

Evaluating Greek primary school textbooks used to teach students with learning disabilities

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The evaluation of textbooks as to their compliance with evidence-based standards of instructional design, and as to their suitability for accommodating the diverse educational needs of various groups of the school population, including students with Learning Disabilities, is considered an important means of improving the quality of educational services. In the present paper, the results of evaluations of the Language and Mathematics textbooks used in the three first grades of the Greek primary school for teaching students with and without Learning Disabilities are reported. The evaluation was based on the following criteria: clarity of instructional objectives, review of prerequisite knowledge, explicitness of instructional explanations, sufficiency of teaching examples, introduction of additional concepts and skills, adequacy of guided practice, effectiveness of independent practice, and appropriateness of knowledge review. According to the results, the textbooks do not satisfy the four out of the totally eight criteria, namely the criteria of: clarity of instructional objectives, explicitness of instructional explanations, introduction of additional concepts and skills, and appropriateness of knowledge review. The results regarding the other four criteria were equivocal. Based on the results, the view can be taken that the evaluated textbooks present considerable shortcomings and inadequacies, necessitating the application of substantial modifications in various parameters of instructional design when used for teaching students with LD. The effects of these shortcomings are discussed.

Keywords: Textbook evaluation, instruction of students with LD.

Evaluación de los libros de texto de Educación Primaria griegos utilizados en la enseñanza de los estudiantes con dificultades de aprendizaje. La evaluación de los libros de texto en cuanto a su cumplimiento de las normas basadas en la evidencia de diseño instruccional, y en cuanto a su idoneidad para acomodar las diversas necesidades educativas de los diversos grupos de la población escolar, se considera un medio importante de mejorar la calidad de los servicios educativos incluyendo a estudiantes con discapacidades de aprendizaje. En el presente trabajo, se explican los resultados de las evaluaciones de los libros de texto de Lengua y Matemáticas que se utilizan en los tres primeros grados de la escuela griega primaria para enseñar a los estudiantes con y sin dificultades de aprendizaje. La evaluación se basó en los siguientes criterios: claridad de objetivos de instrucción, el examen de conocimientos previos, explicitación de las explicaciones de instrucción, la suficiencia de los ejemplos de enseñanza, la introducción de conceptos adicionales y capacidades, la adecuación de la práctica guiada, la eficacia de la práctica independiente, y la adecuación de los conocimientos. Según los resultados, los libros de texto no cumplen en cuatro de los ocho criterios revisados, en concreto los criterios de la claridad de los objetivos de instrucción, la explicitación de las explicaciones de instrucción, la introducción de conceptos adicionales y habilidades, y la conveniencia de revisar los conocimientos. Basándose en estos resultados, el punto de vista puede considerarse que los libros de texto evaluados presentan considerables deficiencias e insuficiencias, lo que exige la aplicación de modificaciones sustanciales en varios parámetros de diseño de la instrucción cuando se utilizan para enseñar a los estudiantes con dificultades de aprendizaje. Se discuten los efectos de estas deficiencias.

Palabras clave: Evaluación de libros de texto, enseñanza de estudiantes con dificultades de aprendizaje.

ly and decisively the methods, the materials, and the activities used for achieving the learning goals (Dreher & Singer, 2001; Reys, 2001; Reys & Bay-Williams, 2003). Inadequate textbooks may substantially compromise students' learning progress (Reys, Reys, & Chavez, 2004). Hence, textbook evaluations are regarded as a useful tool for achieving instructional improvement and for finding effective solutions to problems encountered by students at risk for school failure or students with disabilities (Jitendra, Salmento, & Haydt, 1999).

International research offers some enlightening paradigms of textbook evaluations and the instructional utilization of their results. For example, Jitendra, Carnine, & Silbert (1996) examined the teaching of division presented in two 5th grade mathematics textbooks, in light of nine components of effective instruction, i.e. prior knowledge, introducing new concepts, coherence, clarity of teacher communication, manipulative activities, guided practice, initial practice, later practice, and review. Several textbook inadequacies were established, which, according to the researchers, prevent the meeting of the needs of most students, and may contribute to the widening of the gap between students with mild disabilities and their typical classmates. In another study, Jitendra, Salmento, & Haydt (1999) used nine components of instructional design (clarity of objective, additional concepts and skills taught, prerequisite skills taught, explicit teaching explanations, efficient use of instructional time, sufficient and appropriate teaching examples, adequate practice, appropriate review, and effective feedback) in order to evaluate the quality of 4th grade subtraction instruction appearing in seven Mathematics textbooks. Based on their findings, the researchers concluded that students with learning problems and difficulties would need substantial instructional adaptations in order to benefit from subtraction instruction based on the evaluated textbooks. In yet another study, Jitendra *et al.* (2001) examined the readability levels, the knowledge forms, the intellectual operations, the instructional objectives, and the activities associated with before-, dur-

ing-, and after-phases of instruction of four middle school geography textbooks. A main finding was that the texts were inconsiderate of poor readers and dense with factual information. The researchers concluded that these qualities pose a significant challenge for students facing various learning difficulties and disabilities.

Research focused on textbook evaluation has been conducted also by other researchers, such as Sood & Jitendra (2007) and Bryant *et al.* (2008), with conclusions similar to those of Jitendra *et al.* (1996, 1999, 2001) regarding various textbook inadequacies. It seems that textbooks often do not satisfy the qualitative criteria indicating suitability for teaching typical students who may present learning differences or difficulties; moreover, textbooks often seem to constitute obstacles when it comes to the teaching of students with atypical learning patterns, who happen to be instructed in ordinary classrooms, like students with Learning Disabilities.

Inclusionary school practice has brought the bulk of students with Learning Disabilities (LD) in the ordinary classrooms, where they are instructed together with their typical peers, following the same curriculum and studying the same textbooks (Klinger & Vaughn, 2002). However, the accommodation of the learning needs of students with LD necessitates the implementation of modifications, which the educators are often unwilling or unable to make (Baker & Zigmund, 1990). In that case, the quality of the educational services students receive is to a large extent dependent on the quality of the textbooks used for their instruction.

In Greece, most students with LD are instructed in ordinary classrooms or resource rooms, via the standard textbooks meant for the typical students. Nonetheless, research shows that the educational services these students receive are often sub-optimal, partly because many Greek teachers take the view that the task of instructional modifications for students with LD is not their own duty, but belongs to the responsibility of specialized personnel. One of the reasons they adduce for justifying their unwillingness to undertake the

modifications is the unsuitability of the textbooks they have to use (Agaliotis & Kalyva, 2011).

In order to determine whether the Language and Mathematics textbooks used in the first three grades of the Greek primary school for instructing typical students and students with LD take into consideration important components of instructional design, we conducted two studies, which are described in the present paper. The main research questions of the studies were: a) Do the Language textbooks used in the first three grades of the Greek primary school comply with commonly used standards of instructional design?; b) Are the Language textbooks used in the first three grades of the Greek primary school suitable for the teaching of students with LD?; c) Do the Mathematics textbooks used in the first three grades of the Greek primary school comply with commonly used standards of instructional design?; e) Are the Mathematics textbooks used in the first three grades of the Greek primary school suitable for the teaching of students with LD?

Method

Participants

The participants of the first study (Language textbooks) were 219 primary school teachers (51 males – 23.2% and 168 females – 76.7%), holding full-time positions in public schools situated in different regions of northern Greece. Sixty three of the participants (28.7%) were working in special education units and the rest 156 of them (71.2%) were working in ordinary schools. The age of the sample ranged from 29 to 52 years old, with a mean age of 38 years and 3 months ($SD = 5.23$). Their years of teaching experience varied from 3 to 29 years, with a mean of 14 years and 6 months ($SD = 6.52$). All participants had experience in using the textbooks under evaluation.

The participants of the second study (Mathematics textbooks) were 112 primary school teachers (43 males – 38.3% and 69 females – 61.6%), holding full-time positions in ordinary public schools situated in different regions of northern Greece. The age of the

sample ranged from 29 to 52 years old, with a mean age of 37 years and 5 months ($SD = 7.31$). Their years of teaching experience varied from 3 to 29 years, with a mean of 13 years and 8 months ($SD = 7.15$). All participants had experience in using the textbooks under evaluation.

Procedures and measures

In the study going about the evaluation of the Language textbooks three lessons were randomly selected from each textbook of the 1st, 2nd, and 3rd grade of the Greek primary school, after excluding the first three and the last three lessons, because they had a strong orientation toward knowledge review of the previous and the current grade respectively.

In the study examining the Mathematics textbooks, the evaluation included 16 lessons from the textbook of the 1st grade (total number of lessons: 64), 10 lessons from the textbook of the 2nd grade (total number of lessons: 54), and 6 lessons from the textbook of the 3rd grade (total number of lessons: 60), which referred to the teaching of Number Combinations (additions and subtractions with results up to 20, and multiplications and divisions with results up to 100).

The participants of both studies were provided with brief descriptions of the content of eight instructional design criteria, which correspond to important components of effective instruction (e.g. Swanson, 2001) and have been proven functional in previous textbook evaluations (e.g. Bryant *et al.*, 2008; Jitendra *et al.*, 1999, 2005). Then, they were asked to evaluate the lessons on the basis of these criteria. The criteria were:

(1) *Clarity of objective*. Objectives are specific descriptions of behaviors that students are expected to exhibit after having a particular learning experience. Objectives guide instructional practice, and serve also as indicators to evaluate student performance (Ediger, 2004). Participants of both studies (Language textbooks, Mathematics textbooks) were asked to note a score of 1 if the lesson did not include an objective, a score of 2 if the objective existed but was stated vaguely, and a score of 3 if the objective was complete.

(2) *Review of prerequisite knowledge.* Students learn new and complex content more easily and accurately, if they possess the prerequisite knowledge and skills (Hudson & Miller, 2006). Thus, a review of critical prerequisite knowledge or simpler component skills is important for facilitating learning of higher order content. In both studies a rating of 1 was assigned to lessons including neither a review nor a mention of prerequisite skills, and a rating of 2 to lessons in which at least one prerequisite skill was mentioned, but not reviewed. Finally, a rating of 3 was assigned if the lesson included and reviewed at least one prerequisite skill.

(3) *Explicitness of instructional explanations.* Unequivocal and clearly expressed instructional explanations help students understand concepts and procedures, and increase their opportunities to succeed in school. Instructional explanations play a critical role especially in the case of students with disabilities, who face considerable problems with information processing (Rosenshine, 1995). The scores awarded for this criterion were 1, if the lesson lacked instructional explanations, 2, if the given explanation was not clear, and 3, if the explanation included in the lesson was full and explicit.

(4) *Sufficiency of teaching examples.* The quantity, the quality and the presentation of the examples included in a lesson play a critical role in the promotion of student learning. According to Steel (2002), the presentation of three to five examples for each knowledge or skill, which contain the essential dimensions of the learning goal facilitates understanding and generalization. For this criterion a score of 1 indicated the existence of insufficient (less than 3) and qualitatively poor examples, a score of 2 indicated the presentation of quantitatively sufficient but inadequate examples, and a score of 3 indicated the use of sufficient and adequate examples.

(5) *Introduction of additional concepts and skills.* Acquisition of new knowledge becomes significantly easier when the lesson focuses only on one concept or skill (instead of many), because students can devote all their resources to the achievement of one goal in-

stead of dispersing them, trying to succeed in several areas (Carnine, Silbert, Kame'enui, & Tarver, 2004). This holds true especially in cases of students with compromised cognitive resources (e.g. attention, memory), like the students with disabilities (Jitendra *et al.*, 1999). For this criterion a rating of 1 was awarded when more than two concepts or skills were introduced in the evaluated lessons, a rating of 2 was awarded in cases where two concepts or skills were included in the learning goals, and a rating of 3 was awarded when only one concept or skill was introduced in the lesson.

(6) *Adequacy of guided practice.* Guided practice is the instructional phase in which students begin to apply the knowledge and skills constituting the focus of the lesson, under constant teacher monitoring and, if necessary, support. Students with disabilities need extended guided practice in order to grasp the essential parts of the new knowledge (Sayeski & Paulsen, 2010). The scores awarded for this criterion were 1, if the lesson did not include exercises for guided practice, 2, if the lesson included one or two exercises for guided practice, and 3, if the lesson included more than three exercises for guided practice.

(7) *Effectiveness of independent practice.* During independent practice students complete tasks on their own, without teacher's guidance, trying to achieve high levels of accuracy and speed in knowledge use. Independent practice should be coherent with guided practice, because otherwise students may be confused and, consequently, fail (Carnine *et al.*, 2004). The scores awarded for this criterion were 1, if the lesson included one exercise for independent practice or no exercise at all, 2, if the lesson included two or three exercises for independent practice, and 3, if the lesson included four or more exercises for independent practice.

(8) *Appropriateness of knowledge review.* Taught knowledge and skills should be systematically reviewed, in order to secure retention and functional use in complex contexts (Jitendra *et al.*, 1999). Knowledge review is crucial in the case of students with memory problems, like students with LD (Carnine *et*

al., 2004). For this criterion a rating of 1 was awarded when the textbook did not include systematic review of important knowledge, a rating of 2 was given when the proposed review was inadequate, and a rating of 3 was awarded when the review was sufficient and appropriate.

MANOVA was carried out to determine differences in textbook evaluation according to participants' gender, age, years of teaching experience, and specialization (general or special educators).

Results

The participants' judgments about the evaluated Language and Mathematics lessons appear in Tables 1 and 2 respectively.

Regarding the effect of gender, age, years of teaching experience, and educators' specialty on the evaluation of the Language lessons, it was found that statistical significance existed only in reference to the 8th criterion (appropriateness of knowledge review), where educators with more than 20 years of teaching experience supported more strongly than educators with less years the position that the review proposed in the textbooks is inappropriate ($F_{(3, 17.636)} = 5.93$, $p = 0.001$, $\eta^2 = 0.185$). No other statistically significant correlation was found.

Regarding the effect of gender, age and years of teaching experience on the evaluation of the Mathematics lessons, no statistically significant correlation was found.

Table 1. *Judgments about Language lessons*

<i>Criterion</i>	<i>Dominant judgment</i>	<i>Participants supporting dominant judgment</i>	<i>M - SD</i>
<i>Objectives</i>	Existent, but vaguely formulated	78.7%	2.14 - 0.46
<i>Prerequisite knowledge</i>	Not mentioned - not reviewed	57.3%	1.54 - 0.51
<i>Instructional explanations</i>	Existent, but unclear	58.2%	1.83 - 0.66
<i>Teaching examples</i>	Insufficient and qualitatively poor	50.1%	1.53 - 0.59
<i>Additional concepts and skills</i>	Considerable load of concepts and skills introduced per lesson	64.5%	1.49 - 0.72
<i>Guided practice</i>	Existent, but insufficient	88.9%	1.98 - 0.35
<i>Independent practice</i>	Existent, but insufficient	65.5%	1.82 - 0.54
<i>Knowledge review</i>	Existent, but inadequate	73.2%	1.94 - 0.56

Table 2. *Judgments about Mathematics lessons*

<i>Criterion</i>	<i>Dominant judgment</i>	<i>Participants supporting dominant judgment</i>	<i>M - SD</i>
<i>Objectives</i>	Existent, but vaguely formulated	69.3%	1.97 - 0.47
<i>Prerequisite knowledge</i>	Sufficient in most lessons	51.3%	2.29 - 0.68
<i>Instructional explanations</i>	Unsatisfactory	67.9%	1.77 - 0.62
<i>Teaching examples</i>	Sufficient and adequate	52.8%	2.08 - 0.57
<i>Additional concepts and skills</i>	Considerable load of concepts and skills introduced per lesson	76.8%	1.38 - 0.78
<i>Guided practice</i>	Sufficient	79.3%	2.43 - 0.32
<i>Independent practice</i>	Sufficient	75.5%	2.39 - 0.57
<i>Knowledge review</i>	Existent, but inadequate	80.2%	1.96 - 0.49

Discussion

The studies presented in this paper aimed at the evaluation of Language and Mathematics textbooks of the first three grades of the Greek primary school, as to their compliance with important instructional standards, as well as their suitability for instructing students with LD. The evaluation was based on eight criteria of effective instructional design.

The evaluated lessons of the Language textbooks were judged by the participants as: including vaguely formulated objectives, lacking appropriate review of prerequisite knowledge, offering unclear instructional explanations and insufficient teaching examples, introducing per lesson a considerable load of additional concepts and skills, proposing insufficient guided and independent practice, and presenting inadequate knowledge review.

The respective judgment about the lessons of the Mathematics textbooks was that these lessons: include vaguely formulated objectives, but sufficient review of prerequisite knowledge, offer unsatisfactory instructional explanations, but sufficient teaching examples, introduce per lesson a considerable load of additional concepts and skills, propose sufficient guided and independent practice, and present inadequate knowledge review.

The observed differences in four out of eight (50%) of the criteria used for the evaluation of the Language and Mathematics textbooks may partly be a function of the fact that the Language lessons were randomly selected and did not include common content, whereas the Mathematics lessons had as common factor the reference to the teaching and learning of NCs (along with the teaching of other concepts and skills). In some of the evaluated lessons of Mathematics, then, the main goals may have been qualitatively different from the respective aims of the Language lessons, and this difference may have influenced both the methodological choices of the authors of the textbooks and the application of the evaluation criteria by the participants. For example, in lessons mainly oriented toward memorization or retention of NCs, the application of the criteria of prerequisite

knowledge review, teaching examples, guided practice, and independent practice is probably not the same as in lessons mainly oriented toward the presentation of totally new concepts and skills. In other words, it may be that the selection and evaluation of Language lessons with a recurring subject (e.g. auxiliary verbs) might have led to results comparable to those of the evaluation of the Mathematics textbooks and, similarly, the selection of random lessons from the Mathematics textbooks might have led to results comparable to those yielded from the evaluation of the Language textbooks.

However, regarding the commonalities of the two evaluations, research shows that lessons and textbooks characterized by vague objectives, unsatisfactory instructional explanations, simultaneous introduction of multiple concepts and skills, and inadequate knowledge review create unfavorable conditions for the school progress of all students, but especially of the students with LD (Lerner, 2007; Swanson, 2009).

Specifically, according to Jitendra *et al.* (1999) and Ediger (2004), unless the description of a lesson's objective is expressed in specific, observable and measurable terms, teachers will not know exactly which methodological choices they should make, and what means they should employ, in order to support students in their effort to achieve desired outcomes. The need for using clearly defined objectives becomes paramount in the case of students with LD, due to the peculiarities of their learning mechanisms.

Inadequate instructional explanations may also affect adversely the students' learning progress, as they may obstruct the grasping of concepts and the acquisition of skills (Carnine *et al.*, 2004). Explicit instructional explanations are vital for students with LD, who have to deal both with the demands of acquiring new knowledge and the shortcomings of their information processing mechanism (Jitendra *et al.*, 2005).

Regarding the introduction of several concepts and skills per lesson, it is underlined that this practice not only creates excessive learning load for the student, but it also results

in difficulty to discern the cause of a possible failure to master learning outcomes (Bryant *et al.*, 2008). Moreover, considering the fact that in the case of students with LD various dimensions of their mental resources are often compromised (Lerner, 2007), it can be hypothesized that the introduction of many concepts and skills per lesson may be detrimental to their progress.

Finally, in reference to knowledge review it is denoted that when it is inadequate, it undermines knowledge maintenance and generalization, and compromises school progress, especially in the case of students with LD, who have difficulties in preserving acquired levels of accuracy and fluency in knowledge use (Lerner, 2007).

In conclusion, Language and Mathematics textbooks of the first three grades of the Greek schools seem to satisfy partly some of the evidence-based qualities of instructional design criteria. However, they also present considerable shortcomings and inadequacies, necessitating the application of substantial modifications in various parameters of instructional design when used for teaching students with LD.

Teachers who use these textbooks to instruct students with LD should try consistently to clarify their intended objectives, offer explicit instructional explanations, teach under the motto “step-by-step” focusing on one concept or skill, and employ systematic knowledge review.

References

- Agaliotis, I., & Kalyva, E. (2011). A survey of Greek general and special education teachers' perceptions regarding the role of the special needs coordinator: Implications for educational policy on inclusion and teacher education. *Teaching and Teacher Education*, 27, 543-551.
- Baker, J. M., & Zigmond, N. (1990). Are regular education classes equipped to accommodate students with learning disabilities. *Exceptional Children*, 56, 515-526.
- Bryant, R. B., Bryant, D. P., Kethley, C., Kim, S., Pool C., & Seo J.Y. (2008). Preventing Mathematics Difficulties in the Primary Grades: the Critical Features of Instruction in Textbooks as part of the Equation. *Learning Disability Quarterly*, 31, 1, 21-35.
- Carnine, D., Silbert, J., Kame'enui, E. J., & Tarver, S. G. (2004). *Direct instruction reading* (4th ed.). Upper Saddle River, NJ: Merrill.
- Dreher, M. J., & Singer, H. (2001). Friendly Texts and Text-Friendly Teachers. *Theory into Practice*, 18(2), 98-104.
- Ediger, M. (2004). Psychology of Lesson Plans and Unit Development. *Reading Improvement*, 41(4), 197-207.
- Hudson, P., & Miller, S. P. (2006). *Designing and implementing mathematics instruction for students with diverse learning needs*. Boston: Pearson Education Inc.
- Jitendra, A. K., Carnine, D., & Silbert, J. (1996). Descriptive Analysis of Fifth Grade Division Instruction in Basal Mathematics Programs: Violations of Pedagogy. *Journal Of Behavioral Education*, 6(4), 381-403.
- Jitendra, A. K., Nolet, V., Xin, Y. P., Gomez, O., Renouf, K., Iskold, L., & DaCosta, J. (2001). An Analysis of Middle School Geography Textbooks: Implications for Students with Learning Problems. *Reading & Writing Quarterly*, 17, 151-173.
- Jitendra, A. K., Griffin, C., Deatline-Buchman, A., Dipipi-Hou, C., Sczesniak, E., Sokol, N. G., & Ping Y. (2005). Adherence to Mathematics Professional Standards and Instructional Design Criteria for Problem-Solving in Mathematics. *Exceptional Children*, 71(3), 319-337.
- Jitendra, A. K., Salmento, M. M., & Haydt, L. A. (1999). A Case Analysis of Fourth-Grade Subtraction Instruction in Basal Mathematics Programs: Adherence to Important Instructional Design Criteria. *Learning Disabilities Research & Practice*, 14(2), 69-79.
- Klinger, J., & Vaughn, S. (2002). The changing roles and responsibilities of an LD specialist. *Learning Disabilities Quarterly*, 25, 19-31.
- Lerner, J. (2007). *Learning disabilities: Theories, Diagnosis, and Teaching Strategies* (9th ed.). New York: Houghton Mifflin.
- Reys, R. E. (2001). Curricular controversy in the math wars: A battle without winners. *Phi Delta Kappan*, 83, 255-258.
- Reys, B., & Bay-Williams, J. (2003). The Role of Textbooks in Implementing the Curriculum Principle and the Learning Principle. *Mathema-*

- tics Teaching in the Middle School*, 9(2), 120-124.
- Reys, B., Reys, R., & Chavez, O. (2004). Why Mathematics Textbooks Matter. *Educational Leadership*, 61(5), 61-66.
- Rosenshine, B. (1995). Advances in research on instruction. *Journal of Educational Research*, 88, 262-268.
- Sayeski, K., & Paulsen, K. (2010). Mathematics Reform Curricula and Special Education: Identifying Intersections and Implication for Practice. *Intervention in School and Clinic*, 46(1), 13-21.
- Sood, S. & Jitendra, A. (2007). A Comparative Analysis of Number Sense Instruction in Reform-Based and Traditional Mathematics Textbooks. *The Journal of Special Education*, 41(3), 145-157.
- Steel, M. M. (2002). Strategies of helping students who have learning disabilities in mathematics. *Mathematics Teaching in the Middle School*, 8, 140-143.
- Swanson, H. L. (2001). Searching for the best Model for Instructing Students with Learning Disabilities. *Focus on Exceptional Children*, 34(2), 1-14.
- Swanson, H. L. (2009). Evidence-based instructional models for students with learning disabilities. In G. Sideridis, & T. Citro (Eds), *Classroom strategies for struggling learners* (pp. 100-119). Weston, MA: Learning Disabilities Worldwide.