Purchasing Networks as Clues to Assessing Educational Psychology Textbooks

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Recently the analysis of social networks has proved successful for understanding many educational processes, and has led to dozens of papers on a variety of education-related topics and problems (Natriello, 2005; Watts, 2005), as well as to entire books explaining network research methods both to specialists and to wider audiences (e.g. Barbabasi, 2002; Buchanan, 2002; Watts, 2003). This paper proposes a way that the network perspective can illuminate difference in how textbooks are perceived and used, by analyzing book purchases related to purchases of textbooks. Using information available from the Amazon.com website as a starting point, the author suggests how patterns of correlated purchases (i.e. books also bought with a target book) suggest a strategy for understanding the character of particular texts about educational psychology, as well as the role of the text in teaching educational psychology.

Traditionally, curriculum documents, including textbooks about educational psychology, have provided a framework for teaching a subject. They both describe and prescribe what to teach and sometimes even how to teach (Reid, 1999; Foshay, 2000). These purposes have posed problems, however, given the diversity of priorities and educational philosophies among educators: in spite of authors' efforts to be clear and precise, curriculum documents are frequently construed differently by different individuals, including not only students but the educators and curriculum writers themselves (Doll, 1993; Aoki, 2005). The differences cannot all be explained as intellectual mistakes or deficits within particular individuals, as if some educators or students simply fail to comprehend the intent of a curriculum document, while others succeed. While there may at times be truth to this deficit model of understanding, differences in how curriculum documents are construed and used also reflect legitimate disagreements about the content, priorities, and epistemologies of a written canon, as well as differences in local constraints, resources, and teaching opportunities. To a large extent, curriculum is socially constructed, and the written documents of curriculum are artifacts of social and political compromise as much as creators of it.

Instructors of educational psychology may not always see this social process because they are busy with the more immediate concerns of choosing and using appropriate materials for daily teaching. A case in point is the selection of textbooks: whether handled by an individual teacher, a committee, or an administrator, choosing a textbook is often framed as identifying and comparing the "real" character of particular texts. Book A either is or is not different from Book B; the difference, if any, can in principle be determined and described, usually by careful inspection of their contents. The crucial assumption is that a comparison can in fact be made, and that the comparison is somehow a "true," though complex, representation of the texts themselves. A further assumption is that adopters— whether students or instructors—are in fact free to choose or decline a particular text. There is relatively little consideration of the possibility that adopters may, so to speak, talk themselves into their comparative assessments, or that they may not fully support a text that they are required to use. Given the complexity of assessing full-sized textbooks and the politics of textbook selection (Altbach, et al., 1991), it is not surprising that many instructors conclude, rightly or wrongly, that textbooks are much more alike than different (Brantlinger, 2004; Griggs & Marek, 2001).

Yet talking ourselves into differences remains a distinct possibility in any assessment that combines ambiguity and complexity with major consequences for the resulting decisions. Job hirings, academic awards, and even teachers' end-of-year grades all have these qualities. So does the assessment of children with disabilities; much depends on how such a child is labeled or categorized; does he/she have ADHD, for example, is he/she have a mental disability? The resulting labels or classifications remain ambiguous at best, yet full of importance for the child's future.

Whether the ideas above are insights or assumptions, they make a useful framework for understanding one particular issue about teaching educational psychology, the similarities and differences among textbooks in a particular subject area or field. Assessing textbooks may be like assessing the qualities or needs of a child: the judgments may be in the eye of the assessor as well as in the child, and may be constrained by circumstances more than either child or adult realizes (Mehan, 1996. Put differently, I consider the possibility that two texts—like two children—may or may not differ intrinsically, but that perceptions and/or social roles of the texts—as of two children—may nonetheless differ. Under many circumstances, it is the network of perceptions and roles, and not the books themselves that create what a textbook "is." As I will explain below, there may be ways to explore this possibility.

USING SOCIAL NETWORK ANALYSIS TO ANALYZE CURRICULUM

Social network analysis has recently become increasingly common for understanding how individuals interact and relate in groups. In the past decade, numerous papers and books have developed effective methods, reported provocative findings, and proposed plausible models of social networks (Watts, 2004), including those related to education (Carolan & Natriello, 2005). Network research assumes that qualities and behaviors of individuals (or their artifacts) are not simply "in" members of a group, but reside as well in their links to other members or to artifacts related to members. If I seem shy or gregarious, for example, it is not just because of personal qualities that I carry from one situation to another, but also because of supports and constraints that emerge from relationships in particular situations, peers, or classmates. It is the pattern of linked relationships that give individuals much of their particular characteristics—often causing me, in this example, to behave shyly sometimes and gregariously at other times.

Social network analysis may be familiar to some educators because of early work about sociograms by Jacob Moreno (1932), who originally surveyed social preferences among prison inmates and patients in mental hospitals, and whose work was later applied (ironically, perhaps) (nice comment! to school "inmates" as well. Patterns of social popularity could be assessed in classrooms by asking every student to name their best friends (or sometimes best their work mates), and then mapping the results in a diagram—the "sociogram"—that connected each student with their nominees and nominators. The resulting links can be interesting both to teachers and to social researchers. Some individuals may prove pivotal to the social cohesion of a class, for example, while others may be rather isolated; some classes may contain inward-turning cliques (e.g. boys versus girls), whereas others may have a very inclusive pattern of friendships; and so on.

In the years since Moreno's work, elaborations on the network approach occurred in business, economics, and social psychology. Collectively, the literature has developed key concepts about social networks—measures of social cohesion, for example, and of factionalization, and of the power of individuals situated at strategic points in a network (Burt, 1992). Some of the network research has suggested, too, that network analysis can describe aspects of human behavior even when a network consists of human artifacts rather than relationships as such. Voting patterns form networks, for example, and can be informative about how political influence occurs, and trading networks among nation states suggest which nations are politically "close" even when their political rhetoric suggests otherwise.

Most recently, Krebs (2004) has shown that networked patterns of book purchases suggest the existence of major political factions within the United States. Krebs used data from Amazon.com in one of its webpage features called "Customers also bought…" to document networks of associated book purchases among politically oriented books. The resulting networks of books grouped themselves into clearly isolated left-liberal and right-conservative factions. Individuals who bought a title from one of these groups, in other words, were much more likely to buy other books from the same "faction" of books rather than from the opposing political faction. The results suggested a disturbing conclusion, that liberal and conservative segments of the population may not debate with each other so much as debate with themselves, while merely talking past each other. Although Krebs' discussion implies that the patterns reflect pre-existing personal choices by individuals, the data itself are non-committal about this point. Motives for buying from one group or the other, in other words, may vary among individuals, with some individuals truly self-identifying with one political faction or the other, but others buying from one faction because they lack information about the other faction, because

friends or colleagues encourage or expect them to do so, or even because liberal or conservative instructors of politicial science course require different trade books for their classes.All that is clear is that two "ecologies" of political books seem to exist, one left-liberal and the other right-conservative.

In spite of these ambiguities, Krebs' work suggests a method useful for studying textbook choices, and in particular for investigating whether textbooks about educational psychology occupy distinct educational "ecologies" in preservice teacher education and in the educational market. As with the political books he studied, are certain textbooks purchased together with particular other books? And if they are, do the associated purchases share identifiable characteristics that suggest how the texts themselves may be used and/or perceived? It is these questions that drove the research reported here.

As it happens, estimates of purchasing patterns can be made conveniently thanks to the existence of the world's largest online bookseller, Amazon.com, which currently offers over four million titles for sale and accounts for 10-20% of all retail book sale revenue in North America. Although Amazon itself has not made precise figures for buying patterns available to the general public, studies by researchers outside the company suggest that the buying patterns on Amazon do in fact make a good proxy for general retail buying patterns for a large proportion of titles—especially those with "average to good" annual sales (Rosenthal, 2004), a category that includes most of the leading textbooks about educational psychology, as well as most of the associated books purchased with the textbooks and focused on in this paper. Amazon sales for the target texts and associated books, in other words, are likely to make a good "objective" approximation of their sales patterns from all possible sources (including "bricks and mortar" bookstores, university book stores, and direct orders from publishers). Judging by the size of Amazon sales compared to the size of all publishing sales, Rosenthal (2004) estimates that the Amazon sample probably represents somewhere between one sixth and one tenth of total sales of the same titles.

If it is assumed that Amazon sales constitute a reasonable estimate of total sales, then a feature of the Amazon website makes it possible to identify links in purchases between any one book and any other. Each web page on the Amazon site, as it happens, contains a feature called "Customers also bought…," followed by a list of five or six titles most frequently purchased along with the original title. Since each of the associated purchases in turn contains its own list of "Customers also bought…" titles, it becomes possible to identify a network of correlated purchases for any one title of interest—including, in this case, prominent titles related to preservice teacher education. It is this feature of the Amazon site which allowed Krebs (2004) to analyze purchasing patterns in political books, and which was also used in the research on textbooks described later in this paper.

Note that while research using the Amazon links assumes that associated books reflect something about the place of the target texts in teacher education, the links are, in themselves, noncommittal about what that "something" is. In the research that I am reporting here, for example, Associated Book A may be purchased with Target Text X for several reasons, either singly or in combination. An instructor might perceive Text X as weak on the topics covered by Book A, for example, and require students to buy Book A to compensate for the weakness. Or an instructor might perceive both books as strong on particular topics and simply believe in providing a lot of coverage of the topic when teaching. Furthermore, Book A may be associated with Target Text X because a student decided voluntarily for himself or herself to buy Book A. On the other hand, the instructor of Text X may have required a student to purchase Book A; or an instructor from an entirely different course may have required Book A, and the student happens to be taking two courses at the same time, one requiring Book A and the other requiring Text X. Associated purchases of textbooks may therefore reflect a number of simultaneous choices, judgments, and influences by several individuals.

While sorting out these choices, judgments, and influences on associated purchases is important to fully understand the character of textbooks, the sorting task is nonetheless a separate—and subsequent—research problem from simply discovering *whether* associated purchases take different patterns of *some* sort. A network of purchases represents a kind of "educational ecology" for the target text, and like any other ecology it is maintained by multiple influences and can be explained from multiple perspectives. If each text is indeed embedded in a unique ecology of associated purchases, a subsequent research task then becomes that of determining the multiple factors influencing the ecology. A necessary

prelude to that such research, however, in work akin to taking a "natural history" in biological or environmental studies   is to describe these ecologies accurately and in detail, and document any differences among them.. The research described below undertook this task, addressing the following research questions:

1) With which other books in the large field of teacher education are these four major textbooks associated in the Amazon purchasing network?

2) What implications to prompt future research may be drawn from the nature, differences or similarities of these networks?

METHOD AND DATA SOURCES

To analyze whether associated purchases of textbooks form recognizable patterns, I selected an educational   "curriculum"   that   often   uses textbooks—preservice teacher education—and a subject—educational psychology—where the use of a single major text is almost universal. From among the dozens of possible textbooks about educational psychology, I selected four that are successful and widely used—Woolfolk (2004), Ormrod (2005), Snowman/Biehler (2003/2006), and Eggen/Kauchak (2004),   —based   on

recommendations from colleagues and editors of my acquaintance. While not all the available textbooks in educational psychology are included in this study, these particular four are prominent enough to test the fundamental research questions about whether purchases associated with different textbooks in this field do indeed suggest differences in how these books are perceived.

Following Krebs' method for analyzing political book purchases (Krebs, 2004), a network of sales associated with the four "target" texts was determined for each of the four target texts by using the "Customers also bought…" feature of the Amazon.com website. Each sales network was extended for two steps (i.e. to include "also boughts of also boughts"), creating a web of about 30-35 associated purchases for each of the four texts, or 128 associated purchases for the four texts combined.

Associated purchases were plotted initially as separate networks for each target text, and later as a combined network, using the software UCINET (Borgatti, Everett, & Freeman, 2002). Figure 1 shows the combined network, minus the book titles in order to improve legibility on the diagram.
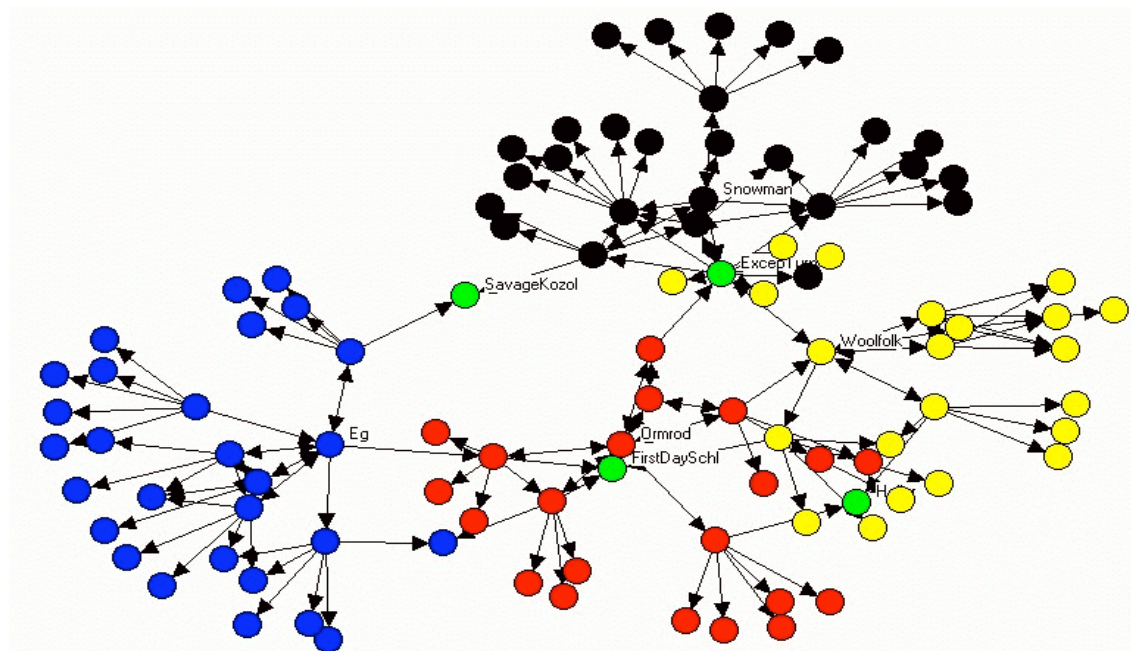

FIGURE 1: NETWORK OF PURCHASES ASSOCIATED WITH FOUR MAJOR EDUCATIONAL PSYCHOLOGY TEXTBOOKS (KEY: SNOWMAN = SNOWMAN/BIEHLER 10TH, WOOLFOLK = WOOLFOLK 9TH, ORMROD = ORMROD 5TH, EG = EGGEN/KAUCHAK 6TH. OTHER LABELED NODES REFER TO BOOKS ASSOCIATED WITH MORE THAN ONE TARGET TEXTBOOK.

As seen in the figure, each text tends to occupy its own "world" of associated purchases, at least when analyzed at the level of specific titles. In some sense, therefore, it seems the purchasers of these four textbooks (or perhaps their instructors who assigned them) seem to perceive them as clearly distinct from each other.

Even casual inspection of the actual titles of associated purchases, however, tells a different story. Most texts are linked to one or more books that appear to be about classroom management, for example, and most are also connected to one or more books about curriculum (e.g. "How To Teach Reading," etc.). It is possible, therefore, that the target texts are perceived similarly or even identically at some deeper, underlying level. Perhaps titles of associated books vary more than their underlying themes, topics, or concepts—an idea that most instructors would find plausible.

To investigate this possibility and to devise a meaningful way to classify the associated books, I used descriptions of each book provided by the Library of Congress online catalogue (United States Library of Congress, 2006). From the catalogue listing for each book, I identified the official descriptors for the book (e.g. "Science—teaching of" or "Schools—administration of"). Combining the descriptors for all 128 books created a list of 103 possible descriptors for the associated purchases as a group. The 103 descriptors were then shown to five professors in my own faculty with experience teaching in various courses in the preservice teacher education. This "expert panel" had between five and 25 years of experience teaching various courses in preservice teacher education; three of them had taught educational psychology in particular, a fourth had taught exclusively curriculum courses, and the fifth had taught exclusively educational administration courses. Working individually, the five professors sorted the 103 descriptors into meaningful major categories. A few weeks later, the five met as a group to discuss their personal taxonomies of descriptors and to reconcile their differences into a single set of 5-6 major descriptors. They succeeded in this task—creating the following five categories. As can be seen, the categories cover much, if not all, of usual content of preservice teacher education:

1) *educational psychology*—including introductory texts about educational psychology, student study guides for this subject, or supplementary books about particular topics normally emphasized in educational psychology (e.g. assessment, human development, learning theory, or motivation);

2) *foundations/administration* -including philosophy of education, school leadership and school organization, multicultural or anti-racist education, and social justice books;

3) *special education*—including either textbooks about this field, narrative accounts of particular students with disabilities, or advice and support about teaching students with particular kinds of disabilities;

4) *teaching and learning*—including general advice about how to survive and/or thrive as a new teacher, testimonial or narrative accounts of unusual teaching experiences, classroom management, books about encouraging or using study skills, and general instructional strategies;

5) *curriculum*-including both curriculum planning issues in general, and books about how to teach particular subject areas or grade levels.

The above five categories allowed reanalysis of the links among the target textbooks and the associated purchases, or more accurately between the target texts and the five *types* of books to which they were linked. Table 1 summarizes the links. The educational and statistical significance of the links is analyzed in the next section.

TABLE 1:

FREQUENCY OF LINKS FROM TEXTBOOKS TO FIVE GENERAL TYPES OF ASSOCIATED BOOKS

Target Text:	Educational Psychology	Foundations/ Administration	Special Education	Teaching/ Learning	Curriculum	*Row Totals*
Woolfolk 9th	3	8	6	3	4	*24*
Ormrod 5th	4	7	1	6	5	*23*
Snowman 10th	3	21	1	1	2	*28*
Eggen 6th	2	6	2	12	6	*28*
Column Totals	*12*	*42*	*10*	*22*	*17*	*103*

RESULTS: PATTERNS OF ASSOCIATED PURCHASES

The categorization of associated books into general types allowed for two kinds of meaningful comparisons. First, as already indicated, it became possible to compare the nature and degree of similarity of types of books purchased with educational psychology textbooks. The links suggested differences among the texts either in how they are perceived, in how they are used within teacher education, or both. Second, it also became possible to hypothesize about the general, *de facto* structure or organization of the teacher education, as compared to its intended structure or organization.

Perceived Differences Among Educational Psychology Textbooks

When links between the texts and general types of books were mapped and compared, the four target texts showed large degrees of similarity, though also noteworthy differences. Statistical significance of the differences in Table 1 cannot be tested directly (e.g. by chi-square) because several of the cell sizes are too small to allow for it. Grouping pairs of texts, however, created larger cell sizes and did allow some exploratory comparisons to be made, albeit in somewhat general terms. Using this strategy along with a standard chi-square test (with Yates' correction), the Snowman/Biehler differed significantly from the other three texts *(p<.02)*, and the Eggen/Kauchak text differed significantly from the others as well *(p<.05)*. Neither Woolfolk nor Ormrod, nor any other combination of texts, differed significantly from any others.

The data were too small to allow other statistic comparisons, but visual inspection of the results suggests that Snowman/Biehler may be especially strong in its links to "foundations/administration" books, whereas Eggen/Kauchak may be strong in its links to "teaching and learning" books. Figure 2 illustrates these possibilities graphically, by mapping the links between target texts and associated types of books according to the strength of the links between them. In Figure 2, a thicker line between target and associated type means a greater number of links; a thinner line means fewer links.
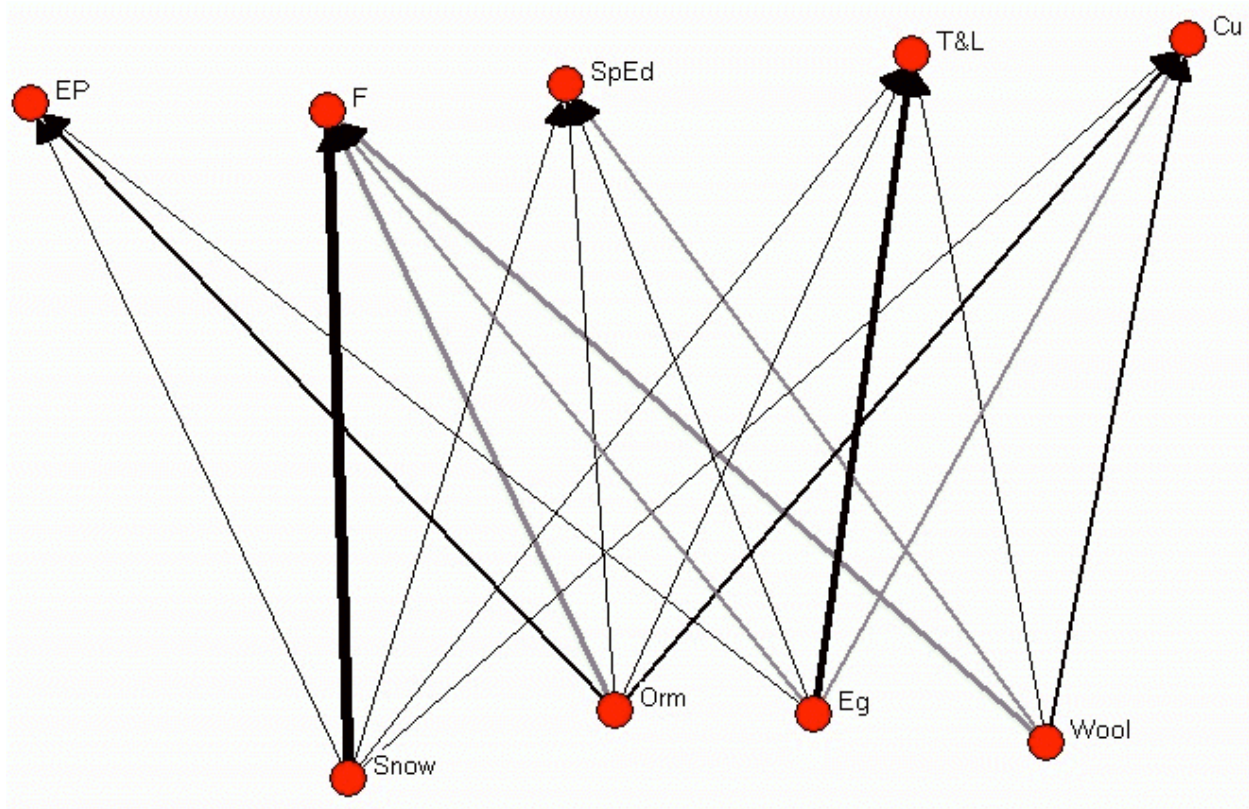
FIGURE 2: LINKS FROM TEXTBOOKS TO FIVE TYPES OF ASSOCIATED BOOKS

(KEY: STRONGER LINKS = THICK LINES. EP = EDUCATIONAL PSYCHOLOGY, F = FOUNDATIONS-ADMINISTRATION, SPED = SPECIAL EDUCATION, T&L = TEACHING AND LEARNING, CU = CURRICULUM. SNOW = SNOWMAN/BIEHLER, 10TH; ORM = ORMROD 5TH; EG = EGGEN/KAUCHAK 6TH; WOOL = WOOLFOLK 9TH.)

Perceived Structure(s) of the Preservice Teacher Education Curriculum

Two Apparent Structures. As the previous section implies, teacher education instructors (and/or their programs and their students) appear to vary in how they organize and prioritize the preservice teacher education curriculum, at least as judged by their book purchases. In one pattern of purchases, relatively high priority is given to issues of educational philosophy, social justice, leadership and management in education. The current data suggest that this pattern may be associated with using one particular educational psychology text (Snowman & Biehler, 2006). Other instructors (and/or students and programs) appeared to give

priority to more immediately practical topics, the ones highlighted by associated purchases of "teaching and learning" books. The latter, it will be recalled, include books about classroom management, instructional planning, tales of survival of difficult teaching, advice to new teachers, and the like. As with the foundations/administration purchasers, the current data suggest that these instructors, students, and programs may tend to use a different particular educational psychology text (Eggen & Kauchak, 2004). In both cases, however, the network data are suggestive, not conclusive. It is entirely possible that additional data with a wider range of texts would alter the pattern. Obviously, too, actual surveys of students and their instructors would be needed to establish the validity of the apparent difference in the

"educational/ecological niche" of the Snowman/Biehler text compared to the Eggen/Kauchak text.

Two Apparent Omissions from the Preservice Curriculum. Just as noticeable, and perhaps more disturbing for some teacher educators, were the omissions within the purchasing networks, and what the omissions therefore implied about the overall teacher education curriculum. Gaps were evident in two areas: classroom assessment and science/mathematics curriculum. Of the 128 possible links among book purchases, only three connected to or from books about classroom assessment and/or the evaluation of learning. A secondary analysis of purchasing networks confirmed the apparent isolation of this field from the rest of teacher education: major texts about assessment and evaluation were overwhelmingly associated with or "surrounded by" other, supplementary books on this same subject, not by books related to the other major categories of teacher education used in this research study.

The situation regarding science/mathematics curriculum was a bit more complicated, but still a cause for concern. Of the 128 possible links, 25 related to some aspect of curriculum (e.g. had titles like "Teaching Writing Across the Curriculum"), but only four of these related to science or mathematics curriculum in particular. Links to curriculum, in other words, were much more likely to point to or from the humanities (especially language arts) than to or from technical, non-humanities subjects.

As with the other patterns discussed earlier, the reasons for these two gaps remain ambiguous. They could represent choices and judgments by instructors or students, or circumstances such as the timing of particular courses within a general teacher education program, or both. Note, though, that whatever the source of the gaps, they are much more universal than the foundations-oriented and teaching-learning ecologies described earlier. The strength of each gap suggests that are not occurring simply because of instructors' or students' choices and priorities, since we might expect the latter to show a lot of variety and diversity, and result in a less clear-cut "avoidance" of assessment books and of science and mathematics books. Since assessment, science, and mathematics are all very much a part of teacher education, additional influences must be contributing to their isolation from the educational psychology textbooks, such as the sequencing of courses or the lack of availability of courses on these subjects to education students.

CONCLUSIONS AND IMPLICATIONS FOR FUTURE RESEARCH

This analysis of purchasing networks associated with four major introductory textbooks in educational psychology, the first of its kind that I know of, has uncovered some intriguing hypotheses for further investigation. The analysis has the advantage of bypassing self-reports, with their attendant biases and unreliability, while using data that is available conveniently and publicly. In these respects network analysis offers a useful way to triangulate or corroborate the self-reported perceptions and judgments of instructors, students, and curriculum experts. In analyzing associated purchases, no one is asked directly how well they *think* or *believe* that a curriculum either is or should be constructed; connections and relationships are implied by purchasing choices that have in fact already been made.

• First, it is clear that each text is associated with a nearly exclusive group of other "teacher education" texts. While each is typically purchased with other textbooks in similar categories, the differences in actual titles purchases may reflect different philosophies or viewpoints held by instructors or even by whole teacher education programs—this is surely one question for future research.

• Second, are associated purchases being made freely by individual students, or because of requirements imposed by the instructor, or by a requirement of a program or of an instructor from another course? If the first, then network links may suggest curriculum relationships within the minds of students; if the second, then they suggest relationships within the mind of a particular instructor; if the third, they suggest relationships within the minds of program planners or *de facto* circumstances of particular teacher education programs. No doubt there is heavy institutional or program-sponsored influences on some of the associated purchases; professors and even whole programs made require students to purchase certain supplementary books. Without actual surveys of students, faculty, and programs, however, we cannot assume that such institutional requirements are the only influence on purchases associated with textbooks.

• Do associated purchases occur because one book is compensating for a limitation of another book, or because one book is supplementing or adding to the strength of another? With the Snowman/Biehler text, for example, are links to "social issues" books frequent because Snowman/Biehler is perceived as strong on social issues, or because it is perceived as weak in this area?

• Whatever the causes of the links among books, how much are the links the result of public perceptions of particular books, and how much the result of intrinsic natures of the books? Regarding the isolation of classroom assessment discussed earlier, for example, do purchasers actually *know,* based on careful examination of the books themselves, that assessment books are not relevant to other areas of teacher education? Or have they simply *heard* from colleagues or classmates that they are not relevant? The same questions can be asked about program steering committees (though at a slight risk of anthropomorphizing committees' thought processes).

• In assessing teacher education as a whole program or curriculum, have all relevant books been included in the analysis of particular purchasing networks? Apparent "holes" in the data may be artifacts of the texts chosen as starting points for analysis. In the current study, for example, science/mathematics education may seem scarce merely because the original starting point for analysis—four best-selling texts about educational psychology—do not happen to have links to this area. It is still possible that certain other teacher education texts, perhaps based well away from educational psychology, do link to science and mathematics education.

All of these questions suggest fertile areas for future research. For example, to clarify the issue of who really chooses associated books—instructors, students, or curriculum planning committees—one could obviously ask members of these groups directly, through open-ended surveys or interviews. Clarifying whether purchasers have actually looked inside books can be addressed in the same way— i.e. by talking to students and instructors in detail about how they make their choices. The issue of whether links show supplementary strengthening versus compensation for weaknesses can be addressed by the traditional method of asking experts to look inside the books and offer their complex, expert, sometimes time-consuming opinions of how the books may be related.

All of these remedies are essentially qualitative, and as such they will create the most valid information when used in combination. Simply asking students or instructors for their assessments of textbooks is a straightforward qualitative research strategy, but one that is subject to unknown amounts of self-report bias (such as an individual's "wishful thinking" or tendency to present himself or herself as having desirable purchasing motives). Hopefully expert analyses are less prone to this particular problem, but experts can nonetheless embody particular perspectives that amount to more "sophisticated" biases if not made explicit. Their perspectives, in addition, may not always be shared, valued, or even understood by the end users of a textbook or a curriculum, the students and instructors. Like all of these methods, network analyses of purchases cannot answer such questions unambiguously,, but this preliminary study demonstrates that they can offer important clues or triangulating evidence for guiding additional research to assess educational psychology textbooks.

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