Innovative Methods

Promoting Cognitive Complexity in Graduate Written Work: Using Bloom's Taxonomy as a Pedagogical Tool to Improve Literature Reviews

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The article applies Bloom's (B. S. Bloom, M. D. Engelhart, F. J. Furst, W. H. Hill, & D. R. Krathwohl, 1956) *Taxonomy of Educational Objectives, Handbook I: Cognitive Domain* to the process of graduate-level writing in counselor education. Bloom's Taxonomy is provided as a mechanism to help students develop and demonstrate cognitive complexity when writing comprehensive literature reviews. The article outlines common assumptions held by students operating at each level of the Taxonomy, typical organizational structure and content of papers at each level of the Taxonomy, and tips to move writing to more cognitively advanced levels.

Graduate students in counselor education write numerous papers. One of the more common types of papers assigned is the comprehensive review of the existing literature. Both master's- and doctoral-level students are expected to write literature reviews for courses, and doctoral students eventually use their writing skills for literature reviews in their dissertations.

Little literature exists, however, to support curricular or pedagogical methods for improving writing in graduate programs. There is some evidence that three types of training are typically available: conducting a library search (Bem, 1995; Peper, 1971), learning to read and understand research (Jackson, 1980), and writing in American Psychological Association (APA, 1994) format. In other words, students may attend classes or workshops to learn how to conduct computerized database searches and collect information to be included in their papers. In addition, students are typically required to take a research methods course to help them read, understand, and summarize research (Council for Accreditation of Counseling and Related Educational Programs [CACREP], 1994). Finally, they may attend workshops or use the APA (1994) *Publi-*

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cation Manual to learn the specifics of how to cite references in APA style. Although the APA manual advocates cognitively advanced writing, it does not offer a mechanism on how to improve the complexity in writing. Rather, it focuses only on the specifics of written presentation. Thus, although specific faculty certainly engage in individualized instruction to improve writing, what seems to be missing in the counselor education literature is a formalized, intentional, and well-grounded mechanism designed to teach students how to critically evaluate and synthesize the material they have collected into cognitively advanced reviews of the literature.

Comprehensive literature reviews involve more than simply a recitation of information gleaned from other sources. Cognitively advanced reviews organize, integrate, and evaluate previously published material (Bem, 1995). As such, they clearly define and clarify the problem; summarize previous work in the area; identify relationships, contradictions, gaps, and inconsistencies in the literature; and suggest the next step or steps in solving the problem (APA, 1994). Through the process, writers enhance their own learning and, it has been argued, advance their capacity for critical thought (Rivard, 1994). A review of the empirical research found consistent results showing that writers who use a specific cognitive strategy in their work demonstrate higher levels of cognitive complexity than those who do not (Klein, 1999).

University faculty in graduate programs often express concerns about students' inability to analyze, evaluate, and critically synthesize the existing research and literature (Anisfeld, 1987; Chamberlain & Burrough, 1985; Froese, Gantz, & Henry, 1998; Makosky, 1985). Jackson (1980) noted that there is a surprising lack of attention to the topic of reviewing and integrating the literature, particularly given the importance that various types of literature reviews have for the science of behavioral health. More recently, this same sentiment has been echoed in the field of marriage and family counseling, with indications that many faculty consider this lack of training for students to be a relevant problem (Piercy, Sprenkle, & McDaniel, 1996).

In the field of psychology, Froese et al. (1998) noted that "this mismatch between expectation and performance may arise from instructional deficiencies" (p. 103). They argued that instructors may make faulty assumptions about students' ability to transfer critical thinking skills learned in other facets of their graduate programs to the writing of comprehensive literature reviews. Because of these assumptions, the essential writing skills necessary to engage in cognitively complex writing assignments are not explicitly taught to graduate students. These writing skills both al-

low students' current level of cognitive complexity to be expressed and, in turn, force students to higher levels of complexity in their thinking and writing (Klein, 1999). Boice (1982) and Nodine (1990) suggested that faculty must make the effort to teach these writing skills to students, but both lamented the absence of relevant models to guide this instruction.

In the field of counselor education, there also is a lack of information on how to teach critical writing skills to graduate students. Articles related to writing literature reviews explain the process of publishing (e.g., Forman, 1988), suggest methods for improving publication success (e.g., Gladding, 1989; McGowan, 1996; Smaby & Crews, 1998), and give tips on publishing in particular journals (e.g., Brown, 1989; Hazler, 1992). No article could be located, however, that provides a model to teach students how to engage in the higher order thinking and writing skills necessary to write advanced quality literature reviews.

There is, however, a framework available to guide counselor educators in their efforts to help graduate students write more cognitively complex literature reviews. The *Taxonomy of Educational Objectives, Handbook I: Cognitive Domain* (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956), more commonly referred to as Bloom's Taxonomy, is a specification of six hierarchically ordered levels of instructional outcomes that are intended to move students toward higher levels of cognitive complexity. Bloom's Taxonomy could be a useful learning schema if applied to writing graduate-level papers in counselor education.

This article outlines the basic premises of Bloom's Taxonomy, applies these premises to writing comprehensive literature reviews in counselor education, and suggests methods for moving students to higher levels of cognitive complexity in their papers. Faculty may use this model to give their students a specific cognitive map for their writing that includes a goal and a method to move toward that goal. Thus, rather than simply telling a student that his or her work "lacks critical thinking," the model is intended to help the student recognize where his or her thinking has broken down and what method can be used to get back on track.

Bloom's Taxonomy

Bloom's Taxonomy (Bloom et al., 1956) was one of the first models developed to provide educators with a systematic classification of cognitive operations. The Taxonomy outlines six hierarchical positions of cognitive complexity, ordered from the least to the most complex: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. The levels are assumed to be cumulative,

with each level of the system building on the successful completion of the previous levels. Much research has been conducted on the model, and it has been found to transcend age, type of instruction, and subject matter (Hill & McGaw, 1981; Kottke & Schuster, 1990; Kunen, Cohen, & Solomon, 1981). Since its inception, the model has influenced curricular development, educational research, and the construction of tests in education and professional organizations (Kunen et al., 1981). It is one of the most widely accepted models of cognitive abilities and educational objectives used in education, and even its severest critics agree that the model has enormous influence and is an important step toward understanding the structure of learning outcomes (Kottke & Schuster, 1990).

Bloom's Taxonomy in Graduate-Level Writing

Skills Used and Assumptions Made at Each Level of the Taxonomy

Each of the six levels in the hierarchy provides an essential skill for students who would like to write cognitively advanced literature reviews. Applied to the process of writing, each level provides a critical component of the process. The levels are articulated in the following sections, with descriptions based on those included in the Learning Skills Program (1999) and with appropriate applications made to the writing process. Of course, it should be recognized that an individual paper may not fit neatly into only one category on the Taxonomy. Nevertheless, the paper can be classified generally into a Taxonomy level based on the overarching principle used to organize and write it, and a precise categorization of the entire paper is not necessary for this method to be successful in promoting cognitive advancement.

Knowledge. In this lowest level, the student recalls or recognizes information, ideas, and principles in the approximate form in which they were learned. The material may vary from specific facts to complete theories, but all that is required is remembering the information. Students who use only this cognitive level in their writing will simply repeat information from other sources without demonstrating an understanding of the material or making distinctions between the quality of the different sources. Common assumptions made by writers at the knowledge level include the following: If it has been published, it is worthy of inclusion; all published articles are equally valid; no true distinctions can be drawn between research and nonresearch articles; and main ideas from source material cannot be distinguished from less important ideas presented.

Comprehension. This level is defined as the ability to grasp the meaning of material and may be demonstrated by translating material from one form to another or by interpreting material. Students using comprehension present a basic understanding of material. Whereas a student at the knowledge level can recall information in a rote fashion, students at the comprehension level are able to manipulate that information in a manner that demonstrates more than simple memorization. In written work, students demonstrating comprehension are able to summarize the main points of articles they have read and can manipulate that information into their own words. However, they continue to make many of the same assumptions that students in the knowledge level make. They are still unable to make distinctions between the quality of the sources they are using, believing all publications to be equally valid and relevant. They continue to have difficulty understanding which information is particularly relevant to the topic at hand, and they may include extraneous information simply because it is interesting or is assumed to be related because it appears in an article with other related information.

Application. Application is defined as the ability to use learned material in new and concrete situations and includes applying rules, methods, concepts, principles, and theories. In their writing, students at the application level are able to select the main ideas and research findings from other sources that relate directly or indirectly to their selected topic. They make explicit connections between the writings of others and the topic at hand. They are able to make decisions about the relevance of a particular piece of information. However, like those students at the first two levels, students at the application level are unable to make distinctions about the quality of information read. In addition, like students at lower levels, they often focus their attention solely on the introduction and discussion sections of other articles (Anisfeld, 1987). Without a meaningful schema for analysis, they are unable to break down source information to the component research principles or conceptual ideas. Therefore, they must rely on the source authors' analysis of their own work, which is typically in the discussion section of the source articles.

Analysis. Analysis refers to the ability to break down material into its component parts and may include the identification of the parts, analysis of the relationship between the parts, and recognition of the organizational principles involved. Students are able to identify the component parts of a research or literature review article and can identify the main patterns or themes in each article reviewed. They no longer need to rely on the source author's own conclusions; they can reach conclusions of their own, based

on an analysis of the research or ideas presented. However, they have yet to articulate a method for evaluating the information and therefore have difficulty reconciling contradictory findings in research. In addition, like students at lower levels of the Taxonomy, they do not demonstrate an ability to link source material across articles. Each item is presented as a stand-alone piece of information.

Synthesis. Synthesis refers to the ability to put parts together to form a new whole. The student originates, integrates, and combines ideas into a product, plan, or proposal that is new to him or her. In their writing, students at this level are able to draw together ideas and research findings from source material into thematically outlined literature reviews. They are able to gather all relevant information, taken from an analysis of the components of the source articles, and combine it into broader themes and principles. However, their writing still lacks an organized and articulated schema for evaluation. Thus, like students at lower levels of the Taxonomy, students at the synthesis level tend to give more merit to source articles that support their premise, ideas, and values and to downplay the results of studies or opinions if they do not match the student's position or if they contradict other sources.

Evaluation. This level is concerned with the ability to judge the value of material for a given purpose. The judgments are based on defined criteria that are either developed by the student or given to the student by an outside source. This is considered to be the highest level in the cognitive hierarchy because it contains elements of all the other categories and involves conscious value judgments based on clearly defined criteria. Whereas students at earlier levels of the hierarchy may evaluate what they have read, they typically do so in a subjective manner. Students who master the evaluative level recognize that there are certain preestablished criteria that are used to evaluate source writings. They make distinctions between research and conceptual articles and between conclusions drawn from research, from experience, or from opinion. In addition, using skills gleaned from research courses, they are able to critically evaluate the quality of different research studies and make evaluative comparisons between them. Thus, they can understand and evaluate contradictory research results when differing methodologies caused those contradictions, and they are more likely to accept the ambiguities of contradictory results when they recognize that the field does not always yield clear-cut answers.

Format of Papers at Each Level of the Taxonomy

When instructors read students' papers, it is often apparent at which level of the Taxonomy a particular student is operating.

Both the format and the content of the paper provide clues. These same clues are useful to assist students in evaluating their own work.

Knowledge. Papers at the knowledge level are typically organized by articles read rather than by topic or theme. Each paragraph outlines a particular article or study, with a description of what the source authors investigated and their results. The paper may seem to be simply a listing of these articles, with little or no integration and few summative comments. A key indicator of papers at the knowledge level is overreliance on quotations. Students are unable to translate the ideas of the source authors into their own words and, thus, overuse quotes.

Comprehension. Like papers at the knowledge level, papers at the comprehension level lack integration and analysis and have an organizational style in which paragraphs are laid out by articles read, rather than by main ideas. However, unlike knowledge level papers, papers at the comprehension level present the main ideas of the source articles, demonstrating a student's ability to distinguish main ideas from less important ideas in the articles read. In addition, comprehension level papers do not rely on quotations but use them sparingly and appropriately.

Application. Papers written at the application level are still organized by source articles rather than by topics or themes. However, with each source article being reviewed, there is a direct and explicit link from that article to the topic of the current paper. The student summarizes the source article and then applies the findings from that article to the topic of their own paper. These links are neither integrative nor summative, and there are few or no connections drawn between source articles.

Analysis. Writing at the analysis level typically includes more detailed descriptions of source article information. Students discuss the specifications of the studies they are including and can identify patterns that emerge. Like students at the application level, they link the source articles back to the main idea of their paper, but they add a layer of complexity by identifying the component parts of the source article that directly support their argument.

Synthesis. When students' writing reaches the synthesis stage, the papers have a qualitatively different look to them. The most notable change is organization based on themes rather than on source articles. Froese et al. (1998) noted that students often summarize articles sequentially rather than comprehensively integrating the various findings. Sequential organization represents a failure to accomplish synthesis. Using synthesis, the students are able to determine the main points not just of source articles (a comprehension task) but of the paper they are composing. Source articles are spread throughout the paper and applied to the arguments and ideas

presented, using the students' own organizational schema to direct the flow of information. Ideas from various sources that support a theme are brought together, compared, and contrasted.

Evaluation. Papers at the evaluation level are organized thematically and present convincing and well-thought-out arguments that are well grounded in the literature. They analyze the source articles for strengths and limitations and include objective critiques of the quality of the source information. They present both sides of an argument with a minimum of researcher bias. They draw synthesized conclusions logically based on objective evaluations; therefore, readers of these papers can feel secure in the quality of the conclusions reached.

Moving Papers to Higher Levels of the Taxonomy

Recognizing a student's current level of functioning in writing comprehensive literature reviews is only important if this recognition can be used to move the student to a higher level of cognitive complexity. A paper might not fit completely into only one level of the Taxonomy because, as with all developmental models, the levels of the Taxonomy are not absolutes, and some overlapping is inevitable (Barrow, 1987). Nevertheless, papers can be generally categorized into a Taxonomy level based on the predominant skills and assumptions demonstrated.

Once a paper is placed at a certain level of the Taxonomy, the next step is to use the information collected to teach the student how to move to the next level. There is considerable support for the idea that the steps toward higher cognitive complexity should be incremental (Bloom et al., 1956; Kottke & Schuster, 1990; Kunen et al., 1981). Thus, if a student presents at the Knowledge level, the next step is to move the student to the Comprehension level. Care must be taken not to bypass that level in an effort to move the student to higher levels of complexity; each level must be understood and competency demonstrated before the next level is attempted.

Of course there are as many writing strategies as there are writers, and no universal strategy will work for everyone. Nevertheless, what follows are some ideas that may be useful to help push students to higher levels of cognitive complexity. Faculty are encouraged to add their own ideas and strategies to the discussion when presenting this material in class.

From knowledge to comprehension. To move from knowledge to comprehension, students need to learn to put the ideas they are reading into their own words. Many students admit that when they are writing papers, they sit down at their computers with the source articles before them, read a source article (or parts of a

source article), and type what they are reading into the computer. This strategy encourages low levels of complexity as students merely repeat information directly gleaned from the source articles without any effort to comprehend the source material. Thus, students benefit from a strategy that forces them to restate or summarize source material in their own words before they include the material in their papers. One such strategy is to read a source article and summarize the main points or themes on a "sticky note" or 3 × 5 card stapled to the article, then enter material into the paper based on the summaries rather than on the actual source articles.

From comprehension to application. To move from comprehension to application, students must take their comprehension summaries and add a direct link from the source material to the paper being written. By asking themselves, "How does this information directly link or apply to my topic?" students force themselves into the application process. If they cannot make direct links, or if the links are strained and difficult to support, then the student is probably including extraneous or irrelevant information.

From application to analysis. Analysis is a necessary and often neglected precursor to synthesis. Unless the source articles are understood and analyzed in detail, synthesis will be based on inaccurate or incomplete information. Whereas a written summary for the purposes of comprehension will focus on more global themes and main points, analysis requires an in-depth review of the source articles. If analyzing an empirical study, what was the methodology used? Are there alternative explanations for the findings? Are causal relationships inferred from correlational data? Are effect sizes reported and are they meaningfully large? Is there justification for the generalizations drawn from the sample that has been studied? In nonempirical articles, how did the authors come to their conclusions? What evidence is provided for these conclusions? The student may develop a list of questions that he or she would use to analyze the source articles.

From analysis to synthesis. Writing from a detailed outline is an important component of producing quality literature reviews, and this becomes particularly true at the synthesis stage. Students often have vague outlines with only three or four general categories when they begin a paper. A change in the process is necessary. Cognitively advanced writers typically start with a very detailed outline that emerges from the themes of the source articles (Jackson, 1980). This is done before the writing begins. An outline detailed enough to include subtopics and both sides of specific arguments will not be conducive to a sequential list-

ing of articles. Students will be forced to use a more integrated approach. However, this outline can be developed only after the source material is read, understood, and analyzed, so that the themes to be included in the outline emerge from the existing literature. Faculty can encourage the use of a detailed outline by working on an outline with the student or, alternatively, requiring an outline to be turned in and evaluated before the final paper is written and submitted.

From synthesis to evaluation. Moving to evaluation requires students to develop an objective rating system for their source articles. Often, students at lower levels of the complexity will struggle with whether to include their own opinions in a literature review (Froese et al., 1998). At the evaluation level, students understand that opinion is not the primary method of evaluation, but reasoned and articulated assessment of the source articles is essential to making evaluative comparisons. To complete this task, students must use the information gleaned at the analysis level to analyze the quality of the research or other types of source articles. They should have clearly defined criteria developed beforehand that will help them make these judgments.

Conclusion

Writing a cognitively advanced literature review is a difficult but important skill for counseling students. Cognitive complexity in writing has been linked to enhanced learner-directed learning, an important component of adult and graduate education (Brookfield, 1989). It also is consistent with developing advanced capacity for critical thought (Rivard, 1994).

Faculty cannot assume that students who are cognitively advanced in other areas of their lives or in other areas of their academic programs will necessarily transfer those skills to their writing. Simpson, Dalgaard, and O'Brien (1986) and Granello (1999) studied the cognitive complexity of graduate students and found that students regressed in their cognitive development when they were faced with new and unfamiliar tasks. These findings can be applied to the process of graduate level writing. Students without a conceptual understanding of the goals and process of cognitively complex writing may easily resort to lower levels of complexity. Certainly, without a model or a goal for writing, it would be difficult for them to use the experience to push their thinking to higher levels of complexity through the process of writing.

The use of Bloom's Taxonomy to increase the cognitive complexity of students' writing is just one attempt to provide a methodology for students in their learning. Clearly, other models could be ap-

plied and be equally, or even more, useful. In addition, the Taxonomy is not intended to be an all-encompassing model of writing. The use of the model does not preclude the importance of other components of writing (e.g., selecting appropriate topics, conducting a comprehensive review of the literature, setting aside time to write, using concise language).

In presenting this model to counselor education students over the past several years, I have found that students benefit from having a clear understanding of the goals of writing literature reviews. Prior to implementing this model in our program, students complained that they were given assignments to write literature reviews without a full intellectual understanding of the desired outcome. They expressed frustration with the faculty's evaluation of their writing as lacking complexity. Discussions with faculty from programs around the country confirm a frustration on the part of many faculty members as well. They want to help their students advance in their writing but lack models or teaching methods to do so. With a model to follow, students more easily understand the desired goals. Furthermore, because most students have achieved higher levels of cognitive complexity in other domains of their lives, they readily understand and identify with the levels of Bloom's Taxonomy. With very little explanation and effort, most students can begin to apply this model to their own writing. Clearly, this model works best when students have opportunities to receive feedback on rough drafts of their writing and have the opportunity to resubmit a paper. A rough draft could be analyzed, using this model, and placed at the appropriate Taxonomy level, with input and discussion between the student and the faculty member on how to reach the next level in the subsequent draft. Faculty who would like to teach this model can photocopy the summary presented in Table 1 and use it with students to stimulate discussion. Students and faculty should be encouraged to add their own ideas in the "tips to move to the next level" category.

Although this article represents a first attempt at applying a model to graduate writing in counselor education, the ideas presented here could benefit from research to determine whether students who have been taught this model actually produce more cognitively complex papers. The symbiotic relationship between cognitive complexity in writing and complexity in thinking could also be the focus of more research. In the meantime, the empirical grounding of Bloom's Taxonomy and research on its use to promote cognitive complexity provide a solid initial foundation for its application to graduate-level writing in counselor education.

TABLE 1

Application of Bloom's Taxonomy to Graduate-Level Writing

Areas of Analysis	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Skills used	Repeat information from other sources.	Summarize main points of articles reviewed.	Select main ideas and research findings from others that relate directly or indirectly to the topic. Make explicit links between source articles and current paper.	Identify the component parts of a research or literature article. Identify patterns or themes in the articles reviewed. Use data and information from others to support current paper's ideas.	Integrate and combine ideas from source articles into a new whole. Draw together ideas into a thematically written research review.	Able to make distinctions about the quality of source articles based on objectively defined criteria.
Assumptions made by the writer	If it has been published, it is worthy of inclusion. All published articles are equally valid. No true distinctions between research and nonresearch articles. Main ideas are not distinguished from less important ideas. Therefore, the information included from authors is not necessarily the main points from their writings.	Make many of the same assumptions as a student using the knowledge domain, e.g., if it has been published, it is worthy of inclusion; all published articles are equally valid; no true distinctions between research and nonresearch articles.	Make many of the same assumptions as a student using the knowledge domain, particularly regarding the lack of evaluation of the relative merit of publications. Believe that selecting main ideas from articles related to the topic and making explicit connections to the current paper is sufficient.	Have same lack of evaluation as students at lower levels. Focus on the details and component parts, rather than the bigger picture ideas of how these findings are interrelated.	Lack evaluative schema for source articles. Tend to include information that supports premise of current paper and exclude that which does not. Have difficulty developing overarching themes when data are in conflict. Unable to make objective determination of what to do when source articles are in conflict.	Not applicable.

(Table continued on next page.)

TABLE 1 (Continued)

Application of Bloom's Taxonomy to Graduate-Level Writing

Areas of Analysis	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Main organization and content of papers at each level	Organized by articles read, rather than topic. Simply give a listing of what others have found with no summative comments, no integration. Information contained is not necessarily based on main ideas of source articles. There is an over-use of quotations from others; unable to capture main ideas in own words.	Able to distinguish main ideas of the articles reviewed. Therefore, although the organization of the paper may be similar to a student at the "knowledge" domain, the content will be based on main ideas from source articles, not just recitation of all they have read.	The paper is still organized by source articles, rather than topics or themes. With each article reviewed, there is a direct and explicit link from the source article to the current paper (e.g., "Therefore, the findings of Smith and Jones support the premise that differences in age between the counselor and client can affect the counseling relationship.")	Each article is directly and explicitly linked to the topic of the current paper by identification of the specific components of the source article that are relevant. The findings from the source articles are not linked to each other.	The paper is organized thematically, rather than by source articles. Main ideas are presented, and source material that supports and questions those ideas is discussed. At the end of each major theme, a discussion of the results from the source articles is included, but this discussion still does not include a systematic objective evaluation.	Paper is thematically organized. Source articles are analyzed and critiques based on strengths and limitations. When findings are in conflict, this conflict is acknowledged. Whenever possible, the quality of the source articles is discussed, particularly when research of differing merit produces contradictory results. Both sides of an argument are presented, with minimal researcher bias.

(Table continued on next page.)

TABLE 1 (Continued)

Application of Bloom's Taxonomy to Graduate-Level Writing

Areas of Analysis	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Tips to move to next level	As each article is read, before beginning to write, summarize main ideas from each article *in own words* on note cards.	At end of each summary, develop an explicit and direct link from the source article to the paper being written. For each summary, ask "How does this relate to my topic?" If it doesn't, or the relationship is strained, then exclude it from the paper.	Add to the summaries all the details that are necessary to make decisions about the merit of the source article. Develop a list of questions that can be asked of every source article to determine essential components. Assess internal and external validity and whether conclusions are based on findings.	Review all source materials thoroughly, develop summaries with detailed information. From these summaries, develop a comprehensive and detailed, thematically based outline *before* beginning to write the paper.	Determine beforehand what constitutes a strong versus weak source article. Use information gleaned from research methods courses to determine methodological soundness of research and results of source articles.	Not applicable.

Note. When using this table to help move a student's writing to higher levels of Taxonomy, it may be useful to read down through the table columns, rather than in rows across.

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