An Analysis of Children's Literature featured in the "Books to Briefs" Column of *Technology and Children,* 1998-2008.

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Introduction

Beginning in 1998, the editors of *Technology and Children* (*T*&C) have included 72 different children's books in a regular feature called "Books to Briefs." These columns are offered to teachers as a means of integrating design and technology activities into elementary-school curricula via children's literature. Each "Books to Briefs" column includes a bibliographic reference to a single children's book (Figure 1, label A) and a summary of the book (label B). The body of the column begins with a section addressed to the student (label C), including the design challenge, which identifies a problem to be solved and a context in which the problem is situated. Since December 1999, every "Books to Briefs" column has included implementation suggestions directed to the teacher (label D). Every column also identifies a suggested grade level for the activity. Some "Books to Briefs" columns also identify limitations on the challenge, allowable resources, or assessment criteria.

From the inception of "Books to Briefs" (in *T*&C volume two, number four) through the end of *T*&C volume 12 in 2008, the column was overseen by the same department editor. During this time, the department editor wrote 18 columns (25%); the remaining columns were produced via a process of manuscript solicitation and editing. More than half of "Books to Briefs" authors (53%;
n = 38) were undergraduate education majors at the time their articles appeared.

Purpose and Approach

The purpose of this study was to evaluate the first eleven years of "Books to Briefs" columns, both as elementary reading-related activities and as technological literacy activities. Two broad research questions were addressed:

1. To what degree are "Books to Briefs" activities consonant with generally accepted principles of elementary reading instruction?
2. How robust are these activities as design challenges? To what degree do they exhibit the characteristics of good technology activities?

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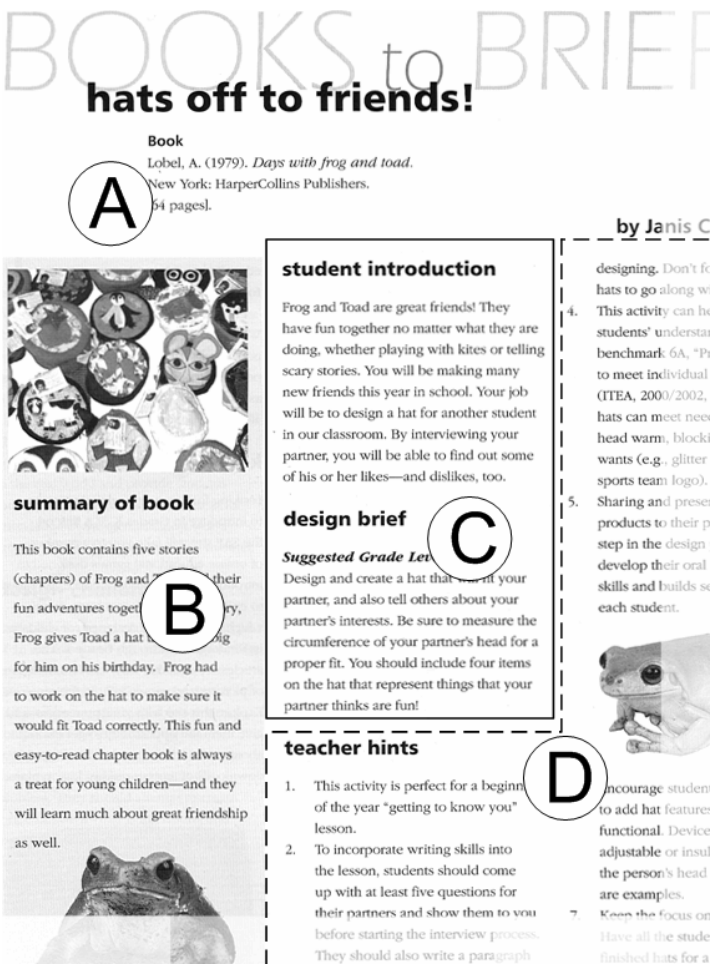


Figure 1. Detail of a "Books to Briefs" column (Churchill, 2006)**.**

The first stage of this study was the development of a database which included information related to the "Books to Briefs" design briefs and the books upon which they were based. Information about the books was collected from print and online editions of Fountas and Pinnell (e.g., 2006) and *Children's Books in Print* (e.g., 2009); and from the online databases at *amazon.com* and *lexile.com*. Data about the design briefs were obtained from Brusic's (2007a) unpublished database of the contents of *T&C* Volumes 1 through 11, and directly from the "Books to Briefs" articles.

The second stage of the study was the analysis of data in which the research questions were clarified and additional sub-questions were developed. These

analyses were the basis for the recommendations presented at the end of this article.

"Books to Briefs" as Reading-Related Activities

To what degree are "Books to Briefs" activities consonant with generally accepted principles of elementary reading instruction? The following sub-questions were developed to facilitate analysis:

1. Do "Books to Briefs" columns represent a balanced variety of children's literature?
2. Do the activities support the view of reading as a process?
3. Are the activities social and collaborative?

These questions are based on Zemelman, Daniels, and Hyde's (2005) analysis of best reading practices, Martinez and Roser (2001)'s summary of the findings of more than 100 research studies of children's responses to literature, and the work of Carbo (2008).

Breadth of "Books to Briefs" Trade Books

In some respects, the 72 trade books were diverse. There was a wide variation in book length and book age, and only three authors had more than one book appear in "Books to Briefs." There was, however, one striking example of uniformity: all but ten of the books (86%) were fiction.

While a preponderance of fictional books is not unusual in elementary classrooms, it is an emphasis which many teachers, reading specialists, and designers of standardized testing wish to reduce (e.g., Vent & Ray, 2007).

Even when finer categorizations of genre are used, the books appear rather homogeneous. For example, under Huck's classification of children's literature (e.g., Kiefer, Hepler & Hickman, 2007), a majority of "Books to Briefs" columns (51%; $n = 37$) fall into one of nine genres. Under the Donovan and Smolkin categorization (2002), three-quarters of the books were classifiable as storybooks ($n = 55$; 76%) (Table 1).

Balancing Easy and Hard Books

In reviewing the literature, Zemelman and associates found that "studies show that young readers need much more of what adult readers sometimes call 'beach books'—easy, predictable, enjoyable quick reads" (p. 47), in addition to more challenging texts. Three sources were used to compare the grade level of each design brief with the reading level of the corresponding trade book:

- The Flesch-Kincaid readability index (Flesch, 1948), available for some books via *amazon.com* (Weeks, 2005)
- The Lexile Score (Reed, et al., 2007)
- The Fountas and Pinnell (e.g., 2006) grade-leveling system

Table 1
Genres of "Books to Briefs" Books

	Donovan and Smolkin Category			
Huck Genre	**Storybook**	**Informational**	**Dual-Purpose**	**Totals**
Contemporary Realistic Fiction	13	0	1	14
Historical Fiction	2	0	3	5
Modern Fantasy	34	0	3	37
Non-Fiction	0	6	4	10
Picture Books	1	0	0	1
Traditional Literature	5	0	0	5
Totals	55	6	11	72

The Lexile score of a text estimates its difficulty and can be converted into a grade-level range. Compared to the Flesch-Kincaid Index and other traditional means of computing readability, the Lexile framework is an advanced algorithm that cannot be performed by hand. Like Lexile scores, the Fountas and Pinnell reading level of a text is proprietary and is based on an "examination of text features and the unique blend of these features in any one book" (2008, n.p.). This includes readability factors as well as more subjective variables such as literary themes and typography. At least one of these three measures of reading level was collected for 62 (86%) of the books (Figure 2).

It may be inferred from Figure 2 that in many cases, students are challenged to read a book above their grade level. Perhaps this suggests the belief that creative, experiential activities can encourage learners to tackle texts above their tested "reading level." It may also imply that a design-brief activity might be seen as *scaffolding* (Reutzel & Cooter, 2004)—as a means of helping the reader approach or negotiate a difficult or novel text.

Of course, the children in nearly every classroom represent a range of reading abilities. For example, Blackorby and associates (2004) found that 27% of the students in a large, longitudinal study of mainstreamed elementary classrooms were rated by teachers as above-average readers, while 30% were below average.

But even given the typical variance in reading levels, it seems clear that the trade books in "Books to Briefs" activities are not what Zemelman, Daniels, and Hyde would consider 'easy' for children at the grade levels for which the "Books to Briefs" challenges were written.

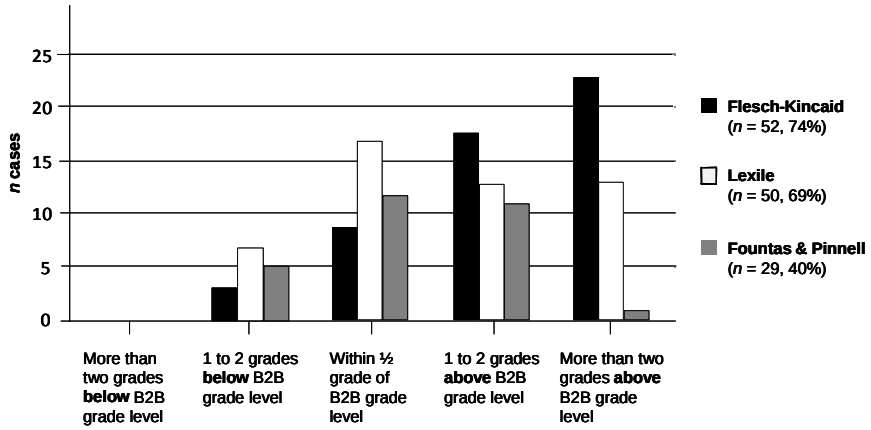


Figure 2. Comparison of averages of grade ranges recommended in "Books to Briefs" (B2B) articles with those suggested by selected sources.

Reading as a Process

The literature supports teaching children that reading is a progression beginning with prior knowledge, followed by making predictions to be tested during reading. Making sense of the text itself is a step that may involve seeking help from printed sources or from other people. The process continues with "post-reading activities"—a step shown to have positive impacts on reading skills (e.g., Atay and Kurt, 2006, p. 255). "Books to Briefs" activities are applications intended to follow reading, and thus appear to be ready-made for this final step.

To be a valuable use of class time, post-reading activities must bolster students' comprehension of the book they have just read. As opposed to decoding text during reading, comprehension is "understanding the meaning of what has been read" (Friend & Bursuck, 2006, p. 507).

Since each "Books to Briefs" is based on a specified book, each could be used by teachers to build comprehension. However, not all "Books to Briefs" design challenges are closely related to the text upon which they are based. In twenty "Books to Briefs" columns (28%), the design challenge is nearly identical to a problem faced by a main character in the book (Table 2).

In a majority of design challenges, however, the problem relates to the book only insofar as they share a topic. Reutzel and Cooter refer to such activities as "extending meaning" projects (2004, p. 408): they are not intended to bolster reading comprehension, but might improve children's reading skills and, in many cases, to broaden their understanding of the book's content.

Table 2
Relationships between design challenges and children's book (N = 72)

Problem faced by a main character in the book	**"Books to Briefs" design challenge**	***Reference***
Students are challenged to address a problem related to the subject of the book *(n = 49; 68%)*		
Mother has a job at a diner, which is where she earns money in hopes of getting a new chair one day. …The day finally comes when…the family is able to get their own very special chair.	Invent your very own special chair for a favorite doll…or toy (e.g., stuffed animal) from home.	*Slaughter, 2002, p. 17*
This book is about a young boy named Alexander who is having a terrible day. …he expresses a desire to move to Australia where he believes all of these bad things will not happen. Eventually, he gets through the day…	Help Alexander get to the "down under" continent. …design and build a vehicle that can travel three feet between two designated points in our classroom (representing the U.S. and Australia).	*King, 2001, p. 19*
Students are challenged to solve the same problem faced by a character in the book *(n = 20; 28%)*		
Mother tells Sal to fill her pail with blueberries, but Sal...came home with no blueberries because she kept eating all of them.	Design and make a pail that will hold blueberries, but, will not allow Sal to easily get the berries back out…until she goes home.	*Claggett, 1999, p. 12*
The possum has a real liking for eggs and Mattie…comes home and discovers that the eggs she put in the crock are missing...	Design an egg holder that cannot be broken into by a possum.	*Robertson, 1999, p. 6*
Students are challenged to address a problem in the book, but in a different context *(n = 3; 4%)*		
Mike Mulligan and his steam shovel, Mary Anne… dig a basement for a new town hall… But Mike and Mary Anne are trapped…Mary Anne is turned into the furnace for the new building, and Mike accepts a job as the building janitor.	What would have happened to Mike and Mary Anne if they got trapped [during an earlier job]…Build a model of one of your best ideas…	*Carlson, 2004, p. 16*

Collaborative and Social Approaches to Reading Instruction

Among the five strategies to "reduce the worst practices and increase the best" identified by Carbo (2008, p. 58) is to "provide student-responsive environments," especially for young children and "global, tactile, and kinesthetic learners" (p. 60). This includes mitigating traditional strategies like seatwork by using varying student groupings.

As identified in Table 3, in about a third of the design briefs (n=27; 37.5%), part or all of the design challenge is to be carried out collaboratively among students. Another 21 (29%) are described as individual activities. In the remaining cases, student grouping is not addressed.

Table 3

Proportions of "Books to Briefs" design challenges specifying collaborative activity, individual, both, or neither

Type of design challenge	***n***	**%**
Collaborative activity	22	31%
Individual activity	21	29%
Requires collaboration and individual work	5	7%
Not specified	24	33%

In four of the books, a main character is faced with a problem that he or she faces alone, such as Henry David Thoreau's construction of a cabin in the woods (Varnado, 2003). In these design briefs, individual activity is either suggested or implied.

Conclusions

The design challenges can be useful after-reading activities. In the hands of an elementary-level teacher trained to teach reading, "Books to Briefs" columns offer relevant, low-cost, hands-on activities that could be important components of the reading process. While not every activity represents best reading practices, K-5 teachers with access to all 72 activities have between 19 and 40 design briefs designed for their grade level to choose from (depending on grade level). Many of these activities encourage, or can be adapted to encourage, collaboration among students. Although some activities are more closely related to the children's book than are others (Table 2), "Books to Briefs" columns could profitably be used to bolster comprehension, and could have additional positive effects, such as on student attitudes toward reading.

"Books to Briefs" challenges are not primarily designed as reading-related activities."Books to Briefs" should not be mistaken for a comprehensive framework for reading instruction. Insofar as each design challenge "is a technological problem solving activity that stems from a book" (Brusic, 2007b, p. 1), these activities are not designed specifically to support reading comprehension. Activities that support reading as a process must help the

student negotiate the text, but most "Books to Briefs" challenges are more fairly characterized as thematic extensions of the trade books.

Alternately, "Books to Briefs" columns may be viewed as scaffolding (Reutzel & Cooter, 2004), but this should be done with the recognition that scaffolding implies that the student can, and perhaps should, be weaned off such activity. This is especially true of hands-on activities. Friend and Bursuck (2006), for example, discuss the value of using "manipulatives and models" to help special-needs students "make connections between the abstractions often pursued in school and the real-life products and situations these abstractions represent" (p. 169). However, they urge teachers to "move their students beyond the concrete level when they are ready" (p. 170). "Books to Briefs" activities are useful in reading instruction, but they are intended to be more than temporary aids. Specifically, they are also intended as technological-literacy activities.

"Books to Briefs" as Technological-Literacy Activities

In a recent analysis of best practices in technology education, de Vries (2007) assigned eleven topics (ethics in technology, design approaches, etc.) to teacher educators from around the world, who analyzed the accounts of eight model programs in terms of the assigned topic. As the topics were not derived from analyzing model programs, de Vries cautions, "the aim of our analyses was not to be complete" (p. 10). Nonetheless, the "characteristics of best practice" (p. 8), which focus on content and method, may be relevant in evaluating "Books to Briefs" activities, including

- "Synthesis of different content dimensions" (procedural, conceptual, etc.);
- Use of different strategies for different design problems;
- "Engaging pupils…in authentic learning;"
- Varying modes of assessment. (p. 10)

As technology activities, "Books to Briefs" are most appropriately judged on the degree to which they enable teachers to meet goals such as those identified by de Vries. Ideally, "technology activities are experiences where students can design something, beyond just building according to directions or learning drafting techniques" (Britton, De Long-Cotty & Levenson, 2005, p. 48).

By definition, the focus of every "Books to Briefs" column is a unique *design brief*—a design challenge addressed directly to students (cf. ITEA, 2004). While the inclusion of a design challenge goes a long way toward identifying an activity as supporting technological literacy, design is not the only skill important in technological activities (e.g., Kim & Roth, 2008). Among technology educators (e.g., ITEA 2005, Brusic 2007b) there appears to be agreement that technological literacy activities should, by definition, focus on technological content as opposed to "activities that are really math or science in technology's clothing" (Britton, De Long-Cotty & Levenson, 2005, p. 49).

To organize the analysis of "Books to Briefs" columns as technological-literacy activities, the following questions were used.

1. To what degree do "Books to Briefs" activities promote technological content?
2. What approach to the design process is represented among the activities?
3. To what degree are the design challenges open-ended, and to what degree are they structured?

Technological Content

One way to evaluate the centrality of technological content in an activity is to identify the technology content standards to which it relates. As *T&C* is a national publication, reference is made to the *Standards for Technological Literacy* (*STL*; ITEA, 2000). Activities that are based on specific benchmarks within the standards would appear to be better examples of technological literacy activities than those that only support or reflect standards. By this measure, the technological content of "Books to Briefs" columns is difficult to judge; only 29 of the articles (40%) identified one or more standards supported by the activity. [1] Half of these (n = 15) identify one or more specific benchmarks within the standards (Table 4).

Since mention of standards and benchmarks is often vague and usually made in the "teacher hints" section of a "Books to Briefs" column, references to standards often appear to be an afterthought. The following is representative:

> [Teacher Hint #9] Address some of the technological literacy content standards (ITEA, 2000/2002) through this activity. Standard 20 is a good starting point for this activity since it focuses on construction technologies. (Needham, 2007, p. 12)

While the activities can, and perhaps should, reflect national content standards, each "Books to Briefs" column must be based on a children's book. Every column accomplishes this, and between a quarter and a third relate quite closely to the book (Table 2). "Books to Briefs" activities are technology activities; perhaps in some cases, children may be acquiring technological abilities, not technological knowledge.

"Books to Briefs" activities may also be judged by the relationship of each activity to the theme of the *T&C* issue in which it appeared. *T&C* themes are either explicitly technological (e.g., "Building Big") or are applications of technology (e.g., "Exploring Air and Space"). Three-quarters of the activities published since thematic issues began in 2000 (45 of 58) have focused on concepts directly related to the theme (cf. Brusic, 2007a).

[1] However, it should be noted that the ITEA standards did not become official until after the first twelve "Books to Briefs" columns had been published.

Table 4
Comparing the number of standards with "Books to Briefs" citations

Standards cluster	Number of standards	Citation of specific benchmarks within standard	Identifying standard only	Sum
Nature of Technology	3	1	4	5
Technology and Society	4	5	5	10
Design	3	5	5	10
Abilities for a Technological World	3	4	1	5
The Designed World	7	12	6	18

Design-Process Elements

The well-established conception of the design process presented to K-12 technology students has the following general steps: defining or understanding the problem; design, research and development; product testing; and making the final product (e.g., Gradwell, Welch, & Martin, 2008, p. 26-34). Every "Books to Briefs" activity involves the first two of these steps; all but one also involves making a product (Table 5). The only common design-process element not widely present among the "Books to Briefs" activities was product testing.

Testing Design-Brief Products

In all, half of the "Books to Briefs" articles specified one or more means of assessing the product of the challenge. Some involved testing under actual conditions (e.g., "we will test our bird feeders by observing if birds visit them" (Fiorella, 2000, p. 18)). In other cases, the product is to be tested under simulated conditions. For example,

> …we will use a large green eraser to represent Froggy. ...After the rafts are completed, we will join Froggy down the lake (a small test pool) and try out our rafts (Suggs, 2001, p. 20)

As discussed earlier, more than half of the "Books to Briefs" books can be classified as fantasy, so it is not surprising that many of the design-brief products do not lend themselves to formal testing. Some authors, then, have designed other means for students to present their final products, such as a group critique (Banks, 2006) or a poster presentation (Bitting, 2006). Table 6 identifies the quantities of activities that specified each type of product testing.

Approaches to the Design Process

In reviewing published K-8 technology-education materials, Britton and associates (2005) classified activities' approaches to the design process, ranging from low-impact "warm-up" exercises to robust design and construction activities (adapted in Figure 3).

Most "Books to Briefs" activities are what Britton, De Long-Cotty, and Levenson call "redesign/ modify/improve" activities. These design challenges specify an existing type of product (e.g., paper airplane, picture frame) to be made by the children. In these cases, students are more engaged in modifying than in the kind of product development implied by the concept of the "design process" outlined by Gradwell and associates or described by the *STL*s. In some cases, students test their product or participate in other parts of the design process, but few "Books to Briefs" rise to the "scaffolded" or "full-scale design and make" levels, each of which usually involves students "in all the design steps, plus revisions, and results in a product," or in some cases, a prototype (p. 49).

Table 5
Product Examples (N = 72)

Product Category	Examples
Container (*n* = 20)	• a pail that will hold blueberries, but will not allow Sal to easily get the berries (Claggett, 1999, p. 12) • a carrying case that would allow your pet to see and hear what is happening on the field trip (Halstead, 2001, p. 20)
Mechanical solution (*n* = 19)	• a tool or machine that will help [Mr. Putter and Tabby] get pears from the tree (James, 2002, p. 19) • a paper airplane that is balloon-powered (Betler, 2005, p. 10)
Model (*n* = 13)	• a space motel that will withstand all of the conditions of living in space (Pilson, 2003, p. 17) • a model of a memorial…to honor the people who lost their lives at the Triangle Shirtwaist Factory (Brusic, 2002, p. 11)
Other physical product (*n* = 14)	• a good that a needy family … might be able to make and sell in a nearby market (Brusic, 2005, p. 17) • a hat that will fit your partner, and also tell others about your partner's interests (Churchill, 2006, p. 14.)
Electronic / graphic design (*n* = 5)	• a simple web page entitled "Life in Outer Space" (Diaz, 2003, p. 16)
Repair (*n* = 1)	• a solution to repair the hole in the hot-air balloon (Sianez, 2008, p. 16)

Table 6
Product Assessments

	Type of Product Testing			
Relationship of Product Testing to Design Brief	**Product tested under actual conditions**	**Product tested under simulated conditions**	**Product displayed**	**Totals**
Integrated into activity	14	14	10	38
Suggested as an option	0	3	2	5
Totals (*N* = 72)	14 (19%)	17 (24%)	12 (17%)	43 (60%)

Note: Each design brief is included in a maximum of one category. Design briefs with both integrated product testing and optional assessment suggestions are counted under the applicable "integrated into activity" category.

On the other hand, every design brief examined in this study was too comprehensive to be classified as "short/focused/practical/warm-up." Thus, among the design approaches, "Books to Briefs" activities fall between the extremes identified in Figure 3.

	Approaches to the design process				
Activity focus	← Teacher-directed				Student-centered →
	Discrete design skills only		Segment(s) of the design process		Complete design process, including revisions
Britton, *et al*., category	Short/ focused/ practical/ warm-up	Investigate/ disassemble/ evaluate	Redesign/ modify/ improve	Scaffolded	Full-scale design and make

Figure 3. Categorization of technology activities' approaches to the design process, based on Britton, *et al*. (2005).

As noted in Table 6, some kind of assessment is described or suggested in a majority of the "Books to Briefs" columns. Most of these design challenges, however, are "one-shot' activities" (Foster, 2006, p. 21) which do not include revising the design. Britton and associates consider design revision—as distinct from the standard design cycle—a hallmark of high-quality technology activities. Only two "Books to Briefs" columns mention design revision, and in neither case is iterative design or testing a focus.

Open-endedness of the Challenge

Britton and associates also classified activities by degree of structure; those with the least structure were termed "open-ended explorations" (p. 49). By definition, all design activities have structure; at a minimum, the challenge

issued to the student limits the activity. Moreover, most have evaluative criteria (although not all specify how the product is to be assessed), so the most open-ended design-brief activities will specify the fewest constraints beyond those necessary for assessment.

Three types of structure were each included in at least one-third of the "Books to Briefs" activities (Table 7). First, some design briefs had built-in checkpoints past which students could not proceed without teacher approval. Second, the authors of some design briefs put specific limitations on the kinds of materials students could use to address the challenge. Finally, some design briefs contained inessential product constraints—conditions placed on the product beyond those necessary to the challenge.

Many activities contained more than one type of structure identified in Table 7. For example, because the book's main character keeps losing several small toys, Landahl's (1998) design brief challenged second- or third-graders "to design and create a … special container to hold at least five items in separate compartments" (p. 14). Student's containers are to be tested by placing five classroom items into them. Students are given additional instructions, including that the "toy container may not be bigger than 2"x2;"" and that "you must draw your design idea first" (p. 14).

Table 7
Types of Structures

Structure	*n*	%	Examples
Process checkpoints	31	43	• Design must be approved by teacher before student can begin working with materials (*n* = 20) • Specific research requirements must be met before proceeding in the activity (*n* = 4)
Inessential product constraints	29	40	• One or more maximum product dimensions, which are not necessitated by assessment (*n* = 16) • Design must include at least one moving part (*n* = 3)
Specific limitations on materials	25	35	• Materials must meet a criterion (e.g., must be recycled, must be wood-based, etc.) (*n* = 10) • Exact materials to be used are listed (*n* = 8)

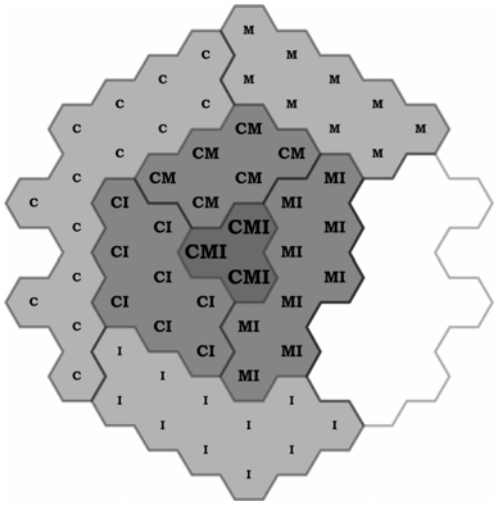
The essential structural element of this activity is that the container holds five items. This requirement is integrated into the scenario and is tested at the end of the activity. The "may not be bigger than 2"x2"" size requirement is an inessential product constraint because it is not mandated by the scenario and it is not required for testing the product. Similarly, the requirement that students produce a drawing before assembling the product is a process checkpoint included to add structure to the activity.

Figure 4 is an illustration of the types and degree of structure of "Books to Briefs" activities. The Landahl activity is represented by one hexagon labeled

'CI.' As illustrated in Figure 4, fourteen "Books to Briefs" activities (19%) are maximally open-ended, and nearly half (n=34, 47%) contain only one type of additional structure. This is in line with Britton and associates' recommendation of "balance" among activities that are structured, partially structured, and open-ended (2005, p. 50).

Each hexagon represents one of the 72 "Books to Briefs" activities. Letters indicate the type(s) of structure built into the activity:

C	Process checkpoints
I	Inessential product constraints
M	Specific limitations on materials



Colors approximate the degree of structure built into the activity:

	n	**%**
No additional constraints	14	19
One additional type of structure	34	47
Two additional types of structure	21	29
Three additional types of structure	3	4

Figure 4. Types and degree of structure

Conclusions: "Books to Briefs" as Technological-literacy Activities

"Books to Briefs" activities are more representative of technology education methods than of standards-based technological content. While most of the activities include technology concepts, very few appear to have been developed based on technology content standards. Thus, with one exception,[2] "Books to Briefs" does not deliberately support the Standards for Technological Literacy. In fact, these activities do not appear intended to support any organized system of technology content. Rather, they exemplify the view of elementary-school technology education as a method of teaching, in which the

[2] Standard 11 of the *STL* (ITEA, 2000): "Students will develop the abilities to apply the design process" (p. 115).

subject may be technology, literature, or any other. In the hands of an elementary-level teacher without technology-education training, these activities could promote among children those segments of technological literacy related to abilities, as opposed to those related to knowledge.

The design challenges encompass a range of design approaches and activity sophistication appropriate for the K-5 level. As technological design activities, "Books to Briefs" challenges vary in quality. As noted in Table 6, only fourteen (19%) challenge students to design, build, and test a full-scale product. On the other hand, all 72 activities integrate multiple elements of the design process and none fell into the least-sophisticated category of Britton and associates' design approaches.

The challenges were also diverse in terms of degree of structure: about a fifth were very open-ended, while a third were moderately to highly structured. As a whole, these 72 design briefs allow for teachers to choose activities which match "the pedagogical needs of the particular students in the educational setting," taking into account students' and teachers' prior experiences with technology activities (Britton, De Long-Cotty & Levenson, 2005, p. 50).

Recommendations

Based on the foregoing analyses, the following suggestions are offered as a way of increasing the degree to which "Books to Briefs" columns represent best practices in education.

1. *Increase the degree to which the activities bolster reading comprehension.* For example, select books with challenges that can be approximated in a K-5 design activity; then ensure that the design challenges are closely related to problems faced by important characters in the book. Where possible, develop challenges that encourage students to return to the text after reading. When students produce a physical product, have each member of the team write a brief description, akin to a museum placard, explaining the relationship of the product to the story.
2. *Increase the range of literature among the books chosen for the column.* This could be addressed by including biographies and other nonfiction books with suitable challenges, and by increasing the breadth of fiction (especially historical fiction).
3. *Discontinue identifying connections to knowledge-based content standards.* It is clear from the "General Guidelines for Books to Briefs Manuscripts" basing "Books to Briefs" activities on technological knowledge benchmarks (i.e., standards 1 - 10 and 14 - 20 of the STL) is beyond the scope of these columns; authors are to "point out linkages to National Standards…where appropriate" (Brusic, 2007b, p. 2). But since nearly all recent "Books to Briefs" columns (including all from 2007 and 2008) include references to technological knowledge standards, some readers may expect that the "Books to Briefs" feature is intended to deliver standards-based knowledge about technology.

Potential authors may also develop this expectation. "Books to Briefs" activities, by nature, promote the exact technological skills and abilities described in STL standard 11, "students will develop abilities to apply the design process" (ITEA, 2000, p. 119). This standard has seven elementary benchmarks (Table 8). Each "Books to Briefs" activity should be designed to support one of these benchmarks, which should be identified with the target grade range in each column.

4. *Include a procedure for assessing the product of each design challenge.* If possible, this should involve testing the product under realistic conditions. Ideally, the activities would include teacher hints for iterative design and testing.
5. *Encourage the implementing teacher to select the degree of structure for each activity*. Minimize the constraints described in the design challenge addressed to the students, but provide the teacher with a range of potential structural elements, such as product or material constraints and process checkpoints, in the "teacher hints" section of each article.
6. *Make the entire "Books to Briefs" collection available online, free.* Although such a move seems very unlikely to reduce subscriptions to T&C, a 12- or 24-month embargo could be placed on the web publication of activities.

Table 8
Elementary-level benchmarks

Grades K–2	**Grades 3–5**
A. Brainstorm people's needs and wants and pick some problems that can be solved through the design process.	D. Identify and collect information about everyday problems that can be solved by technology, and generate ideas and requirements for solving a problem.
B. Build or construct an object using the design process.	E. The process of designing involves presenting some possible solutions in visual form and then selecting the best solution(s) from many.
C. Investigate how things are made and how they can be improved.	F. Test and evaluate the solutions for the design problem.
	G. Improve the design solutions.

Final Thoughts

With a few exceptions, "Books to Briefs" activities compare favorably to best practices in K-5 reading and technological literacy. This is especially true of the more recent columns.

Since comprehension is so central a goal of elementary reading instruction, "Books to Briefs" activities may be fairly judged by the degree to which they support comprehension, and here the results are mixed. On the other hand,

"Books to Briefs" activities are also low-risk entry points for elementary teachers to introduce technological design to their students—and as technology activities they are largely successful. However, teachers must have access to the activities—both as ready-made activities and as examples upon which teachers may develop their own. This is the impetus for the final recommendation, not derived directly from the analyses conducted for this study.

Digital access would allow teachers to choose from the widest range of "Books to Briefs" activities, and could encourage users to post new design briefs or modified versions of the existing activities, including translations into other languages. Perhaps most importantly, this could also be an important step toward promoting technological literacy among all children.

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