

High-Impact Interactive Write-In Textbooks: Powerful Tools for K–12 Classrooms

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Introduction

Instructional materials are constantly evolving, and a current element of change is the format and usage of textbooks. Once uniform and ubiquitous, textbooks now incorporate multiple formats and options, including printed hardback texts, e-textbooks, and consumable interactive write-in textbooks. The focus of this paper is specifically on interactive write-in textbooks that combine printed text with graphics and workbook-like space placed within the text for student interactions. Such interactive student textbooks can be a powerful tool for learning in the K–12 math classroom when best practices and proven interactive notebook strategies are implemented.

History of Consumable Educational Materials

Consumable booklets were first used in American schools in the 1920s as academic exercise workbooks. Initially hailed as tools of efficiency to save teacher and student transcription time in the classroom, consumables, for much of the past one hundred years, have been predominantly drill-based or short-answer exercises where student responses could be quickly evaluated as either correct or incorrect.

After their introduction, objective-based consumables, such as workbooks and worksheets, were used to supplement classroom instruction and were referred to as *supplemental materials*. While these materials provided valuable practice, in some instances, they were used as busywork, and educators began to question their value



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and the amount of time devoted to their use. As with most educational materials, the key was implementation, and educators were divided on their usefulness (see Graves, 1969). It was not until Bloom and his colleagues systematized educational objectives, it became clear that most supplemental materials addressed less rigorous skills within the framework.

In 1956, Benjamin Bloom, Max Englehart, Edward Furst, Walter Hill, and David Krathwohl published a framework for categorizing educational goals: *Taxonomy of Educational Objectives*. Bloom's Taxonomy, as it has come to be known, has been applied by generations of educators in their teaching and originally consisted of six major categories: knowledge, comprehension, application, analysis, synthesis, and evaluation. Knowledge was understood to form the foundation for the other five skills and abilities. Each category included subcategories, all ranging along a continuum from simple to complex and from concrete to abstract. Although remarkably thorough, the taxonomy is generally only remembered for the six main categories.

In 1963, Samuel Klinger wrote about “exposing the empty ritual of the workbook.” Most workbooks offered only rote activities of repetition for basic skill building. Even though the attitude reflected by Klinger became more prevalent over the next 40 years, workbooks persisted with low-level thinking activities and very little space for student writing and original problem-solving.

In 2001, Bloom's Taxonomy was revised to reflect a shifting emphasis from the static educational objective to the more dynamic concept of classification, utilizing action verbs to indicate common cognitive processes by and through which knowledge is engaged. The new categories are remember, understand, apply, analyze, evaluate, and create. Knowledge is understood to be the basis of the six categories and is further classified as factual, conceptual, procedural, or metacognitive. This shifting emphasis from static objectives to dynamic classifications has rippled across every educational enterprise and has included a reimagining of textbooks as educators seek meaningful materials at all intersections of the classification continuum.

Just as textbooks have shifted from one format to multiple formats, our definition of *workbook* has also shifted. Initially, workbooks consisted of black-and-white low-level activities; now, a variety of formats are available, and they may include textbook elements, such as full-color graphics, sections of text, graphic organizers, and callout sections to highlight important people, places, processes, events, and ideas. As always, the key to their successful impact lies in implementation.

Why Use Write-In Textbooks in the 21st Century?

The recognition of a multimodal, dynamic process of education by the updated Bloom's Taxonomy, as well as our increased understanding of how the brain works, has generated a certain amount of upheaval to the traditional model of the classroom. Nearly endless varieties of educational options are currently executed, including but not limited to flipped classrooms, desk-free classrooms, online learning platforms, and an emphasis on real-world, open-ended problems.

For example, there is an emphasis in math instruction on helping students establish a sound conceptual footing so that they understand the “why” behind math and are able to defend their

reasoning in solving problems. Write-in textbooks have a place in today's schools if they present informational text and visual graphics to reinforce discovery learning while providing opportunities for students to solve problems by gathering and evaluating data. These write-in textbooks must not only allow for foundational knowledge building and practice but also provide space for student thinking, reflection, and extension, that is, differentiation.

Powerful teaching strategies such as open-ended problem-solving that were previously associated specifically with differentiated instruction are now expected in all classrooms. We see multiple advantages for utilizing interactive textbooks to help meet those expectations.

Advantages of Interactive Write-in Textbooks

- Pages or lessons are written by content specialists and organized in a thoughtful manner while following academic standards. The content is usually scaffolded, beginning with review of previous material and progressing to more grade-level-specific, standards-based content, skills, applications, and procedures. This is true for any textbook, but interactive textbooks integrate areas for written assessment following sections of text.
- Pages or lessons can be referred to multiple times as needed. Students move forward in the interactive textbook as the year progresses and new content is covered, but students can be guided to go back to make connections with previously learned material. Multiple exposures to concepts and vocabulary terms help learners at all levels master those concepts and terms (see Marzano, 2004, 2009, in Zike, 2018, for additional information).
- Lessons can be easily connected to related topics and skills found elsewhere in the text. For example, after completing lessons on decimals in the front of a text, the instructor might guide students to jump to a lesson with a focus on adding and subtracting money found later in the text to see applications for learning about decimals. Again, this can be done with hard-copy texts, but write-in textbooks allow students to note page numbers in the margin and make notes on how the concepts are interrelated.
- Students own the books and can mark in them, highlight, glue things on pages, and attach tabs to the outer edges of pages to denote key sections or important reference materials. These student-owned books can be taken home at the end of the year to be used as reference materials in the home in a way that is impossible with traditional textbooks.
- Write-in textbooks are an important part of pre- and ongoing assessment. Like student notebooks, they allow the instructor, the student, and the parent to see how the student is performing based on learning outcomes (formative assessment). Interactive textbooks and notebooks can help determine if the student is ahead, behind, bored, confused, on task, missing a key concept, or in need of a challenge (Zike, 2018).
- Information and activities featured in interactive textbooks can be presented based upon teaching practices and techniques that have been shown to be the most effective, or in other words, are best practices. Incorporating best practices into the pages of the write-in textbook increases the likelihood that students will use them successfully.

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- The different elements included in interactive textbooks, including text, tables, charts, graphs, interactive spaces, and online activities, benefit learners of all styles (e.g., visual, kinesthetic, verbal, logical). This variety of elements is also helpful for English-language learners, who can utilize the interactive textbook to create an individualized learning resource to aid in the development of English language skills and content knowledge.
 - Because the content is already arranged in a logical format, interactive textbooks can help students to organize information, explain ideas, and reflect on their learning process.

Chunking and Text Interactions

The text in write-in textbooks is frequently condensed and concise. Visual graphics and realistic examples are used to enhance the content presented, which strengthens visual literacy. It is not uncommon for a course of study to end before a typical textbook is completed. Teachers who feel they have to “cover the text” are less likely to find time for students to get personally involved in real-world applications of the content. Teachers’ guides offered with the interactive texts frequently offer suggestions for integrating problem-solving activities and student-directed activities related to the chunked information presented in the text.

Ever since Miller’s (1956) research on working memory introduced the concept of chunking, educators have accepted that learners can process only a limited amount of new information at a time. As Tomlinson (1999) states, “Though the brain retains isolated or disparate bits of information, it is much more efficient at retaining information that is ‘chunked’.” Educators present “chunks” of information through mini-lessons, learning stations, or sections of text and then allow time and tasks for students to process that information. Students working at more basic levels of understanding require smaller chunks to process; more advanced students can be expected to work with larger chunks of data or information.

Textbooks offer students opportunities to build shared background or foundational concepts, primarily through reading, in different content areas. Information is offered through text features, including headings, titles, different fonts, and images, and graphic elements such as tables, graphs, diagrams, and graphic organizers. According to Sanchez, Lorch, and Lorch (2001), these text features serve as critical cues for pinpointing important information and its organization within the text, and students pay attention to those cues. Without headings and an understanding of the organization of the text, students have much less recall of the text details. When students learn how to use existing text features in print text, they make better predictions, become primed for new learning, and show gains in comprehension of the content being studied (Kelley & Clausen-Grace, 2010). By adding in their own cues, in the form of highlighting, underlining, note-making, and including visual elements such as arrows to show relationships between concepts in an interactive textbook, students maximize their learning opportunities.

Katayama and Robinson (2000) found that graphic organizers can play an important role in the development of note-taking skills. When students have to generate some of the information they will study, that information becomes more meaningful than if complete notes are provided. Fisher

and Frey (2004) distinguish between note-taking, which is utilized during oral presentations of information, such as lectures or class discussion, and note-making, utilized during interactions with printed materials. Both skills have shared characteristics and require practice and instruction for their development. Using graphic organizers as note-making tools within interactive textbooks may ultimately enhance students' independent note-taking skills as they gradually learn to identify the content-specific structure of informational text. There is also a growing body of research (Mueller & Oppenheimer, 2014; Friedman, 2014, as cited in Zike, 2018) supporting student note-taking by hand rather than via electronic device.

With regard to informational graphics, such as tables, charts, diagrams, and time lines, the human brain processes images more quickly than words, and those images are more likely to remain accessible in our long-term memory than the words surrounding them (Levie & Lentz, 1982). When interactive textbooks provide such visual informational graphics, students gain opportunities to develop their visual literacy and analytical skills. Write-in texts often include blank or partially completed tables or other data recording aids.

In line with the current focus on applying what is learned in an interdisciplinary manner, write-in textbooks include interactive spaces for students to process, apply, and/or demonstrate what they are learning, including simply the opportunity to write in and “claim” the textbook as they build foundational knowledge. In well-designed interactive textbooks, space for student reflection and response is provided at important points within the text, presenting an opportunity for students to process the text in smaller chunks rather than just at the end of the chapter. By interspersing student responses throughout the chapter, students can actively participate in building their knowledge, and teachers have opportunities to clarify confusing concepts, identify common questions, make connections to current or historic events, or suggest cross-curricular connections.

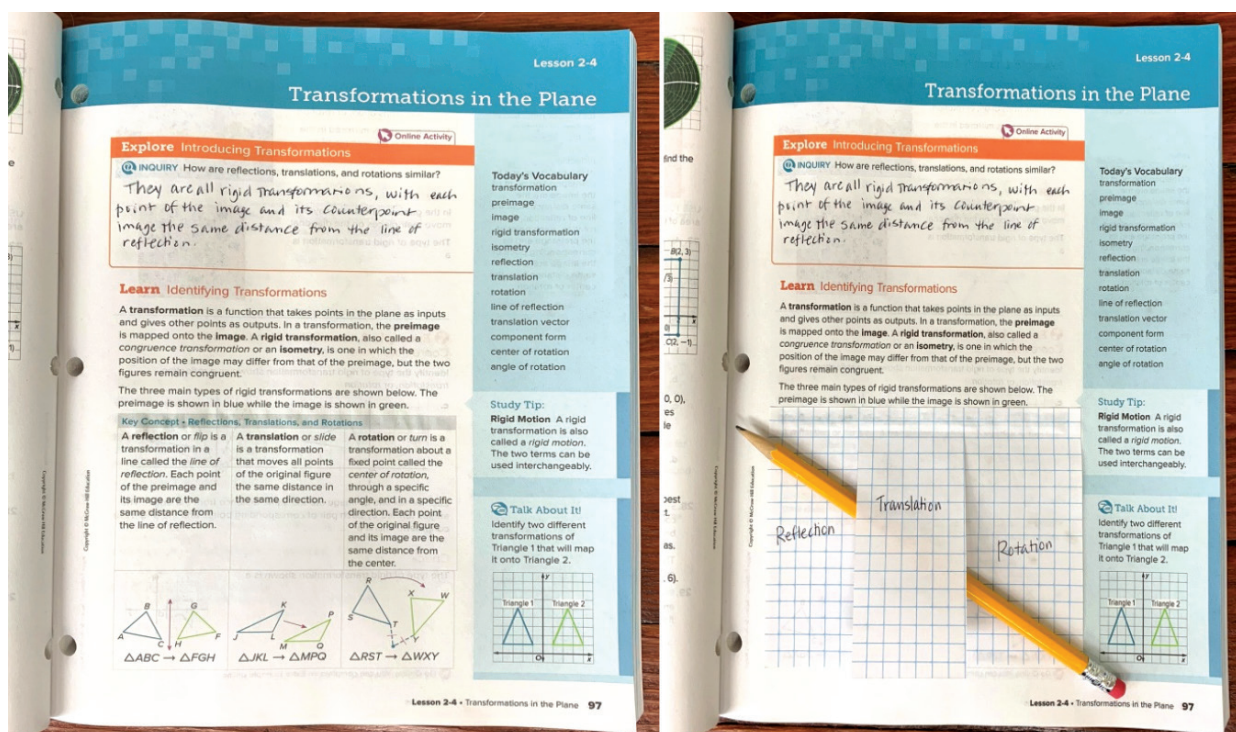
Student interactions can range from writing an original response within a designated space to designing an activity that takes them away from the text into a world of investigation and application. The difference between “don't write in the book” and “write in the book” is ownership.

Incorporating Additional Elements

Interactive student notebooks (ISNs), made using either a composition book or a spiral notebook, are used by students to record notes, thoughts, questions, observations, opinions, and other forms of content *interactions* (hence the name *interactive notebook*). They provide a platform for students to communicate through writing and the use of visual graphics while encouraging students to be creative and think independently. Interactive student notebooks provide unlimited opportunities for students to individualize their learning product as they keep a cumulative record of their personal learning experience.

While interactive textbooks are necessarily limited to specific content and interaction, they may be used in the manner of an interactive notebook or in conjunction with existing student notebooks. Students could begin with the textbook activities and further explore concepts, questions, issues,

and ideas within their interactive student notebooks. Indeed, some of the teaching tools in ISNs—such as stackers, student-generated questions, current events, and real-world connections—could easily be adapted for use in interactive textbooks. For example, a student might complete the activities within the textbook and add a notebooking element to master difficult concepts. In this case, quarter sheet of graph paper hides the textbook definitions to prompt a self-check for understanding and create space for an original example that demonstrates mastery of each term (see the below photographs). The quarter sheet of graph paper is attached using an anchor tab so the original text and activities are still accessible. The additional elements (see Zike, 2018, for additional ideas) create a textbook/notebook hybrid.



Interactive textbooks provide a perfect format for the development of note-taking/summarizing/comprehension skills because textbook companies can create a system with gradual release of responsibility as students progress through the book. Elementary textbooks might help establish and build baseline skills such as identifying text features and recording vocabulary in cloze format or in tables or charts, incorporating more open-ended responses as students develop the writing skills to complete them. Higher level textbooks might offer a more student-driven writing format while also incorporating elements to build visual literacy skills such as tables, charts, graphs, and maps.

When interactive textbooks are adopted for use, there is a great opportunity to combine rigorous student notebooking strategies within them. In some instances, this hybrid-interactive textbook might take the place of an interactive notebook, while in others, it might be used in addition to a student's interactive notebook.

By beginning with the interactive textbook as the basis for an interactive notebook, students have the entire content of the course and the related activities presented in the textbook as a base for adhering supplemental materials that range from blank half sheets of notebook paper to duplicated tables or graphs. For example, students frequently copy data from a whiteboard or from a text into their interactive notebook to help them remember the information it imparts. When using write-in textbooks, there is no need for students to transcribe the text. Textual graphics, including indentations and bullet points, allow students to rank information in order of importance. Students can highlight the text, draw a box around the main idea, underline key points, or make notes in the margin. Arrows may be used to show cause and effect relationships. Using such strategies, students develop graphic thinking skills that will allow them to express their connections and show their thinking process. Because of this, any writing element added to a consumable notebook should be at a higher level of difficulty and original to the student—comparing, justifying, questioning, and determining cause and/or effect.

It can be argued that both ISNs and standards-based interactive textbooks that incorporate rigorous notebooking strategies do the following:

1. Establish and record clear learning goals and/or important standards.
2. Note expected goals and outcomes and the classroom rules related to the activities used to achieve them. (*How will students demonstrate their math understanding graphically? Algebraically? In words? Numerically?*)
3. Are individualized and flexible. No two notebooks (*or write-in textbooks*) will look alike, nor will they contain the exact same student exhibits, vocabulary, and products. Learning outcomes unite the class study, not the products used to obtain those outcomes nor the level at which they will be assessed.
4. Collect student activities that range from the introduction of new content (*found on the pages of the write-in textbook*) to challenging uses of the knowledge gained. (*Students might glue a summary of a real-world application of what they have learned over and above the related text in the interactive textbook.*)
5. Are representative of the content covered in a class, but they do not contain everything used during instruction. Some products cannot physically be included in a notebook (*or the interactive textbook*). Include descriptions or photographs of these instead.
6. Can be used to preview, present, apply, and assess content through teacher- and student-directed differentiated activities while strengthening visual and numerical literacy. (*Students might work with a small group or a partner to extend what they have learned in the interactive textbook and make a notation of the project they developed in the textbook margin.*)
7. Provide evidence as to which methods work best for each student.
8. Focus on the main ideas and relate them to global concepts. Information is chunked and scaffolded to form a whole. (*The physical act of gluing a quarter- or half sheet of paper of student-generated print over text in the interactive textbook can demonstrate chunking and/or scaffolding.*)

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9. Provide multiple ways for students to record and use terms that meet their needs, immersing them in content vocabulary as they interact with past and present activities in the notebook (*interactive textbook*).
 10. Provide opportunities for students to build upon previously learned materials. (*Remember, the interactive textbook is not a one-way street!*)
 11. Demonstrate how students have gained knowledge, making them proud of their accomplishments. Students go back and interact with previously learned content, terms, or ideas and find that some things that originally seemed difficult have become easy with experience and practice.
 12. Contain questions that are teacher- or text generated (about 20% +/-), student generated (about 60% +/-), and real-world generated (20% +/-).
 13. Are an important part of pre- and ongoing assessment (Zike, 2018).

Conclusion

Textbooks have changed over the years. No longer the primary focal point of classroom instruction, textbooks are still part of an important arsenal of print and digital resources available to teachers and students alike. The three versions of textbooks most common today—printed textbooks, e-textbooks, and interactive write-in textbooks—all have advantages and disadvantages. The e-textbook is predicted to become more prevalent in the coming years with the printed hardcover text becoming less common; however, during this transition, there is an important place for the third type of textbook between these two extreme scenarios: Write-in textbooks provide an exciting opportunity for student ownership in a personalized learning process that did not exist in the past, when student textbooks were treated like classroom library books on loan. Now the student textbook can be on loan from the student to the classroom as a place for recording their personal journey of growth and inquiry.

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