the lesson's main ideas. In the educational system of Cyprus, school inspectors are assigned supervisors to local schools for evaluating teacher performance and providing curriculum consultation to schools.

Maria presented a lower mean percentage of change over baseline compared to George. Her quiz score means were 9.8 (*SD* = 2.4) and 9 (*SD* = 0) points during lecture phases one and two, respectively. Her intervention means were 14.5 (*SD* = 1.6) and 13.5 (*SD* = 1.3) points across the GN program conditions one and two, respectively. Maria's mean percentage of change over baseline one was 23.5%, and the mean percentage of change over baseline two was 22.5%. Manos presented similar progress patterns to Maria's. His lecture means were 9.7 (*SD* = 2.4) and 8 (*SD* = 0.8) points across baseline conditions one and two, respectively, while his average quiz performance increased to 14.4 (*SD* = 1.4) and 13.5 (*SD* = 1.3) points during intervention phases one and two, respectively. Hence, Manos's mean percentages of change over lecture phases one and two were 23.5% and 27.5%, respectively.

Iasonas and Andreas demonstrated the highest mean percentages of change over lecture. Specifically, Iasonas's mean performance was 8.3 (*SD* = 3.3) points for lecture phase one and 8.5 (*SD* = 3.0) points for the second baseline. Upon entering GN, Iasonas's intervention means were 14.8 (*SD* = 0.4) and 14.5 (*SD* = 0.6) points for GN conditions one and two, respectively. Thus, his mean percentages of change over lectures one and two were 32.5% and 30.0%. Finally, Andreas's mean quiz performance for baseline one was 9.0 (*SD* = 3.1) points and 7.3 (*SD* = 1.0) points for baseline two. During the GN program, Andreas's mean performance increased to 15.0 (*SD* = 1.1) points in

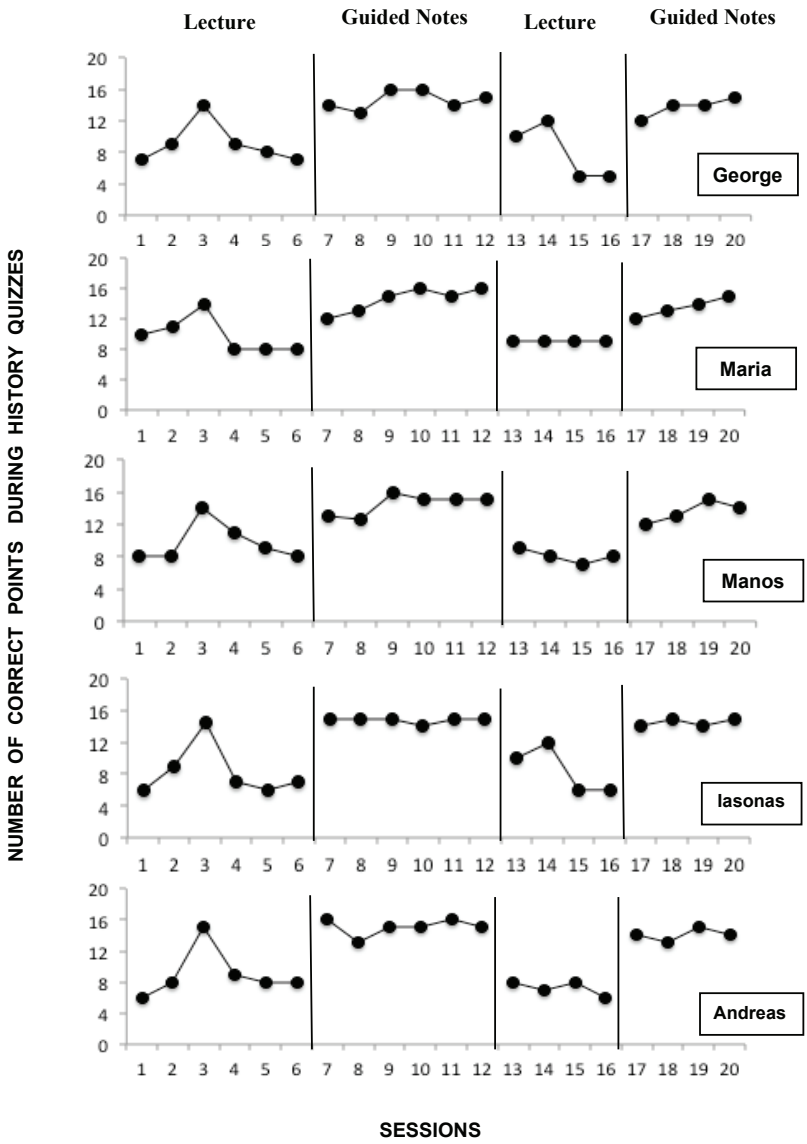

Figure 1. Student quiz performance in history class across experimental conditions.

intervention phase one and 14.0 (*SD* = 0.8) points in intervention phase two. His overall mean percentages of change over baseline one and two were 30.0% and 33.5%, respectively.

Note-taking Performance

Figure 2 presents the results of student history note-taking performance across experimental conditions. Specifically, George's means for lecture one and two were 0.2 (*SD* = 0.4) and 0 points, respectively. During the GN package, his note-taking mean increased to 16.3 (*SD* = 0.8) points for intervention phase one and 16.0 (*SD* = 1.4) points for phase two. Hence, George's mean percentage of change over lectures one and two were 80.5% and 80.0%, respectively. Likewise, Maria's mean note-taking performance was 0.2 (*SD* = 0.4) points for lecture one and 0 points for lecture two. Her performance increased to 18.0 (*SD* = 1.9) points during the GN program phase one and 15.8 (*SD* = 0.5) points during the GN program phase two. Maria's mean percentages of change over lectures one and two were 89.0% and 79.0%, respectively.

Manos and Iasonas evidenced the highest mean percentage of change over baseline compared to the rest of the group. Specifically, Manos's mean performance was 0.2 (*SD* = 0.4) points for lecture phase one and 0 points for lecture phase two. His intervention mean increased to 19.3 (*SD* = 1.0) points during the GN program phase one and 17.5 (*SD* = 1.3) points during intervention condition two. Manos's mean percentages of change over lectures one and two were 95.5% and 87.5%, respectively. Iasonas showed a mean of 0.2 (*SD* = 0.4) points during the first lecture phase and a mean of 0 points in the second lecture condition. However, his mean note-taking performance was 19.2 (*SD* = 1.0) during GN program phase one and 17.8 (*SD* = 0.5) points in the second intervention phase. Iasonas's overall mean percentages of change over lecture conditions one and two were 95.0% and 89.0%, respectively. Finally, Andreas presented similar progress patterns with the rest of the students. His mean performance during lectures one and two was 0.2 (*SD* = 0.4) and 0 points, respectively. During intervention, his mean note-taking performance was 17.2 (*SD*=1.5) and 16.5 (*SD*=0.6) points during the GN program phase one and two, respectively. Andreas's mean percentages of change over lecture conditions one and two were 85.0% and 82.5%, respectively.

Social Validity

Student outcomes. Sixty percent of the students agreed strongly that the GN intervention program helped them acquire history content easily, whereas 40% of students agreed on the statement. All five

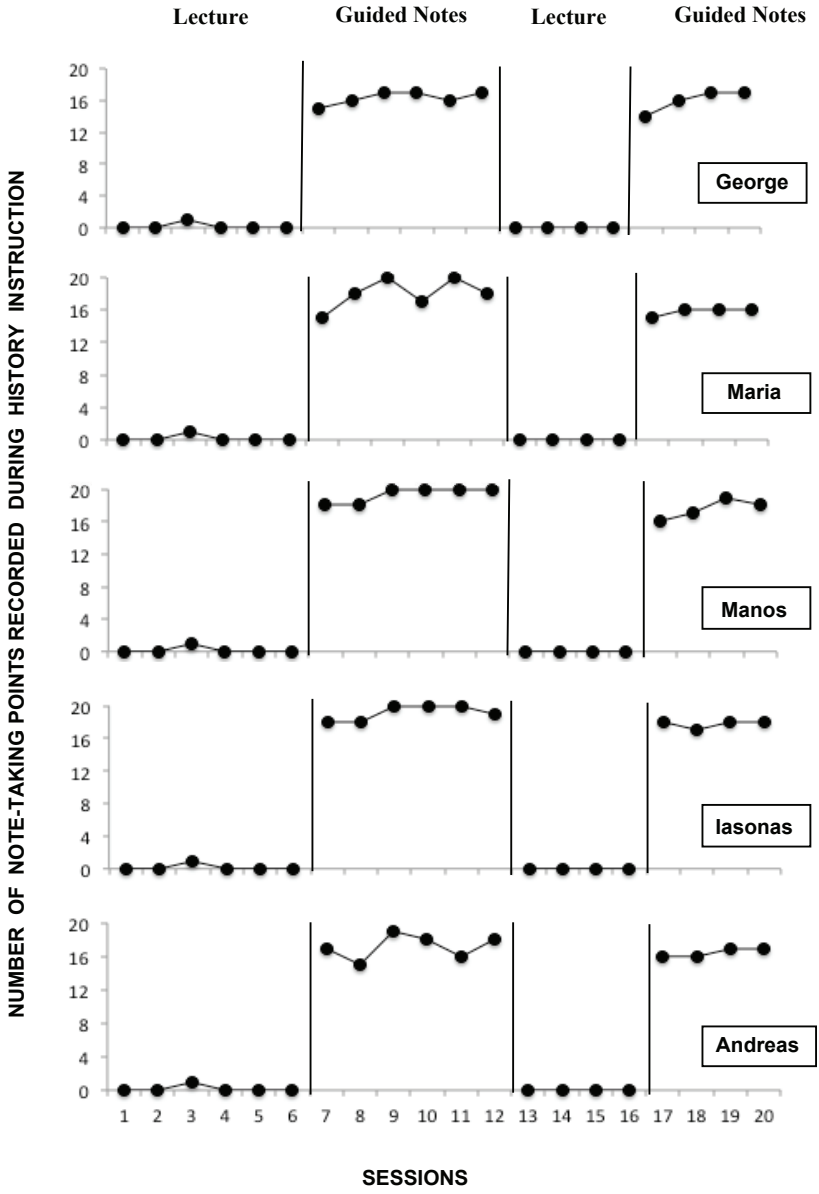

Figure 2. Student note-taking performance in history class across experimental conditions.

students agreed that their history grade improved during intervention and 60% of students agreed strongly that they were able to recall history content easily. All students viewed the GN program easy to follow during the teacher's instruction. Eighty percent of students agreed strongly or agreed that they self-observed improvement in their history learning. Additionally, in one open-ended question all but one student commented that they would not change anything in the GN. One student wrote that more blanks could have been included for completion in the GN. In the second open-ended question, students' views included the following: "Guided notes presented the main ideas in a clearer manner and I was able to learn history events easier," "By filling the blanks with main ideas, I could understand history better," "I like the teaching format with the GN in our history class," and "Guided notes give an easy and fast way to study history at home because they are simple."

Teacher outcomes. The teacher agreed strongly that the GN intervention was effective in helping his students with LD and learning difficulties to improve their academic performance in history. He agreed strongly that the target students as well as the other students in the classroom were actively responding to and engaging with the history content. He expressed interest in implementing GN the following year as well as recommending the strategy to his colleagues. He commented that the GN program did not include difficult strategies to implement.

Discussion

This experimental study investigated the effects of a GN intervention program on the history quiz and note-taking performance of five students with and without LD in a Greek-speaking Lyceum in Cyprus. Students' note-taking and history knowledge improved only during the implementation of the GN program. This outcome replicates previous research findings conducted with English-speaking student populations in American schools (e.g., Haydon et al., 2011; Konrad et al., 2009; Larwin et al., 2012) and with non-English speaking students (e.g., Narjaikaew et al., 2009; Shimamune et al., 2015). As noted earlier, the GN program consisted of a variety of elements (PowerPoint slides, GN with embedded graphic organizers, fill-in-the-blanks, structured group activities) that all produced higher student quiz performance during intervention than the traditional lecture. This finding gives support to Heward's (2001) and Konrad et al.'s (2011) recommendation of including additional effective teaching

elements in student GN. In addition, most of the students, who had not been diagnosed with a specific disability, exhibited satisfactory improvement during the GN program. Such evidence supports Larwin et al.'s (2012) assertion that GN are effective for learners with and without disabilities. Certainly, such empirical finding strengthens policy and legislative efforts in promoting an inclusive school enviroment for all students, where active student responding is supported by the implementation of empirically validated practices (Konrad et al., 2009).

Limitations and Directions for Future Research

We acknowledge that our study includes a number of limitations. First, we did not standardize the history quizzes nor test them for equality. It is possible (and, in fact likely) that quizzes were not comparable to one another in terms of difficulty. Future researchers should make efforts to ensure that quizzes are comparable to one another. One way to address this concern would be to use a different experimental design. In a multielement design, for instance, researchers could randomly determine which condition (GN vs. no GN) students participated in just before beginning a session. Using this approach would allow participants to be in different conditions during the same instructional session. This would allow experimenters to say with more confidence that it was the GN that affected performance rather than the content presented or the measurement taken.

Second, although we measured the quality of students' notes, we did not determine whether students became better note-takers. GN may serve as a teaching process helping students learn how to take better notes on their own; however, this has yet to be substantiated with sufficient empirical research. Given that note-taking performance of students in the current study returned to baseline levels when GN were withdrawn, it is clear that a few sessions with GN are not sufficient to teach students to take notes on their own. Systematic, explicit teaching efforts to teach note-taking strategies and perhaps gradual fading of GN are likely needed to help students, particularly those with learning challenges, learn to take notes independently. Future research should examine this assumption.

Third, the intervention materials were developed by the researcher rather than the teacher, which presents a limitation to the external validity of our findings. However, one should consider the educational context in Cyprus, which is characterized by conservatism, centralization, no school autonomy, and limited principal authority (Karagiorgi & Nicolaidou, 2010). Schools and teachers have not been accustomed to participating in applied experimental research

projects and classroom teachers have been traditionally reluctant to get involved with tasks beyond the ones assigned by the ministry. In this study, we considered the collaboration with the classroom teacher a success as he had been involved in the implementation process and had provided feedback on the development of materials. Future research should build on the existing collaboration by having teachers take more initiative in lesson design using GN.

Finally, further research should focus on the implementation across other content areas from Cyprus's national curriculum (physics, chemistry, mathematics, geography) comparing student outcomes between students with and without disabilities in middle school (i.e., Gymnasium) and Lyceum settings. It would be of particular interest if further studies focus on students with behavioral issues, as this constitutes one of the frequently reported teacher factors for discipline referrals and psychological support in Cyprus (MOEC, 2014a). Future researchers could also consider designing and conducting component analyses to tease out the relative effects of the various parts of the GN instructional package utilized in the present study. Indeed, it may have been the visual presentation of the material (via PowerPoint), the embedded activities, or the more organized presentation of material that led to the improvements in student performance. Given that GN have been shown to be so effective in previous research, we suspect that the GN contributed to the students' improvements, but we are uncertain how much and in what ways. Most likely, the new instructional elements introduced during intervention, including GN, worked in combination with one another to form an effective instructional package.

Implications for Practice

This experimental study demonstrated that the GN program, in combination with other well-documented elements of effective instruction, is a promising tool to be examined further and to teach students content in non-English–speaking settings (Narjaikaew et al., 2009). Secondary teachers who wish to implement such GN programs should consider the following points. First, it is important that teachers recognize that GN in the absence of other effective teaching methods (e.g., explicit teaching, engaging activities, feedback) will not be a "magic bullet." Teachers should carefully plan their instruction to present information explicitly, to systematically and strategically introduce new material, and to arrange ample opportunities for students to respond to instruction and receive feedback. They can then include the GN program as part of that instruction. Teachers should also recognize that their use of GN is not a substitute for teaching

students *how* to take notes. Eventually students, particularly those who move on to postsecondary education, will need to learn to take notes on their own.

We found that our instructional package with GN-embedded graphic organizers, multimedia (videos), and structured activities not only increased student achievement outcomes but also was well received by the teacher and students based on their social validity ratings. Secondary teachers who are responsible for teaching content effectively to all students may find that investing time and effort into transforming their lecture-based lessons by carefully organizing their content, planning engaging activities, and including GN will result in successful, inclusive, and academically engaging classroom environments.

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