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College Students' Theory of Note-Taking Derived From Their Perceptions of Note-Taking

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In this ethnographic interview study, college students' theory of note-taking emerged after 4 phases. The theory was confirmed in a 5th interview phase. The students' theory includes conclusions consistent with ones already in the note-taking literature, but also many insights into note-taking dynamics that have not been identified in previous research. The amalgamation of previous note-taking theory and empirical outcomes with the students' theory provides a more complete theory of self-regulated note-taking than existed previously.

Most college students take notes in most classes (Hartley & Marshall, 1974; Nye, Crooks, Powley, & Tripp, 1984; Palmatier & Bennett, 1974), with note-taking being the primary means of creating a record of information that is presented in lectures (Suritsky & Hughes, 1991). Such note-taking is valuable, for information recorded in notes is much more likely to be remembered later than content not noted (Aiken, Thomas, & Shennum, 1975; Bretzing & Kulhavy, 1981; Einstein, Morris, & Smith, 1985; Kiewra & Fletcher, 1984).

Di Vesta and Gray (1972) offered a seminal analysis, claiming that note-taking promoted encoding of information during lecture and facilitated later review by providing a record of lecture content. Since then, there have been many experiments evaluating the impact of note-taking on encoding as well as the effects of reviewing lecture notes. In most of the studies in which the encoding function of note-taking is examined, taking notes, even without opportunity for review, improved learning; in most studies in which the review function of notes is examined (i.e., comparing performances of students who were permitted to review notes they had taken with those of students not permitted to review their notes), reviewing notes enhanced performance on tests over lecture content (see Hartley, 1983; Kiewra, 1985, 1989; Ladas, 1980, for summaries of the relevant evidence). Several investigators have gone farther, proposing mechanisms mediating the effects of note-taking. For example, Peper and Mayer (1986) argued that note-taking stimulates a generative process by which notetakers connect lecture content with their prior knowledge. Einstein et al. (1985) presented data consistent with the conclusion that note-taking increases the likelihood that the notetaker detects the underlying structure of information presented in the lecture.

Regardless of which mediating mechanisms one champions (e.g., encoding through prior knowledge mediation, encoding through recognition of underlying organization, and reviewing), it is clear that note-taking during lectures requires self-management (see Zimmerman & Schunk, 1989) of strategies, prior knowledge, and attentional capacity (e.g., Strage, Tyler, Rohwer, & Thomas, 1987). For example, self-regulation of note-taking strategies is evident when college students are highly selective during their note-taking, thus they are more likely to note important ideas presented in lectures rather than unimportant information (e.g., Kiewra, Mayer, Christensen, Kim, & Risch, 1991). Self-management is also apparent when students reorganize lecture content during note-taking (e.g., Einstein et al., 1985).

Even so, studies inspired by Di Vesta and Gray's (1972) encoding–review framework have been minimally informative about how college students self-regulate their note-taking, as well as how note-taking is controlled by and interacts with demands and other course characteristics. In fact, factors that may affect self-regulated use of note-taking strategies often were held constant in previous studies that were designed to isolate encoding and reviewing functions of note-taking. For example, the target lectures in note-taking studies typically have been isolated experiences rather than part of an ongoing course, so that the situation did not permit or demand integration of textbook content or previous lecture material with the information presented in the target lecture. Our supposition, consistent with conventional hypothetico-deductive logic is that investigations that are sensitive to the many potential determinants of note-taking will not occur until there is a more realistically complex theory of note-taking than the Di Vesta and Gray model. In this study, we sought to create such a theory that is based on students' perceptions of note-taking, a students'

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theory of note-taking that would provide testable hypotheses about the note-taking process.

Students experience many different courses, and they regularly make conscious decisions about note-taking in their courses. If student note-taking is like other areas of expertise involving complex, conscious problem solving, it is reasonable to expect that students possess detailed theories about their note-taking. If so, they should be able to provide information about how they take notes, when and why they vary note-taking, and how notes function in their student world (e.g., Diaper, 1989; Meyer & Booker, 1991; Scott, Clayton, & Gibson, 1991).

To tap college students' theories of note-taking, one of the many aspects of education that students have theories about (Thorkildsen & Nicholls, 1991), we used ethnographic interviewing (e.g., Mishler, 1986; Spradley, 1979). The interviews we conducted were intended to illuminate college students' beliefs about factors affecting note-taking, regulation of note-taking, and functions of note-taking. Focus groups and open-ended individual interviews about note-taking were followed by progressively more formal and focused interviews of individual students. Thus, the beliefs about note-taking emerging from early interviews were checked and elaborated in later interviews.

Readers familiar with the note-taking or metacognition literatures recognize that this approach to interviewing differs considerably from questionnaire and interview methods that were used in previous research on note-taking (e.g., Annis & Annis, 1982; Curley, Estrin, Thomas, & Rohwer, 1987; Kulhavy & Kardash, 1988; Palmatier & Bennett, 1974) or metacognition (e.g., Herrmann, 1982; Kreutzer, Leonard, & Flavell, 1975). The interviews in this study were flexible and opportunistic compared to interview procedures in these previous investigations. Our approach was consistent with contemporary qualitative methodologies that stress the gradual emergence of the operations of a study as data are collected and analyzed (e.g., Guba & Lincoln, 1989; Strauss & Corbin, 1990). Thus, rather than a single, fixed set of questions being used throughout the investigation, the interview evolved as the study proceeded so that students' beliefs about note-taking suggested in earlier interviews could be explored in more detail in later interviews involving other students.

Some readers will recognize that the type of interviewing used here is commonly used by knowledge engineers as part of designing expert systems (e.g., Diaper, 1989; Meyer & Booker, 1991; Scott et al., 1991). The developers of expert systems must learn quickly about a task environment and identify how experts make decisions in that environment by exploiting the extensive knowledge people possess about decisions they make often and consciously. Similarly, we assumed that students would know much about their repeated, conscious decisions to take and use notes.

In short, we expected the interview study reported here to be revealing about college students' understanding of note-taking, permitting the construction of their theory of note-taking, one more complete than previous conceptions of note-taking. We especially expected the students to identify factors affecting note-taking that were not considered in previous analyses and thus, suggest important new hypotheses about note-taking that go beyond the encoding–review perspective that has driven note-taking research for the past 20 years.

Method and Intermediate Results

Participants

All 252 participants were undergraduates at a major public university in the eastern United States, with 149 participating in focus groups during Phases 1 and 2. Each focus group was comprised of between 12 and 30 students. Fifty-nine other participants were interviewed individually during Phases 2–4 (18 in Phase 2, 33 in Phase 3, 8 in Phase 4). Forty-four students participated in Phase 5. We determined the number of students that we interviewed in each phase by continuing to interview people as long as useful information was being generated (Strauss & Corbin, 1990). At that point, we reflected on how a new round of interviewing might be constructed to generate additional information that would fill in gaps in understanding. The participants were solicited from classes (with a small amount of extra credit given for participation) and campus organizations whose leadership had agreed to cooperate with recruitment of participants into the study. The focus groups typically met during regular class or organization meeting time. In recruiting subjects, every effort was made to assure that a sample of students representative of the campus population was obtained. That is, recruitment occurred in classes across the campus and through organizations serving many segments of the student body. One indication of the diversity of the participants was that 36 different undergraduate majors were represented in the overall sample.

Data Collection and Analysis

Consistent with recommendations in the qualitative methods literature (e.g., Bogdan & Biklen, 1982; Lincoln & Guba, 1985; Strauss & Corbin, 1990), there was continuous movement between data collection and analyses in this study, thus methods and emerging results are discussed simultaneously. There were five phases of data collection and analyses.

Phase 1 data collection. We used two initial focus groups to gain some sense of the types of responses students would provide to our questions about note-taking, to develop some initial categories of responses from students, and to formulate questions for further exploration of these categories and of note-taking in general during subsequent phases of the study. Initially, broad questions were presented to subjects that were based on issues tapped in previous research and our intuitions about the note-taking process. These broad questions included the following:

How do you take notes?
When do you take notes?
How do you know what to write?
What do you do with your notes outside the classroom?

Group members were encouraged to elaborate on their own answers and the responses of others, provided the discussion remained on note-taking. Members of the group were also encouraged to move the discussion in whatever directions they felt it should be moved to cover the reasons for note-taking, factors affecting note-taking, and the use of notes. All three of us were present during these focus groups and took notes summarizing student responses.

Phase 1 analysis. We circulated our notes from the sessions to one another. During this review process we perceived that we were all recording similar information at comparable levels of detail. We decided that additional interviews would be conducted by individual coders, in the belief that there would be little difference in the conclusions drawn from any given session if there was only one scribe rather than two.

The interviewer–coders agreed that the Phase 1 focus group data were codable into broad categories of student responses. For example, one category was *notes as memory aids,* which was subdivided into what students did before class, after class, and before a test. We used these broad categories and subcategories as guidelines for developing questions that we posed during the Phase 2 data collection.[1] Such questions included the following:

What do you do with your notes between classes?
How does note-taking help you during the lecture?
How do your notes help you prepare for a test?

Phase 2 data collection. We conducted 5 additional focus groups and interviewed 18 individual students, using the goal of Phase 2 to generate all categories of issues that students consider critical in describing note-taking and its place in course achievement. The Phase 2 focus groups largely followed the same format as the Phase 1 focus groups, except that the specific questions that developed as a result of Phase 1 categorizations were included in Phase 2. The Phase 2 focus groups served primarily to generate categories to discuss in greater detail with the Phase 2 students who were interviewed individually. The researchers continued talking to focus groups until it was clear as part of the Phase 2 analysis that no new categories of issues related to note-taking were being generated. The Phase 2 focus group sessions typically lasted 30–45 min.

The Phase 2 individual interviews were conducted in a fashion recommended by Bogdan and Biklen (1982). Although the interviewer had a specific set of starter questions emanating from the analyses of the Phase 1 and Phase 2 focus group data, the participant was permitted to guide the interview so that concepts emerging during the interview were covered. (See Appendix A for the Phase 2 individual interview starter questions.) As a result, not every question on the interviewer's starter list was covered during every individual interview. During each interview, the interviewer continuously reflected to a participant what she believed the participant had said about note-taking, thus providing opportunities for the interviewees to correct any interviewer misperceptions.

When participants raised issues that warranted coverage in subsequent interviews, the two interviewers apprised one another of these emerging categories, and each interviewer attempted to tap the issue with the remaining participants in Phase 2. This approach to interviewing ensured that intermediate conclusions emanating from Phases 2 and beyond were not based on one student's responses but rather reflected a consensus perspective on note-taking.

Phase 2 analysis. As with the Phase 1 data, we categorized the responses of the participants and arranged the data into category and subcategory hierarchies. In spite of differences in the interviewers' styles and despite large individual differences in the particular categories mentioned or emphasized by individual participants, the categories and subcategories identified by the two interviewers were similar. The categories that emerged at this point were goals of note-taking, content–structure of notes, contextual factors affecting note-taking, and postclass use of notes.[2]

The categories and subcategories were studied by the two interviewer–coders to detect gaps in the data set. Once gaps were identified, new questions were developed for administration to individual students in Phase 3. Examples of the gap-filling questions included the following:

Are notes you take (a) mostly verbatim, (b) mostly paraphrased, or (c) a mix of verbatim and paraphrased?
What do you do with your notes when studying? (a) Recopy with no meaning change or change of form? (b) Rewrite with meaning change or form change? (c) Review? (d) Nothing?
If you rewrite, do you (a) add information? (b) Take out information? (c) Reorganize? (d) Other?
Do you use your notes for assignments or homework problems?
Do your notes contain (a) information showing relationships between concepts or (b) no information showing relationships between concepts?
When you take notes, do you use a specific method?
Do your notes change over the course of a semester? If so, what makes them change? (a) Testing experiences? (b) Adjusting to professor's style? (c) Increased knowledge? (d) Attitude change? (e) Other?

For those items that required students to choose one or more of several alternatives, the response choices were based on student responses collected in Phases 1 and 2.

Phase 3 data collection. Although the Phase 3 interviews did not adhere to a strict script, they were more interviewer-directed than were the Phase 1 and Phase 2 interviews. We were intent on filling gaps in the emerging model rather than on exploring with these new subjects the categories that were already represented in the model. The questions developed during Phase 3 analysis were mostly forced choice, as exemplified by the examples presented in the Phase 2 analysis section, but students were also encouraged to respond in a more open-ended fashion. These responses were recorded and categorized as previous interview data had been.

To more certainly capture note-taking functions with respect to differences in course characteristics, we interviewed each of the 33 Phase 3 interviewees twice with the same interview questions. One time the interviewees answered with respect to a course they had taken in which it was easy to take notes (i.e., course material was easy to understand, the instructor spoke slowly and presented the material in an organized fashion). The second time they responded with respect to a course they had taken in which it was difficult to take notes (i.e., course material was difficult to understand, the instructor spoke quickly and presented material in a poorly organized fashion). The descriptions of easy- and difficult-to-take-notes courses were derived from student descriptions that we obtained in earlier phases of data collection. That is, we asked a student to think of a course that fit the easy-to-take-notes description as closely as possible and to report on their note-taking with respect to that specific course; they also thought of a specific course that fit the difficult-to-take-notes description as closely as possible, and they reported on their note-taking in that course. Half

[1] We do not specify the various intermediate models of the issue surrounding note-taking because these models were preliminary to the model that emerged at the end of the five phases of data collection and analysis.

[2] We used slightly different but essentially synonymous wording for the category labels at this point in time. Use of the same labels here and later in this article emphasizes the continuity of classification scheme.

the students responded in the easy–difficult order and half in the difficult–easy order.[3]

Phase 3 analysis. The gaps in the Phase 2 model were filled through qualitative and quantitative analyses of the responses to the Phase 3 data collection questions, with the qualitative analyses and the quantitative analyses discussed in the Final Results section. A model of note-taking that was based on all analyses conducted in Phases 1 through 3 was produced at this point.

We then decided to recode all of the raw data from Phases 1 through 3, to force additional exploration of potential categories of information about note-taking and the relations between these categories. Both interviewer–coders attempted to begin their codings anew, subject to the constraint that they were, of course, aware of their previous classification decisions. An important difference during recoding, compared with previous codings, was that all of the data were on hand at this point. In particular, both interviewer–coders at this point had access both to their own and to the other coder's complete data.

Each of the two interviewers recoded all of the data independently. In doing so, they generated category and subcategory labels that they felt best characterized the responses obtained in the study. Then, the two researchers reviewed each of their categories and subcategories with one another, one classification at a time, and attempted to identify synonymous categories and subcategories in the two schemes and classifications that were not synonymous. Consensus categories and subcategories were negotiated by the two interviewer–coders, with classifications deleted from the model when consensus could not be reached about them. Categories and subcategories remained in the emerging model only when both interviewer–coders agreed that there were multiple indications in the data supporting the classification. Even though there were some debates between the two interviewer–coders about subcategories (most of which were resolved), four undisputed categories emerged from the analysis. They were the same four categories that we detected in our earlier analyses: goals, content–structure of notes, contextual factors affecting note-taking, and postclass processing of notes.

As the two investigators identified categories and subcategories of issues pertaining to note-taking, we kept track of issues and categorizations that were not fully understood, and we devised questions that might tap these concerns. Most of these questions tapped contextual factors affecting student note-taking, including the following examples:

> Why do you prefer to take notes verbatim or to paraphrase (dependent on the participant's preference)? (a) Aids understanding? (b) Decreases processing? (c) Insures correctness? (d) Other?
>
> If you use a specific method for taking notes, which of the following form elements are used as part of the method? (a) Outline? (b) Arrows? (c) Main words only? (d) Charts, diagrams? (e) List with major headings? (f) Other?

These clarification questions, along with some of the Phase 3 data collection questions, were then presented to 8 new students in Phase 4 data collection.

Phase 4 data collection. Eight students were interviewed on a one-to-one basis, with a questionnaire used as a guide during this 30-min interview (see Appendix B). The questionnaire specifically tapped the contextual issues identified as unclear during Phase 4 analysis and repeated some of the more important Phase 3 data collection questions. Students responded twice to this questionnaire, once with respect to a course in which it was easy to take notes and once with respect to a course in which it was difficult to take notes, with the order of responding as a function of course difficulty counterbalanced. As in Phase 3 data collection, students were encouraged to elaborate their answers with any additional information they considered important.

Phase 4 analysis. The questionnaire data were used to fill in gaps in the model emerging from Phase 3 analysis. In general, this process proceeded much as in the previous analysis phases. Some of the most important specific points are covered in the Final Results section.

Summary of procedures in Phases 1–4. We began by posing general questions about note-taking to groups of university students. Subsequent interviews were informed by the categories and subcategories of information pertaining to note-taking that emerged in the initial interviews, with questions posed in subsequent interviews intended to illuminate these categories. We reviewed the categories and subcategories several times, while explicitly searching the data for information that challenged the classifications, and we informed each other about potential new classifications between and within categories and subcategories. When we could not resolve ambiguities about classifications on the basis of the participants' responses, we devised new questions for use in subsequent interviews with new participants. By the end of Phase 4, there was theoretical saturation (Strauss & Corbin, 1990): The cycles of data collection and analyses yielded a model that was consistent with all of the obtained data as far as we could determine based on multiple reviews of the data; cycling through the data was not producing any new information about note-taking. The two interviewers–raters were in complete agreement with these results, which are summarized in the Final Results and Discussion sections.

Phase 5: Data collection and analysis. To make one last check on the conclusions emerging from Phases 1–4, we coded the main findings of Phases 1–4 into a series of 65 questions that could be answered with one of two or three alternatives (e.g., for 3-choice items, a student could agree with the statement, not agree, or indicate it was true some of the time; two-choice items tapped the types of materials coded with verbatim versus paraphrased notes). These questions were printed in a questionnaire that required about 20 min of class time to complete, with groups of up to 28 students completing the questionnaire simultaneously. The responses of the 44 Phase 5 students to this questionnaire were compared with the responses that we expected on the basis of the conclusions emanating from Phases 1–4.

The following 5 items were among the 65 included on the Phase 5 questionnaire:

> Is it easy to use your preferred methods [of note-taking] in classes where the content is presented in an organized fashion and at a reasonable pace? (expected answer: Yes)
>
> In studying for tests and doing homework, do you consult extensively with classmates in classes where the material is presented at a reasonable pace and in an organized fashion? (expected answer: no)
>
> Has the way you take notes changed since you entered college? (expected answer: yes)
>
> Can you study well from someone else's notes from a class, if you did not attend the class? (expected answer: no)

[3] One reviewer suggested the possibility that these requests were more likely to tap students' general understanding about note-taking in easy- and difficult-to-take-notes courses rather than behaviors occurring in any one course (Ericsson & Simon, 1993). Of course, our goal was to elicit just such general understandings, so this possibility is not problematic.

How are worked problems in math, accounting, science, etc. likely to be noted? Verbatim or paraphrased? (expected answer: verbatim)

Phase 5 responses were considered to be strongly consistent with responses in Phases 1–4 when a clear majority of Phase 5 participants responded as expected based on the Phases 1–4 data. Phase 5 responses were deemed to be moderately consistent with Phases 1–4 when the following held: (a) For yes-expected items, most Phase 5 participants responded *yes* or *some,* and there were more *yes* responses than *no* responses. (b) For no-expected items, the majority of Phase 5 participants responded *no* or *some,* and there were more *no* responses than *yes* responses. Phase 5 responses were mildly consistent when one of the following occurred: (a) For yes-expected items, the majority of Phase 5 participants responded *yes* or *some.* (b) For no-expected items, the majority of Phase 5 participants responded *no* or *some.*

The Phase 5 responses were strongly consistent with our expectations for 42 of the 65 items, moderately consistent for 15 of the items, and mildly consistent for 7 of the items. The following Phase 5 item was not consistent with our expectations:

When you are taking notes, do you do so in anticipation of what they will be used for—for example, different types of notes taken if they will be used to study for a multiple-choice versus an essay test? (expected response, yes; majority Phase 5 response, no).

This point was dropped from the final model described in the results section, because it could not be confirmed in Phase 5.

Final Results

The main results emerged from Phases 1–4, with Phase 5 serving as a final check of the conclusions. Most of the results are qualitative and are presented as such. Because the Phase 3 and Phase 4 data could be quantified to some extent, the qualitative outcomes produced by collapsing all of the data are complemented sometimes by quantitative analyses of the responses to Phase 3 and Phase 4 questions, with such analyses typically reinforcing conclusions emerging from the qualitative data. Throughout the presentation of the results, we present sample student comments that contributed to the conclusions.

Perhaps the most general observation was that every student interviewed reported taking notes during lectures. The participants provided much more fine-grained information, however, detailing their goals in taking notes, the content and structure of their notes, contextual factors affecting note-taking, and how notes are used after a lecture. Both of the coders (Peggy Van Meter and Linda Yokoi) agreed with the coherent description of note-taking described in this final results section and summarized in Appendix C.

Goals

Our participants reported being goal-directed in their note-taking. The overarching goal was doing well in their courses. Subgoals were also identified. Sometimes students had more than one goal; sometimes their goals shifted, for example, as their understanding of course characteristics changed over the term.

Consistent with Hartley and Marshall (1974) and MacManaway (1968), some students reported that one goal of note-taking is to direct attention during class, as exemplified by these reports:

When the class is boring though, taking notes helps me to pay attention. (individual interviewee)

If I didn't take notes, I would fall asleep. (focus group member)

Taking notes definitely helps concentration in class. (individual interviewee)

Some students reported wanting to learn during the lecture and believed that note-taking facilitated the process of understanding and organizing the material presented in class. For example, in the words of one focus group member, "Taking notes gives you the structure of the concept." Also, 4 of the 8 Phase 4 participants reported that construction of paraphrased notes increases understanding of class content.

Students reported attempting to construct notes that could be study aids outside of class, thus permitting review of material likely to be covered on exams and providing worked examples that could be helpful in doing homework. These uses of notes were reflected in these comments:

Much of the test is based on stuff in the notes. If you don't take notes, you miss a lot of the information for the test. (focus group member)

I don't read the whole chapter. I skim it and read the stuff I heard mentioned in class. I use my notes as a guide in reading the chapters so that I know what to read. (individual interviewee)

The examples that are put on the board during class are a big generalization of the problem or concept. Writing down the example allows you to work out the problems that are the derivations of the same thing. (focus group member)

In summary, the goal of wanting to acquire information in class so as to do well in courses is composed of subgoals that include wanting to remain attentive in class, learning and organizing material presented in class, and collecting information that can be used later to prepare for exams and to do homework.

Content–Structure of Notes

Students are selective in what they code into notes; they favor information that might be important to know. This includes lecture content redundant with text, material stressed by the professor, information written on the board, or content cited on the syllabus. Definitions, main points, and important concepts are noted. Content that is not completely understood is given differential emphasis in notes. Some material, such as guest lectures, films, and common knowledge is ignored because students believe they will not be held accountable for it or because they already know the information.

Content is coded into key terms and outlines. Although specific form varies (e.g., outlines, bulleted listings, arrows), students report that they write notes so that they can see meaningful groupings and connections, with personal

shorthand typically used to construct such notes. Some material is recorded verbatim. Other content is paraphrased. Some students cited advantages of paraphrasing, such as it decreases the amount of writing required in class and provides a check on understanding of lecture content:

> If it's a long thought, I paraphrase it. Paraphrased notes are shorter. (individual interview)
> Ideally I would write [the notes] all in my own words so I could check my understanding of them. (individual interview)
> I let the professor finish . . . the concept. Then, I can write it down in just a few words. If I can't write it down in a few words, then I know I don't understand. (individual interviewee)

Contextual Factors Affecting Note-Taking

Students were definitely aware of differences between their courses, perceiving that the ease of note-taking varies with respect to lecturer style, the relationship of course material to student background knowledge and characteristics, and the specific content and demands of the class.

Lecturer style. On the positive side, students reported that some lecturers presented material at a pace well matched to the difficulty of the content. These lecturers were well organized in their presentations; their presentations were clear and provided unambiguous separation of important points. They indicated that good lecturers often provided outlines or overviews before lecturing, with their points clearly separated. Good lecturers also follow lecture outlines given to the class. Such outlines were perceived as helpful in deciding what information should be in notes and how it should be structured, as illustrated by these comments:

> I preview the outline or use it to anticipate a new topic. (individual interview)
> [The] outline is written on the board . . . [and the instructor] goes straight through it so it is easy to follow (individual interview)

In addition, students reported that some easy-to-take-notes-from lecturers signalled very well what information needed to be in notes. These clues included (a) putting information on the board, (b) slowing the rate of speech, (c) repeating specific information, and (d) telling the class what information is important.

More negatively, students had little difficulty pointing to specific teaching practices that made note-taking difficult. One commonly cited problem was the pace of the lecture, with comments such as the following indicative of student difficulties:

> Teacher spoke really fast. She went over a lot of stuff not in the book, and she'd go too fast so you'd miss stuff. . . . [She] jumped from point to point . . . [and was] not considerate of student limitations. . . . Everything was at the same level. (individual interview)
> In [one class] I have to write everything I can get because he goes so fast I can't figure out what to write down. So, I write everything. (individual interview)
> [She] went so fast I couldn't remember anything she said. I had to put it in my own words to try and understand. (individual interview)
> Sometimes I'd write a definition so fast it didn't make any sense when I read it. (individual interview)

Students pointed out a special difficulty encountered when a course required that the lecturer present diagrams or pictures pertaining to the concepts being discussed. This difficulty is directly expressed by these two students:

> Pictures, diagrams, and graphs are already drawn on the board. You can't get both the explanations and the picture. (individual interview)
> [There were] a lot of diagrams and charts you have to write to understand . . . [it's] hard because while you're writing it, he's explaining it. [You] have to do two things at once. (individual interview)

Students also reported that it is very hard to take notes in poorly organized lectures, with the resulting notes perceived as difficult to comprehend after the lecture. The frustrations with lecturer organization come through in the following statements:

> [He] jumps . . . [I] can't tell when he's done with a point. [I] can't tell when there's a subject change, but, [I] don't have enough time to do anything about it anyway. (individual interview)
> [He] taught a concept with examples. [He] never stated directly what the concept or steps were. (individual interview)
> A lot of it's technical. . . . [I was] so busy trying to get down the language that I didn't know if what I wrote was relevant to the test. . . . Nothing tells me about the transition, if it's a new topic or not. (individual interview)
> He'd just start something, and I wouldn't know what it was. He'd just jump into it. . . . [I] tried [to use my notes] but they weren't useful. [They were] just a jumble of numbers. I didn't understand. (individual interview)

One particularly vexing lecturing practice occurred in some difficult-to-take-notes classes: The lecturer provided a lecture outline and then did not follow it. This made it very difficult for students to know which information was important and how to relate the points made in lecture.

Because so many students perceived that constructing class notes differed in difficulty as a function of lecturer, during Phases 3 and 4 we asked students to recall a course they had taken in which note-taking was easy—in the sense that the lecturer was organized and presented material at a reasonable pace relative to the inherent difficulty of the material in the course—and another course they had taken in which note-taking was difficult—in the sense that material was presented in a disorganized fashion and at too rapid a pace relative to the difficulty of the material in the course. Responses to these items confirmed and elaborated the difficulties experienced in disorganized, rapidly paced courses compared with organized, slower paced ones.

Two of the Phase 4 questions (Questions 2 and 3 in Appendix B) were especially revealing about the effects of the lecturer on note-taking. Some additional information is required to appreciate these questions: Students reported having preferred methods of note-taking. Some students

like to write key terms; others opted for key terms in one place and details in another; whereas still others reported writing everything, using personal shorthand, outlining, dotting (or boxing or color coding) main points, using lines to divide points, generating headings followed by filling in the body of an outline, marking what is not in the book, or drawing arrows to indicate connections between mains points. In two different questions, one aimed at the use of verbatim or paraphrased note-taking and the other at use of other methods, Phase 4 students reported that they were better able to apply their preferred methods of note-taking in their easy-to-take-notes course than in their difficult-to-take-notes courses: For each question, 7 of the 8 students indicated they could use their preferred methods for their easy-to-take-notes course but only 2 of 8 could do so for the difficult-to-take-notes course, both $ps = .031$ (one-tailed) by a binomial test of the McNemar hypothesis (Marascuilo & McSweeney, 1977). These responses were complemented by reports throughout the study that rapid and disorganized lectures prevented the students from using their preferred methods of note-taking. The following remarks illustrate these student reactions:

> I use an outline form, when I can. If the professor is too fast, I end up just writing the information down under the heading. It's not organized. (individual interview)
>
> I end up with fragmented sentences. It's like I'll get the beginning and the end of what is said and miss the middle, but at least I get the main ideas so then the book can fill in the holes. (individual interview)
>
> If the professor is fast, you should write everything down and try to figure it out later. If the professor is slower, you can organize and put into categories. (individual interview)

In short, although many students reported accommodating poor lecturers by using various types of note-taking, they were aware of important gaps in the notes taken from these lectures, gaps that later required some effort to determine the points the lecturer might have been making.

One difference in the quality of notes taken in easy-to-take-notes courses compared to difficult-to-take-notes courses was identified in the responses to a Phase 3 and Phase 4 question about whether notes captured relationships between concepts (Question 4 in Appendix B). For the easy course, 33 of 40 reported they did; the corresponding figure for the difficult course was 16 of 40, a lower proportion, $\chi^2 (1, N = 40) = 9.48, p < .005$ (large sample approximation to McNemar's test; Marascuilo & McSweeney, 1977).

More positively, there was a trend in the student reports (Question 5 in Appendix B) toward adjustments in reaction to challenging lecturers. Twelve of 40 (30%) Phase 3 and Phase 4 students reported a change of approach to note-taking during the easy-to-take-notes course they had experienced; 20 of 41 (49%) reported doing so for their difficult-to-take-notes course. This trend toward more shifts in the difficult compared with the easy course was not statistically significant, however, $\chi^2 (1, N = 40) = 1.88, p > .10$ (large sample approximation to McNemar's test; Marascuilo & McSweeney, 1977). Of the 32 occasions when students indicated a reason for change, adjusting to the professor's style was indicated 14 times, and reaction to testing demands was cited 11 times. Such shifts are represented by these comments:

> Once you learn from the tests what stuff is important, your note-taking changes. (individual interview)
>
> After you've taken a test, you just listen more and write less. You get to know the professor and what he'll ask. If he tests from the lecture, I write as much as possible. (individual interview)
>
> He doesn't present the lecture in an orderly fashion. . . . I have a better idea of what's important now, so I notice that. Since the midterm, I've been taking fewer notes. (individual interview)

Student knowledge and characteristics. Students reported different note-taking behaviors as a function of the relation between their own prior knowledge and the information presented in the course. Many reported that courses were easier when the content was in an area in which they had high prior knowledge. When taking a course in a familiar content area, students reported being more selective in their note-taking, writing less, and differentially attending to information that was new to them:

> If I know the information from before, I only write a little bit, not the whole thing. I just write the label or something. (individual interview)
>
> If it's similar [to what I know], I don't take many notes. I try to incorporate what I already learned and write stuff [that will] refresh my memory. (individual interview)

Notable here, the only report by a student in Phases 1–4 of never taking notes in a course came from an interviewee who perceived that the information presented in the course in question was so consistent with his prior knowledge that there was no new information for him in it.

In lectures, which are otherwise difficult because material is presented rapidly or in a disorganized fashion, participants reported note-taking advantages for students high in background knowledge, as represented by these comments about poor lecturers encountered by our students in their studies:

> I know some of the other students had a real hard time with the class. I didn't, I think, because I had taken so many history courses that I knew some of the information. At least I knew what to expect. That prior knowledge is important. It helps you keep up. (individual interview)
>
> I'm good at anatomy so I can tell what relates. If I wasn't, I think I'd have a problem. (individual interview)

In addition to prior content knowledge that can affect note-taking, students perceived that their know-how as notetakers changed over the course of their college years. They reported taking more responsibility for their note-taking as they progressed through school, learning to take down complete thoughts in an organized fashion, increasing their selectivity, and improving the accuracy of their notes, as exemplified by this student report:

> [My note-taking] has definitely changed. I don't write down as much. I didn't use to read before class, but now I do.

> Having read the book helps me to know what's important. (individual interview)

Another student reported a shift with the transition from community college to the university:

> I . . . [had] . . . to take better notes and listen better because there is no discussion, and I can't ask questions. (individual interview)

In short, both prior knowledge of course content and knowledge of how to take notes affect the ease and effectiveness of note-taking. One additional difference between students that we have not yet considered is that they differ in the amount of effort they are willing to expend to create good notes: For example, on the one hand, 2 of the 8 Phase-4 participants reported that they attempted to take verbatim notes to have a correct record of material presented in the class. On the other hand, 2 of the 8 Phase 4 students favored paraphrased note-taking because they believed it required less effort.

Type of content and course demands. Our participants also recognized that different types of material are presented in class with different types of notes resulting. Some courses, such as ones in speech, history, and biology, involve presentation of factual material including definitions, names, and dates. Examples, especially problems worked out by the professor, were cited as common in accounting, mathematics, and engineering classes. Both facts and examples were frequently reported as copied (i.e., noted verbatim). In contrast, courses in philosophy and the social sciences were viewed as presenting more ideas and concepts, with paraphrased note-taking reported in such courses as capturing main ideas and themes. Student perceptions about how their note-taking varied with type of course material are reflected in these comments provided by participants:

> You have to take different notes in math and accounting than in . . . [speech]. . . . In classes like math and accounting, you write a lot of examples and problems. In classes like [speech] you write a lot more definitions and lists and things like that. . . . In classes like philosophy, you write a lot less, and you write about ideas instead of facts. (focus group member)
>
> In [American history] I write key terms on the left and facts or information about them on the right. . . . Notes in [math] class are very step-by-step from one problem to another. It's just writing down examples. (individual interview)

Notes also were reported as verbatim by some students to the extent they believed that the accountability system in a course required recognition or recall of verbatim information, or they feared that paraphrasing might distort the professor's meaning. These concerns are reflected in these remarks of participants favoring verbatim note-taking:

> I write definitions word for word. This is what you get tested on most of the time. If you can recite it back to them word for word, you do better. I have more confidence in notes I write verbatim. (individual interview)
>
> I *put stuff in his words* so that on the exam I can recognize how he would say it. (individual interview)
>
> I normally write exactly what the professor said because I figure he thought about it and how to say it. If you paraphrase, changing one word can change the whole meaning . . . especially verbs and adjectives. . . . You don't want to change those. (individual interview)

Methods of note-taking varied for some students for easy versus difficult materials, as is exemplified by these comments:

> If it's a hard class, I try to write everything down because I am not familiar with the information. (individual interview)
>
> If it's really hard, I use the professor's words. That way when I go back to the book I can look it up. That way I can be sure that I got it right. If it's an easier class, I paraphrase more because I'm familiar with the content. The notes are also shorter without a lot of technical information and more abbreviations. (individual interview)

Whether verbatim and paraphrased note-taking varied systematically in easy-to-take-notes versus difficult-to-take-notes courses, as suggested by the comments that we just presented, was explored in greater detail in Phases 3 and 4. In general, paraphrased note-taking was reported by most participants for both the easy-to-take-notes course (18 of 35 respondents, with 4 additional participants reporting a mix of paraphrased and verbatim) and the difficult-to-take-notes course (25 of 39 respondents, with 2 additional participants reporting a mix of paraphrased and verbatim); the corresponding percentages (51% and 64% respectively) did not differ significantly according to McNemar's test, χ^2 (1, N = 35) = 1.23, $p > .10$. In short, students reported that paraphrasing occurred more often than not in courses and was preferred by some students for all of their note-taking. There were multiple indications in the comments that we received that paraphrasing was the only possibility in some situations (e.g., when material was presented rapidly) in comparison with other situations when it was an option (e.g., when material was presented slowly and in an organized fashion or when student prior knowledge was high); thus, the content was familiar.

Postclass Processing of Notes

Not all notes taken in class are used later. Students reported that they ignored their notes when (a) notes were confusing or incomplete, as sometimes happened in fast-paced or disorganized lectures; or (b) the material was known already, as when notes contained examples of problems that students had now mastered so that they believed working on new problems would be more beneficial.

Most notes are processed after class, however. The most frequent response to the Phase 3 question, "What do you do with notes?" was, review them, which was reported by 17 of 33 students for the easy-to-take-notes course and by 14 of 33 students for the difficult-to-take-notes course. Rewriting (including reorganizing, elaborating, and deleting information) was reported by 8 students for the easy-to-take-notes course and by 11 students for the difficult-to-take-notes course. When students reported rewriting, they reported adding information, deleting information, and reorganizing

information with similar frequency. Recopying without making changes to the content or structure of the notes (e.g., as a method of review or when original notes were messy) was reported 5 and 3 times, respectively, for easy-to-take-notes and difficult-to-take-notes courses. The distributions of responses to this question did not differ significantly as a function of course difficulty. That is, there were similar proportions of reviewing, rewriting, and copying reported for the easy-to-take-notes and for the difficult-to-take-notes courses, χ^2 (3, N = 33), 1.60, $p > .10$ (Bowker extension of the McNemar test; Marascuilo & McSweeney, 1977).

Phase 3 students were evenly split in reported use of notes for assignments and homework. Seventeen of 33 reported using their notes for both their easy-to-take-notes course and for their difficult-to-take-notes course.

Notes may play a more prominent role in preparing for exams in easy-to-note courses. When students were asked to indicate how many sources of information they used in addition to their notes when studying for their difficult-to-take-notes course, they indicated a mean of 2.32 sources versus a corresponding mean of 1.42 with respect to their easy-to-take-notes course, dependent $t(40) = 3.57$, $p = .002$. For both types of courses, the text was the most frequently cited study resource besides notes, with 31 reports (out of 41 possible) for their easy and 37 reports (out of 41 possible) for their difficult course.[4] (Throughout this study, students often indicated that they used their notes to guide textbook reading, paying special attention to those sections covering material mentioned in their notes or using their textbook to clarify information which was not clear from their notes.) Five students reported using past exams for the easy course, and 9 reported using them for the difficult course. Supplementary help from a tutor, teaching assistant, or professor was reported three times for the easy course and six times for the difficult course. Use of supplementary materials such as teacher handouts and study guides was reported 4 times for the easy course and 12 times for the difficult course. The most striking difference in use of study resources as a function of course difficulty was with respect to peer discussions. There were 5 reports for the easy-to-take-notes course and 19 reports for the difficult-to-take-notes course, a clearly significant difference, χ^2 (1, N = 41) = 9.39, $p < .005$ (large sample approximation to McNemar's test; Marascuilo & McSweeney, 1977). When it is difficult to take notes in a course, students get together more often to pool their resources than they do when note-taking in a course is easy.

An important point made by students was that they put information in notes that was personally meaningful to them, relevant to what they did not know already, and what they needed to understand. For this reason, postclass usefulness of notes was reported by some students as depending on self-generation of notes more than other factors, so that using another student's notes was mentioned as not helpful by several participants:

> Having taken notes helps to trigger my memory when I study. . . . I've written down keywords, and those are meaningful to me. I wouldn't be able to use someone else's notes because those aren't meaningful to me. They're meaningful to whoever wrote them. What's best for me may not be best for someone else. My notes meet my needs. (individual interview)
>
> I don't think that you can say one set of notes is good, and the other is bad. If one person wrote them for him- or herself, they're all good because they're meaningful for that person. Only he has to follow them. (individual interview)

Summary

The participants in this study told us of their multiple goals in taking class notes, the content and structure of the notes taken, and about contextual factors affecting their note-taking. Thus, the professor's style of lecturing is a salient determinant of note-taking, although note-taking also varies with student characteristics and course content and demands. After notes have been created, there are various ways that they may be processed further, ranging from not processing the notes to reviewing them, to rewriting the notes with elaborations, to using them in conjunction with other resources in preparation for exams and completion of assignments.

Discussion

Three points are covered in this discussion: (a) The students' theory of note-taking emerging from their perceptions of the note-taking process and its effects includes important points that have been validated in previous experimental studies of note-taking. (b) The students' theory permits a number of new hypotheses about note-taking, with many of these hypotheses complementing and suggesting elaborations of previous conclusions. (c) When previous conclusions about note-taking and the students' theory are combined, a more comprehensive model of student self-regulated note-taking begins to take shape.

Consistency of the Present Data With Previous Outcomes and Conclusions

A number of observations offered by the students in this study were consistent with conclusions in the existing note-taking literature. Some of these included the following: (a) Most students take notes in most of their classes (e.g., Palmatier & Bennett, 1974). (b) Note-taking increases student understanding and recall of lecture content (Kiewra, 1985, 1989). (c) At least some students reorganize lecture input as they take notes (e.g., Einstein et al., 1985). (d) Note-taking affects attention in class (see Cook & Mayer, 1983). (e) When lecture content is presented rapidly, the effects of note-taking are limited, presumably because of insufficient opportunity to process the content presented (Aiken et al., 1975; Cook & Mayer, 1983; Ladas, 1980; Peters, 1972). (f) Organized lectures that include clear sig-

[4] Throughout this study, students often indicated that they used their notes to guide textbook reading by paying special attention to those sections containing material mentioned in their notes or by using their textbook to clarify information that was not clear.

nals to important information result in notes that are more certain to contain that information. Student learning of critical content is more likely when lecturers flag centrally relevant information (e.g., Hartley & Cameron, 1967; Hartley & Fuller, 1971; Howe & Godfrey, 1977; Ladas, 1980; Locke, 1977; Maddox & Hoole, 1975; Moore, 1968).

Hypotheses About Note-Taking That Emerged From This Interview Study

The students' theory also includes perspectives that have not been previously considered in psychological research on note-taking, such as new hypotheses about goals during note-taking, contextual factors affecting construction of notes in class, and use of notes after class.

Goals. With a few exceptions (e.g., Kiewra, DuBois, Christian, McShane, Meyerhoffer, & Roskelley, 1991), researchers have examined only main effects of processes such as encoding and review (see Kiewra, 1985; Ladas, 1980; Suritsky & Hughes, 1991), without determining why students engage in note-taking. That is, there has been relatively little attention to students' goals as they take notes.

Do students perceive that note-taking affects their understanding of content while they take notes? Some students we interviewed reported that note-taking promoted their attention to lectures and understanding of content. When students are preparing notes, are they doing so in anticipation of subsequent processing of them? Are they preparing them with a particular type of subsequent processing in mind? The participants reported that they did. The students in this study recognized that their notes could be informative about upcoming examination content. They also recognized that sometimes notes could serve as a guide to textbook reading and to inform homework assignments by providing examples that were related to assigned problems.

In short, at least some students claim that they take notes that reflect interrelationships between note-taking, later processing of notes, and academic accountability. This interview study provided information about how self-regulated note-taking might be motivated by multiple goals, for example, it might be intended to increase online attention and understanding of content as well as to prepare aids for subsequent study and completion of written assignments.

Contextual factors affecting self-regulated note-taking: Explaining lecturer variables that determine note-taking efficacy. An important hypothesis that emerges from the students' theory is that note-taking style evolves more in some courses than others, and in particular, within-course evolution of note-taking style is especially likely when note-taking is difficult. Our students reported shifting note-taking style after experiencing examinations and coming to understand the types of demands in the courses. This claim is consistent with previous research establishing that students do vary their note-taking depending on expectations about exams (Carrier & Titus, 1981; Kulhavy, Dyer, & Silver, 1975; Rickards & Friedman, 1978; Weener, 1974). It is also consistent with the observation that college students monitor the relationship between use of strategies and test outcomes, maintaining strategies that they perceive to promote test performance and shifting from strategies that they perceive are ineffective in mediating test performance (e.g., Pressley, Levin, & Ghatala, 1984). Unfortunately, the tactic taken in most previous studies has been to study note-taking not as it varies over a course but on one occasion, and with students usually only vaguely aware of accountability demands. The possibility of within-course shifts in note-taking identified in this study could only be evaluated in within-course longitudinal studies of note-taking. That students reported differences in note-taking shifts as a function of lecturer style suggests that such longitudinal work should be conducted both in courses in which lecturer style supports note-taking and in courses in which it does not.

Although researchers have recognized for some time that students have more difficulty taking notes in rapidly paced, disorganized lectures than in slower-paced, organized presentations, the mechanisms mediating note-taking and learning failures in the former situation and successes in the latter situation are poorly understood. The theory of note-taking developed in this study includes several testable hypotheses about when note-taking is easy and when it is difficult: (a) Our students reported that they had preferred methods of taking notes, often methods designed to capture important relationships between the various ideas in a lecture. They reported that use of their preferred methods was precluded when lecture content was presented quickly and in a disorganized fashion. (b) The second potential explanation of note-taking failures with rapid or disorganized lectures that emerged in this study was that notes produced in easy-to-take-notes courses were substantially more complete with respect to information about how course concepts relate than were notes in difficult-to-take-notes courses. That is, when lecturer style precludes use of preferred strategies, especially strategies that present an integrated representation of lecture content, the learner is left with a set of notes that are not as informative as those emanating from courses in which the lecturer style fosters the development of more complete and organized notes. As a result, students in these difficult-to-take-notes courses must rely on additional sources (e.g., textbooks, classmates) to complete their notes, fill in missed information, and specify connections between concepts. Both strategies that can be applied during note-taking and the quality of notes resulting from application of note-taking strategies may be affected by lecturer style and pace.[5]

[5] One reviewer (a) suggested an alternative interpretation, namely that difficult-to-take-notes courses are simply more difficult courses; (b) argued that what is needed are analyses of note-taking within intrinsically difficult and easy areas of course work; and (c) suggested that our students' claims about the determinants of easy- and difficult-to-take-notes courses are credible only if there are difficult and easy courses. Admittedly, the present data does not address these possibilities. We are pleased that the analysis offered here stimulated the reviewer's thinking because it was our intent to generate new and testable hypotheses about note-taking.

Contextual factors affecting self-regulated note-taking: Explaining student variables. Our students reported that the way that they took notes in a course was determined by the relationship between their background knowledge and the lecture content. This possibility has been explored in a few studies (e.g., Barnett & Freud, 1985; Peper & Mayer, 1986). It is surprising, however, given the theoretical importance of the prior knowledge construct in educational psychology (e.g., Anderson & Pearson, 1984), that so little research has been conducted on how note-taking in lectures varies with prior knowledge related to lecture content (see Kiewra, 1989). Information about the strategies students can and do use when taking notes on content related to prior knowledge versus content not related to prior knowledge enriches understanding of situational constraints affecting note-taking as well as more general issues, such as the interrelationships between strategies and prior knowledge (see Pressley, Borkowski, & Schneider, 1987, 1989).

The students' theory also suggested the hypothesis that use of note-taking strategies changes with college experience, a possibility not considered in previous note-taking research. Not even the effects of practice on the development of automaticity in note-taking has been considered in previous research and theory pertaining to college student note-taking, despite the widespread understanding of practice effects on automaticity in cognition and performance (e.g., Druckman & Bjork, 1991, Chapter 3). Research elucidating how and why there are shifts in note-taking across the college years should complement other developmental research efforts on note-taking, in particular, demonstrations of increases in note-taking from the junior high years to high school and into college (e.g., Annis & Annis, 1982; Christopoulos, Rohwer, & Thomas, 1987). Such research should also complement the growing body of data documenting significant growth in cognitive development during the college years (Astin, 1993, Chapter 7; Pascarella & Terenzini, 1991, Chapter 4).

Contextual factors affecting self-regulated note-taking: Explaining course content variables. That students believe note-taking varies with course content and perceived course demands suggests that simple conclusions about how students take notes are wrong. For example, a frequent claim (Kiewra, 1985; Suritsky & Hughes, 1991) is that paraphrased notes reflect deeper (Craik & Lockhart, 1972), more meaningful processing than do verbatim notes. What our participants told us, however, was that they sometimes use verbatim note-taking as a result of deep processing, such as when they sense paraphrasing would distort meaning (i.e., they processed the material deeply enough to recognize that it might be confusing later if notes were paraphrased rather than exact). In addition, student election of verbatim note-taking when course material is specific or when tests require exact memory can be interpreted as a reflection of sophisticated understanding of content and course demands rather than superficial processing. The recurring themes in the traditional note-taking literature that verbatim note-taking reflects developmental immaturity or lack of content area expertise that would permit deep processing are challenged by the students' perceptions summarized here. Only studies specifically designed to tap how students decide to produce exact versus paraphrased notes could inform researchers about whether the theories in the literature or the theory developed here better explains when notes are verbatim versus when they are paraphrased.

Postclass processing of notes. More often than not, note-taking has been explored as an isolated part of learning in college courses. Our students believe that note-taking is coordinated with other study tactics when they prepare for exams and complete assignments. An important challenge in coming to a complete understanding of self-regulated note-taking is to map out how note-taking interacts with other study processes. Some clear direction for this research is suggested by the theory developed here. Our participants claimed that notes were a more important source of content for courses in which note-taking was easy than for courses in which note-taking was challenging. In particular, difficult-to-take-notes courses seem to stimulate more peer consultation about the course content. Who cannot remember discussions aimed at divining what Professor X could have possibly meant in his lecture last Tuesday? Our students claimed that such discussions are more necessary when Professor X goes fast and presents material in a disorganized fashion than when the professor is more reasonably paced and well organized in his or her presentations. If self-regulated learning in college is to be understood, how notes (however incomplete and disorganized) inform and are informed by such conversations (and other content resources, such as past exams and textbooks) needs to be studied in detail.

Our participants reported that there are important links between encoding and review; they claim that their own notes are personally meaningful to them, represent their personal selection of important points, and are filled with comments and abbreviations only fully understandable to them as creators of the notes. This possibility contradicts a recurring hypothesis in the note-taking literature (e.g., Suritsky & Hughes, 1991) that students benefit from reading notes produced by others, although the effects of providing notes to students have been mixed (see Kiewra, 1989). In the few investigations analytical enough to isolate the effect of reading another student's notes per se (e.g., uncontaminated by the reader having experienced the lecture), there has been little evidence of learning gains from reading someone else's notes (e.g., Kiewra et al., 1991). At present, we know very little about how students process their notes when they review and about how they decipher the codes they created for themselves at study (Kiewra, 1989). Study of how students review and use personally produced notes, compared with how they process notes produced by others, has high potential for illuminating how students craft notes to meet their personal study and review needs. Such research has the potential to increase understanding of self-regulation during the entire note-taking–review cycle, thus linking planning for study during lecture with study and elaboration during review. (See Barnett, Di Vesta, & Rogozinski, 1981, for some evidence that personalized notes and interpretations of them during review can be an important mediator of achievement on tests

over lecture content.) If future investigations of student note-taking are conducted longitudinally within courses, researchers would have the opportunity to understand how regulation of note-taking shifts as students understand the note-taking, review, and accountability demands in particular courses.

An Emerging Model of Student Self-Regulated Note-Taking

In this section, we consider a composite student whose note-taking would be consistent with outcomes reported in previous studies and with the theory of note-taking developed here. Note-taking for such a student would serve multiple goals. It would increase attention in some lectures and force selectivity in attention; as the student attempts to construct a representation in notes reflecting the organization of a lecture, the goal of understanding would be served. Notes would be constructed in anticipation of study for exams and completion of other homework. That is, the composite notetaker would be aware of future demands and needs and, thus, would construct notes to facilitate learning and performance in the long term. Of course, these subgoals would be part of the notetaker's larger goal of doing well in courses.

Such a notetaker would have developed a repertoire of note-taking strategies and beliefs about when some note-taking practices are more appropriate than others. These metacognitive beliefs would specify the situational appropriateness of various strategies and would guide their use in particular situations. For example, the composite notetaker would recognize multiple occasions when construction of verbatim notes makes sense; he or she would know particular ways of flagging relationships between concepts presented in lecture, and he or she would use personalized codes during note-taking that would make sense only to him or her. A composite notetaker would be selective, with one principle of selection being to note information that is important (e.g., covered in lecture and text, stressed by lecturer, cited on syllabus); another is to note information that is unfamiliar or personally difficult for the notetaker. Because of differences in background knowledge, no two composite notetakers would select the same points for inclusion in notes, which is one reason that personally constructed notes might be more useful to the students who construct them than they are to others.

The composite notetaker would be aware of whether the notes taken in a class would be effective in meeting course goals. A composite notetaker would recognize when notes are poor because the notetaker lacked background knowledge that could be related to lecture material, the lecturer presented content too rapidly, or the lecture was poorly organized. If notes were inadequate to meet course goals, the composite notetaker would not resign. Sometimes notes would be recopied after class or rewritten with elaboration. Often, the notetaker would use other resources to make up for the lack of high quality notes, and in particular, he or she would seek out the help of others who may be able to fill in the gaps in problematic notes (e.g., other students in the class).

Throughout the term, the notetaker would evaluate the content of exams and reflect on how well his or her notes covered what was on the tests. If notes were not promoting high performance on exams, the composite notetaker would alter note-taking in an attempt to improve performance on subsequent exams. With increasing experience coping with university lecturers, the composite notetaker would become a better notetaker, thus expanding his or her repertoire of note-taking strategies and becoming increasingly aware of what should be noted in lectures so that notes are maximally useful for meeting course demands. The college notetaker would have been developing his or her repertoire of strategies for many years.

In summary, our participants believed that how a college student takes notes in a class today is determined by a long history of experience with courses. Unfortunately, analyses of college student note-taking to date generally have ignored distal variables (such as previous course experiences) as potential determinants of current note-taking behaviors. The student participants in this study claimed that note-taking in a course today is also determined by previous experiences in the current course such as exams. Unfortunately again, such experiences have not been studied in extant work on note-taking. Many note-taking experiments have required students to process a lecture completely disconnected from other course content. Our students indicated repeatedly that note-taking is determined by student perceptions of course demands, lecturer style, and the relationship between the current course content and background knowledge. Once again, such perceptions generally have been ignored in note-taking research. The interviewees made clear that notes are only one source of information in a course and that they are used in combination with other resources. Nonetheless, how notes are combined and coordinated with other sources of input has generally been unstudied. The students' theory of note-taking developed in this study provides a window on many of the potential variables that must be better understood if an even more complete model of college student note-taking is to be constructed. That is, although the theory offered here is more complex than previous models of note-taking, as it is validated additionally in other investigations, it probably will be expanded and elaborated. The students' theory of note-taking that we have developed from student perceptions is a start on a more realistically complete theory of college student note-taking than the model that has driven note-taking research for the past 20 years.

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Appendix A

Phase 2—Individual Interview Starter Questions

When do you take down notes? How do you know what's important (to take down)?

What is the structure of your notes?

When did you first begin to take notes?

How has your note-taking changed over the years?

What are the different ways in which you use your notes?

Do you always take notes? When do you not take notes?

What do you do with the things in your notes that you do not understand? What if this doesn't work?

How does note-taking affect your ability to think about the information during class?

What is the function of paraphrasing?

How does class size affect your note-taking?

What role does experience play in your note-taking?

What is a good set of notes? A bad set? (What is the difference between notetakers who take good and bad notes?)

How many words do your notes typically contain?

How do your notes change over the semester? How do you learn to change them?

Do you study with others? Under what conditions?

Do you understand other people's notes? Do you ever borrow other people's notes? Under what conditions?

How do your notes change from course to course?

How do you take notes when you have a guest speaker (as compared with the regular lecturer)?

What is the purpose of taking notes?

Appendix B

Phase 4—Interview Items

(Administered twice, once with respect to an easy-to-take-notes class and once with respect to a difficult-to-take-notes class)

1. Do you take notes (in this class)?
2. Do you typically prefer to take notes verbatim or to paraphrase?
   a. Why do you prefer this method? Aids understanding? Decreases processing? Insures correctness? Other?
   b. Are you able to use this method in this class?
      1. Why? or
      2. Why not?
3. Do you use any specific methods when you take notes?
   a. Are you able to do this with this class?
   b. Why? or
   c. Why not?
   d. Is the form of notes reflected by this method provided by the professor?
4. Do your notes contain: Information showing relationships between concepts? No information showing relationships between concepts?
5. Did your note-taking change during the course of the semester in this course?
   a. Quality increase? Or decrease?
   b. Why?
6. What did you do with your class notes when you studied? In rewriting, did you add information, delete information, reorganize, or other? (During the second portion of Phase 4 students were asked this only if they indicated that they rewrote notes.)
7. Did you use different sources to help you study for this class?
   a. If yes, which sources did you use?
   b. For each source named, how did you use this source?

Appendix C

Outline of Final Results: College Students' Theory of Note-taking

Goals

What the student hopes to achieve by taking notes: Although the overarching goal is doing well in courses, students formulate more specific goals before and during note-taking, with the possibility of multiple goals for a single note-taking situation or shifts in goals within and between note-taking situations.

A. Attention: Increases student attention to lecture
B. Understanding: Increases student comprehension and memory of material presented in lecture
C. Organization: Opportunity to connect ideas, provide structure, or generate a wholistic representation of lecture content
D. Study aid: Informs about content of exams
E. Homework aid: Informs about solutions to practice problems and provides information relevant to written assignments

Content–Structure of Notes

A. Content that is placed in notes
   1. Content redundant with text
   2. Material professor stressed
   3. Content on board or overheads
   4. Content cited on syllabus
   5. Definitions, main points, important concepts, and ideas
   6. Information not well understood or familiar
   7. Guest lecturer and film content not noted, nor is content that is common knowledge
B. Structure (Preferred methods vary from student to student, but approaches cited below are common)
   1. Key terms
   2. Outline of some sort (e.g., flagging relationships between more and less important content)
   3. Personal shorthand
C. Completeness of notes
   1. Verbatim
   2. Paraphrased
      a. Attractive because demands less writing
      b. Paraphrased notes sometimes constructed in class as test of understanding of content

Contextual Factors Affecting Note-taking

A. Lecturer style
   1. Speed: Slow to fast (relative to difficulty and novelty of material)
   2. Structure
      a. On a continuum, from organized to disorganized
      b. On a continuum, from clear to vague
      c. On a continuum, from separated points to unclear separation of points

      Instructors can aid note-taking by providing and sticking to outlines or by giving signals that indicate important information (e.g., by presenting important material on the board, lecturing more slowly, repeating central ideas, or announcing what is important). Lecturers may prevent students from being able to use preferred note-taking methods (e.g., by talking too fast to permit students to use preferred note-taking strategies) or from developing notes that represent relationships between concepts (e.g., by presenting diagrams and lecture simultaneously, being poorly organized, or deviating from lecture outline presented to class). In such courses, students may adjust their note-taking to match the instructor's style better or as their understanding of the demands of the course increases.
B. Student knowledge and characteristics
   1. Prior knowledge: Easier to take notes when lecture content is related to prior knowledge possessed by the learner. When prior knowledge is high, fewer notes are taken, and there is greater selectivity, as students focus on new information in the lecture. Occasionally, students are so knowledgeable about the lecture topic that no notes are taken. High prior knowledge is especially advantageous when the lecturer is poorly organized or rapid in presentation.
   2. Increasing know-how: Knowing how to take notes increases as a function of college attendance (more organized, selective, accurate).
   3. Some students more committed to creating complete notes than are other students
C. Type of content and course demands
   1. Verbatim notes are often favored for more defined and specific content (e.g., definitions, names, dates, examples). Verbatim notes are used if the accountability system in the course requires verbatim recall of well-defined points or if paraphrasing might distort the meaning. (Even so, some students prefer paraphrasing for most notes, including to capture well-defined, specific points.)
   2. Paraphrasing is possible with familiar material and is preferred for conceptual and ill-defined content, especially if learning of general principles is the demand in the course.

(Appendix continues on next page)

Postclass Processing of Notes

A. Occasionally class notes not used
   1. Notes students consider not to be good (e.g., perhaps because lecturer is difficult to take notes from)
   2. Material already well known
B. Notes are processed after class
   1. Methods
      a. Review
      b. Rewrite (changing form or content, including elaborations, reorganizations)
      c. Recopy (rewriting without changing form or content)
   2. Factors affecting the extent to which notes are used
      a. Used for homework assignments when lecture content is pertinent to it (e.g., worked examples)
      b. Notes used proportionately more for exam preparation in easy-to-take-notes courses
      c. Notes combined more with other sources of information (e.g., text, past exams, teaching assistant consultation, student discussions), especially in difficult-to-take-notes courses
      d. Personalized aspects of notes are important in conveying information to students, so that self-constructed notes are more useful than are notes taken by others

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