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# *Parallel note-taking: A strategy for effective use of Webnotes*

*Many instructors supply online lecture notes but little attention has been given to how students can make the best use of this resource. Based on observations of student difficulties with these notes, a strategy called* parallel note-taking *was developed for using online notes. The strategy is a hybrid of research-proven strategies for effective note-taking and reading. This paper describes student difficulties using online notes, reviews note-taking and reading strategies, outlines the parallel note-taking strategy, and describes the method for teaching this strategy. Additionally, the paper presents the results of a survey which confirmed observations of student difficulties using online notes and which suggested that parallel note-taking should be appropriate in this situation. Finally, the paper describes several ways for developing online notes and teaching students how to effectively use them as a learning tool in the classroom.*

Computers are becoming part of many instructors' repertoire of presentation media, both in and out of the classroom. One way that computer technology is making inroads into the classroom is through instructor-supplied online lecture notes, or "Webnotes." Webnotes are usually very popular with students (Chrisman & Harvey, 1998; Levine, 2002; Murphy & Cross, 2002) and are available in many forms ranging from rough outlines to complete transcripts of lectures.

Because Webnotes are a relatively new kind of "text" for students to navigate, there has been little research into their use. Some studies suggest that instructor-supplied lecture notes improve student performance (Annis, 1981; Smith, 1984), while others show they have a negative effect (Murphy & Cross, 2002). However, research examining how students use Webnotes and how they may affect student performance is lacking. In our experience, many students print out Webnotes, but are unsure of how to use them effectively. Some students print out Webnotes in lieu of taking their own notes during lectures or discussions. Others take notes in class in a more traditional way and put available Webnotes to little or no use. Sadly, some students use Webnotes as a substitute for going to class.

While there has been little to no research into the use of Webnotes specifically, a great deal of research is available regarding the use of learning strategies for taking effective lecture notes. Note-taking has long been recognized as an important element of students' understanding of lecture material (Armbruster, 2000). Controlled experiments show that students who perform encoding plus storage note-taking functions (i.e. taking notes and reviewing them) outperform those who do not (Kiewra et al., 1991; Kiewra, Dubois, Christensen, Kim, & Lindberg, 1989). Armbruster's (2000) review of the literature on note-taking found that student notes are generally incomplete and contain less than 40% of the main content ideas. The amount of information included, note completeness, and length of notes is significantly, positively correlated to student performance. Evidence from several decades of research emphasizes the importance of taking complete lecture notes and of reviewing them. Moreover, strategies which encourage active processing of information help students to learn effectively. In particular, note-taking strategies that promote rehearsal and review of lecture material enhance learning.

The split-page method, also known as the Cornell method (as explained in Pauk, 2000), is a note-taking strategy in which the student divides his or her paper into two columns, takes lecture notes on the right-hand side, and uses the left margin to write questions or annotations. The split-page method is effective because it incorporates an element of self-testing. Students who employ either self-questioning or reciprocal-questioning with a peer significantly outperform those students who review lecture material without self-testing (King, 1991). When students think about the lecture material by forming and then answering questions, their performance improves because the process of self-questioning forces students to monitor their learning and comprehension. Additionally, self-testing as a part of split-page method encourages students to review

on a regular basis rather than waiting until just before an exam (Nist & Holschuh, 2000a). Active engagement with the notes before, during, and after class is the most important element of the split-page method of note-taking.

Similar results have been found in research relating to strategies for the effective use of written texts. For example, *annotation* is an active reading strategy that involves the following elements: writing brief summaries in students' own words in the margins, enumerating lists of ideas, noting examples, putting information in graphs and charts where appropriate, predicting possible test questions, marking confusing ideas, and underlining key words and phrases (Nist & Simpson, 1988). Research shows that students who annotate text outperform students who are given pre-reading questions, even though they spend less time studying for the exam. Annotation requires students to isolate, reduce, and organize information in a personally meaningful way; identify key concepts and important supporting details; and monitor learning (Nist & Holschuh, 2000a). More generally, annotation encourages active reading and monitoring of understanding (Nist & Holschuh, 2000b). When annotating, according to Nist and Simpson (1988), students are engaged in active reading because they process the information, build ideas, and make connections. Because annotations are written in students' own words, if they find they cannot rephrase the material, they know they do not fully comprehend the information. Annotation is an exceptionally flexible and accessible strategy, and can improve motivation because students approach the text with a purpose (Nist & Diehl, 1998). In order for annotation to be an effective method for enhancing comprehension, students must write notes in their own words (Nist & Simpson, 1988; Strode, 1991). Research has demonstrated that mastering this strategy can require more than one semester of instruction and practice (Holschuh, 1995; Mealey & Frazier, 1992).

The split-page method and textbook annotation are effective strategies for student learning because they require students to actively engage with new information. These strategies involve processing information in ways that make it meaningful to the individual student, and self-testing techniques that insure the student properly understands the information and can successfully analyze and apply it. These strategies promote active learning approaches to two familiar sources of information in the classroom. As a new kind of "text," Webnotes present a new challenge to students. Thus we began this study with the following questions: 1) What difficulties do we observe in student use of instructor-supplied Webnotes? 2) How can we help students use Webnotes more effectively? 3) How do students actually utilize Webnotes?

## Methods

The primary goal of this paper is to present the parallel note-taking strategy and describe how it can be used and taught. Additionally, we discuss the ways in which students interact with online notes, based on a survey we gave to our students, and why we believe our strategy to be effective.

The parallel note-taking strategy and this study emerged from our experience as instructors of "Learning to Learn" seminars that we taught across a variety of disciplines (geography, biology, and philosophy). As instructors of the course, we met weekly to discuss our teaching as well as learning and study strategies across the disciplines. As the year progressed, we noticed students in each of our classes were having similar difficulties utilizing Webnotes effectively. To respond to our students' needs, we developed the parallel note-taking strategy, which we based on research-tested note-taking and text marking strategies. After teaching the strategy, we administered a survey to learn more about how our students actually use Webnotes. Our survey confirmed our observations of difficulties students have using Webnotes effectively and we believe our strategy is likely to address student needs.

### *Context*

The parallel note-taking strategy was taught in Learning to Learn Adjunct Seminars (UNIV 1116). UNIV 1116 is a one-hour, pass-fail elective course attached to large, introductory lecture courses ("content class") across a variety of disciplines. The seminars meet once a week outside of lecture. Lessons cover textbook reading, studying, writing, exam taking, and time management strategies. Grades are based on attendance and participation. Refer to Table 1 for a description of the core courses.

**Participants.** Students who participated in the adjunct seminars where the parallel note-taking strategy was taught were enrolled in Introduction to Human Geography (GEOG 1101), Introduction to Organismal Biology (BIOL 1104), or Introduction to Philosophy (PHIL 1000). Refer to Table 1 for a summary of student enrollment in the courses and adjunct seminars.

**Student difficulties using Webnotes.** We observed several difficulties that students experienced in their interactions with Webnotes. Perhaps the most universal was that students tended to use them as a substitute for taking their own notes or even for attending lectures when the instructor made Webnotes available. Some students complained in our UNIV 1116 class that Webnotes in their content class made it easier for them to procrastinate in their studying, as it made it possible to not only put off learning textbook material but lecture material as well.

*Table 1*
*Description of the content classes to which UNIV 1116 adjunct seminars were attached and the format of the Webnotes made available in each class.*

| Course Title | Intro to Human Geography (GEOG 1101) | Intro to Organismal Biology (BIOL 1104) | Introduction to Philosophy (PHIL 1000) |
|---|---|---|---|
| Student composition | Majors and non-majors | Non-Science Majors | Majors and non-majors |
| Content Class Enrollment | 127 | 330 | 59 |
| UNIV 1116 Enrollment | 13 | 40 | 14 |
| Time Webnotes posted | Before lecture | After lecture | Before lecture |
| Webnotes format | Skeleton outline | Detailed paragraph | Detailed outline |
| Course description | Through lectures, develop awareness of the world, particularly with regard to how what happens in one place can have significant consequences in other places across the planet. With a focus upon understanding and explaining some of the political, historical, and economic relationships that bind people together. | Through lectures, provide an introduction for non-science majors to the diversity of life that inhabits planet Earth, with a focus on organisms, their evolutionary history, their characteristics, and their interactions with one another. | Through reading, discussion, and lectures, to develop acquaintance with some of the most important figures of western philosophy, from its beginnings in the 6th Century B.C.E. to the 20th Century C.E. and to acquire through discussion some practice in dealing with philosophical problems. |

As a consequence of not attending lectures some students complained that Webnotes could be difficult to understand. These students became frustrated with Webnotes when they tried to review them as preparation for exams. Often students were conscious of their own tendencies to procrastinate, and felt that Webnotes exacerbated the problem.

Students experienced other, more general difficulties. Some instructors' Webnotes were filled with what students perceived as an overwhelming amount of information. Others were confusingly organized and not reader-friendly: they did not flow evenly, they did not clearly emphasize which information is most important, or they did not explicitly indicate the level of thinking expected of students (memorization versus analysis and application, for example).

*The Parallel Note-taking Strategy*

Our observations of student difficulties involving Webnotes led us to conclude that a new strategy is needed that promotes a higher level of interaction with Webnotes, just as the split-page method and annotation do for traditional lectures and textbooks. We devised a new strategy, parallel note-taking, to fill this need. To implement the parallel note-taking strategy, the student prints out the Webnotes and places them in a three-ring binder. On the backs of these pages the student draws a margin approximately two inches wide. On the wider side of the margin the student writes notes that "parallel" the text of the Webnotes, and in the narrower side writes process notes, summaries, predicted test questions, and other annotations. If the student has the Webnotes before the lecture is delivered, he or she takes the binder to class and uses the back of the previous page to take notes that "parallel" the printed Webnotes on the facing page — that is, that add to or elaborate the printed notes with new information provided in the oral lecture. Students who obtain Webnotes after the corresponding lecture take their own set of lecture notes and later use them as a reference to annotate the printed Webnotes on the backs of the opposing pages. We reasoned that this strategy would address student difficulties with Webnotes because it requires the student to perform the same encoding tasks that take place in conventional note-taking and text annotation. Additionally, this new strategy requires the student to use information from the oral lecture to elaborate the Webnotes, in effect helping the student to create a new text that is personally meaningful.

*Method of Instruction*

Some of our students had access to Webnotes before the lectures (GEOG 1101, PHIL 1000). We asked these students to read about annotation and

the split-page method in *College Rules!* (Nist & Holschuh, 2002). Then we gave a verbal description of the parallel note-taking strategy and showed examples using Webnotes from the courses in which they were enrolled. We emphasized how the notes paralleled the printed Webnotes and showed how the margin can be used for annotating, taking process notes, and predicting test questions. We then asked the students to try out the parallel note-taking strategy during lecture in their content class. The following week, students shared their experiences and discussed the advantages and disadvantages of the strategy as well as how to modify it to suit their individual learning needs.

Other students had access to the Webnotes only after the lecture had been delivered (BIOL 1104). The method for teaching the strategy was similar. These students also read about the strategies before class. We gave a verbal description of the parallel note-taking strategy and then modeled the process of annotation using an overhead projection of an excerpt from the Webnotes. The students then practiced the strategy on a handout containing a different excerpt from the Webnotes in class, and were assigned the task of annotating one set of Webnotes. The following week, students shared their experiences as described above.

*Survey*

After developing the parallel note-taking strategy, we wanted to evaluate our observations of student difficulties. To ascertain student attitudes and to reveal how students used Webnotes, and thus determine if our strategy would be appropriate to respond to student needs, we distributed anonymous surveys to three UNIV 1116 classes. The students were taught the parallel note-taking strategy several weeks before they were surveyed. Sixty-two surveys were completed and consisted of three open-ended questions: 1) How do you use Webnotes? 2) What do you like about your professor's Webnotes? 3) What do you find problematic about your professor's Webnotes?

For each question, students were asked to be specific in their responses. Because of the large number and variety of answers to the three questions we developed a rubric to classify the diverse responses. Three of us independently read through the surveys to identify patterns that emerged from the data and develop a rubric for scoring answers. On the first read through the surveys we independently coded the responses to identify categories. On subsequent reads, we identified patterns within categories and discussed similarities and discrepancies among the categories until we reached consensus. Once we agreed upon categories and patterns within them, we coded the responses for all the surveys. Survey questions and answers, summarized according

to the rubric we used, are presented in Table 2. We present tallies of responses and the proportion of total students or total responses to each category. Some student responses to a single question indicated use of multiple strategies.

## Results

Students responded that they interacted with their Webnotes in a variety of ways (Refer to Table 2 for a summary of responses). Responses tended to fall into "elaborative" and "non-elaborative" learning strategies. We considered a strategy elaborative if it required the student to actively manipulate information in a way that was meaningful to them, and a strategy non-elaborative if the student did not add to or interact with the material. Examples of elaborative interactions included "added own notes during class," "annotation," "used as a study tool," and "previewed Webnotes before lecture." Non-elaborative interactions included "followed along during class," and "read." Sixty-seven percent of all student responses indicated an elaborative use of Webnotes, while 30 percent of responses indicated use of non-elaborative strategies. As students were allowed to give multiple responses, some student responses indicated both elaborative and non-elaborative uses of their Webnotes. Elaborative techniques that students chose to employ covered a range of reading, note-taking, and study strategies that would be employed before, during, and after lecture.

Students liked Webnotes for a variety of reasons. Many felt it was very helpful to have lots of detailed information that included visuals. Webnotes helped students to focus during class and guide their studying for exams. Students reported that during class, they could "listen more and write less" and that Webnotes "supplement information they miss in class." Students also indicated that Webnotes helped draw their attention to important information, identify what information the professor thought was important, guide preparation for exams, and organize their studying. Students appreciated Webnotes particularly when they were well-organized.

Things students found problematic about their professor's Webnotes included both format and use issues, as well as the temptation to skip class. Forty-two percent of students found the amount of information included in Webnotes problematic. Some students indicated too little information while others indicated too much information was included. This difference corresponded to variations in the format of the notes for different classes (skeletal outline versus detailed paragraph form). Poor organization of Webnotes was a significant problem for students, who preferred notes that correspond to the lecture and are easy to fol-

*Table 2*
*Summary of responses and rubric from 62 student surveys regarding student use of Webnotes. Responses are presented according to the scoring.*

| Questions and response rubric | GEOG 1101 | BIOL 1104 | PHIL 1000 |
|---|---|---|---|
| Total number of surveys | 10 | 39 | 13 |
| How do you use Webnotes? | 12 | 62 | 19 |
| Elaborative strategies | 9 | 41 | 12 |
| Add own notes during class | 7 | 0 | 5 |
| Study tool | 2 | 16 | 6 |
| Annotate | 0 | 25 | 0 |
| Preview before lecture | 0 | 0 | 1 |
| Non-elaborative strategies | 3 | 18 | 7 |
| Follow along during class | 3 | 0 | 3 |
| Read | 0 | 18 | 4 |
| Don't go to class/pay attention/take notes | 0 | 3 | 0 |
| What do you like about your professor's Web-notes? | 12 | 49 | 12 |
| Lots of detailed information (including visuals) | 1 | 19 | 2 |
| Can focus during class and add own notes | 6 | 9 | 7 |
| Can add own notes | 0 | 1 | 0 |
| Can listen more and write less | 6 | 0 | 5 |
| Supplements lecture notes if information is missed | 0 | 8 | 2 |
| Guides attention, note-taking, and studying | 1 | 12 | 1 |
| Draws attention to important points | 0 | 0 | 1 |
| Exam preparation | 0 | 6 | 0 |
| Guides note-taking and studying | 1 | 6 | 0 |
| Good organization | 4 | 9 | 2 |
| What do you find problematic about your professor's Webnotes? | 13 | 40 | 15 |
| Amount of information | 3 | 23 | 1 |
| Too much information | 0 | 20 | 0 |
| Too little information | 3 | 3 | 1 |
| Poor organization/difficult to follow | 5 | 6 | 5 |
| Timing of posting | 1 | 6 | 1 |
| Not enough space to add notes | 1 | 1 | 2 |
| Skip class/Don't focus during class | 2 | 2 | 1 |
| No comment/Not applicable | 1 | 2 | 5 |

*Table 2, continued*
*Summary of responses and rubric from 62 student surveys regarding student use of Webnotes. Responses are presented according to the scoring rubric.*

| Questions and response rubric | Tallied Responses | Proportion Responses |
|---|---|---|
| Total number of surveys | 62 | - |
| How do you use Webnotes? | 93 | - |
| Elaborative strategies | 62 | 67% |
| Add own notes during class | 12 | 13% |
| Study tool | 24 | 26% |
| Annotate | 25 | 27% |
| Preview before lecture | 1 | 1% |
| Non-elaborative strategies | 28 | 30% |
| Follow along during class | 6 | 6% |
| Read | 22 | 24% |
| Don't go to class/pay attention/take notes | 3 | 3% |
| What do you like about your professor's Web-notes? | 73 | - |
| Lots of detailed information (including visuals) | 22 | 30% |
| Can focus during class and add own notes | 22 | 30% |
| Can add own notes | 1 | 1% |
| Can listen more and write less | 11 | 15% |
| Supplements lecture notes if information is missed | 10 | 14% |
| Guides attention, note-taking, and studying | 14 | 19% |
| Draws attention to important points | 1 | 1% |
| Exam preparation | 6 | 8% |
| Guides note-taking and studying | 7 | 10% |
| Good organization | 15 | 21% |
| What do you find problematic about your professor's Webnotes? | 68 | - |
| Amount of information | 27 | 40% |
| Too much information | 20 | 29% |
| Too little information | 7 | 10% |
| Poor organization/difficult to follow | 16 | 24% |
| Timing of posting | 8 | 19% |
| Not enough space to add notes | 4 | 4% |
| Skip class/Don't focus during class | 5 | 12% |
| No comment/Not applicable | 8 | 6% |

low. Some other issues of student concern are timing of posting, lack of margin space to add notes, and the temptation to not pay attention or skip class.

## Discussion and Conclusion

This project was designed as teacher research on how students used Webnotes after learning the parallel note-taking strategy. Its purpose was to identify variables such as student problems with Webnotes and ways that they use Webnotes. These variables can be used to design future research studies, which could include pre- and post-surveys and interviews of students as well as content analysis to evaluate the quality of the student notes. We present the discussion of this study by research question.

*1) What difficulties do we observe in student use of instructor-supplied Webnotes?*

We observed that our students had similar difficulties using Webnotes regardless of the discipline. We think this is because Webnotes are a new enough "text" that many instructors and students are unclear about how students can make the best use of them. The result is that students face serious difficulties in their interactions with Webnotes. Our study suggests that these difficulties largely center on how both educators and students perceive their function.

In our experience instructors generally make Webnotes available to students for two reasons. Both reflect the convenience to instructors and students that the internet and computer technology offer. One is that the internet makes it possible to distribute textual material to students at little or no cost in time or money. Many instructors are sufficiently computer-literate that they know how to make their lecture notes available on the internet either through Web pages or other online sources available to students (such as WebCT). The second is that some lecture halls and classrooms have electronic projection equipment which enables instructors to incorporate their lecture notes into audiovisual presentations, ranging from simple overhead projections of a lecture outline to elaborate computerized slideshow presentations. These sorts of presentations are convenient for instructors because they reduce the need to write on a chalkboard or dry-erase whiteboard, which enables them to cover material more rapidly. Since these presentations are often composed on a computer, it is not difficult for instructors to make them available to students online.

However, this new use of technology is accompanied by mixed messages about how instructors and students should best use it. Many

instructors, perhaps perceiving Webnotes as simply an alternative to distributing photocopied handouts, do not feel there is any need to explain how Webnotes should be used. This approach, however, encourages students to perceive Webnotes as a substitute for the oral lecture, and in turn reinforces some maladaptive learning habits. Since Webnotes are often the instructor's own lecture notes, many students feel that it is not as important to attend the oral lecture as it is to obtain a copy of the Webnotes. Many of our students complained that Webnotes made it easier for them to skip class, which encouraged them to procrastinate in their learning tasks. Since these students knew they could read the Webnotes later, they believed they could afford to miss lectures, and as a result they would procrastinate not only their textbook reading but learning lecture content from Webnotes material as well.

When instructors do provide instruction in how to make use of Webnotes, sometimes their advice leads to confusion and reinforcement of maladaptive learning behaviors. We know of several instructors who believe that students who have Webnotes should not take notes in lecture, on the grounds that students will listen more attentively if they are not busy transcribing notes. We believe this sends the message that the function of note-taking is simply transcription — a message that ignores the known importance to student learning of encoding new information during note-taking (cf. Armbruster 2000).

Despite the difficulties and confusion surrounding Webnotes, we believe that they are potentially an invaluable resource for student learning. Webnotes can highlight important concepts, provide figures or illustrations, and serve as a reference when the professor moves rapidly through lecture material. They can also alleviate the difficulties students face of having to listen to and process what a professor is saying in lecture and simultaneously copy it down. Thus the effective use of Webnotes can address many challenges presented by traditional note-taking.

*2) How can we help students use Webnotes more effectively?*

We believe that many students experience difficulties with Webnotes because in many cases neither instructors nor students recognize that Webnotes are a new "text" which functions very differently from traditional texts. Instructors and students tend to perceive of Webnotes as simply a supplementary written text that is available online. However, we think that Webnotes should be regarded as a hybrid text. They are a written resource and, to that extent, function as a supplement to other course textbooks; at the same time they are a guideline for or record of an oral resource, the class lecture. Hence a strategy for the effective

use of Webnotes should account for both of these aspects of the text. The parallel note-taking method requires students to interact with this hybrid text by helping them to use Webnotes as a guide for creating of their own texts which facilitate their learning and understanding of course material.

The parallel note-taking method itself is a hybridization of the strategies of split-page note-taking and annotation, which, as we discussed above, independently have been shown to enhance student learning. The split-page method is modified for taking notes during class when Webnotes are made available prior to lecture. A combination of the split-page method and annotation are employed for Webnotes that are made available after lecture. As with the note-taking and reading strategies described above, purposeful interactions with Webnotes before, during, and after lecture can make these instructor-provided notes a powerful resource for learning. We believe the parallel note-taking strategy for using Webnotes is effective because it involves the same active learning tasks involved in the split-page method and textbook annotation: it engages students during lecture and encourages them to draw together information from multiple sources and make connections about main ideas. Additionally it allows them to monitor their learning, self-test, and review before exams.

*3) How do students actually utilize Webnotes?*

The survey we gave to our students asked them to describe how they actually use Webnotes in their classes. The results of our survey confirmed many of the problems we had originally observed our students to have. Additionally, our survey indicated that, having learned parallel note-taking, some students used elaborative strategies to interact with Webnotes in their courses. Based on these results of our survey data, we believe our strategy is on target for addressing student needs using Webnotes.

The parallel note-taking strategy addresses several difficulties that students face when presented with Webnotes. When an instructor's notes are projected onto a screen during lecture students feel a sense of divided attention that results from the need to transcribe the projected notes and simultaneously process the professor's verbal explanations. Instructors who supply notes before their lectures tend to cover material very quickly because they might believe they do not need to pause to allow students to take down the information. The parallel note-taking strategy allows students to keep pace by relieving them of the burden of trying to simultaneously take notes from two sources of information. Because the projected lecture notes are already in their notebooks,

students can focus on elaborating and annotating the printed Webnotes based on the instructor's verbal lecture.

In classes where the student has access to Webnotes after the lecture, the parallel note-taking strategy facilitates the task of correlating and synthesizing the student's own notes with the online Webnotes. Often the online notes can present an overwhelming amount of detailed information, some of which the instructor may have explained in a different form in the oral lecture. Parallel note-taking provides a method for simplifying and organizing the information from Webnotes: the student can identify key ideas and important details by comparing his or her own notes with the printed lecture notes, and then emphasize and elaborate the important information through annotation on the opposing page.

Most importantly, through its incorporation of the split-page method, parallel note-taking encourages an elaborative approach to the use of online lecture notes which can help students engage in strategies that enhance encoding and retention of lecture material. Using the margin for summaries written in his or her own words requires the student to actively process the material and provides an opportunity for the student to monitor comprehension. Using the margin for predicting questions allows the student to rehearse the material and monitor retention. The split-page and textbook annotation strategies have been shown by research to be effective tools for student learning because they encourage students to engage in active, higher-level learning tasks in place of more passive strategies such as recopying notes or rereading texts. Because parallel note-taking incorporates the same higher-level learning tasks, it also should be an effective strategy for students to use when they interact with instructor-supplied Webnotes.

### *Changing the Perception of Webnotes in the Classroom: Webnotes as a "Hybrid" Text*

Our survey and observations indicate that it is important that both educators and students acknowledge that Webnotes are a new "text," and that they should not treat Webnotes in the same way as they treat more conventional texts. Because they are a hybrid text that incorporates both written and oral elements, Webnotes have a dual nature. Hence educators should organize and present course materials with the dual function of Webnotes in mind, and students should use strategies that are appropriate for interacting with both the written and the oral aspects of Webnotes.

In general terms, this means that some instructors will need to rethink the role that Webnotes should play in their classrooms. Webnotes sometimes are regarded as a substitute for students taking their own

notes during lectures. We believe this is an inappropriate way of dealing with the very real problem of students who have not learned how to take high-quality lecture notes. Webnotes used in this way amount to a crutch for passive learners, and in the end only present these students with another unfamiliar text to navigate and no tools to help them find their way. Instructors who use Webnotes to replace student note-taking squander an opportunity to provoke students to think differently about learning at the college level. When an instructor uses Webnotes to design a lecture as a means to encourage students to engage in active learning, Webnotes can become a powerful tool for enhanced learning in the classroom. The parallel note-taking strategy complements such an approach to the use of Webnotes by providing students with a tool for interacting efficiently and effectively with this new text.

We think Webnotes are most effective if the instructor designs them carefully and teaches students how to use them actively. Posting Webnotes well in advance of lecture allows students time to preview them and to use parallel note-taking to add their own notes during class. Instructors should take time to teach and demonstrate the parallel note-taking strategy and encourage their students to use it in order to actively engage with the material during lecture rather than rely on Webnotes as a substitute for their own class notes.

*Recommendations for Instructors Designing Webnotes*

The results of our survey suggest some ways that instructors can compose and organize Webnotes that will promote efficient and effective student learning. The things that students liked or found problematic about Webnotes fell into two general categories: content and format. Content issues included the amount of information and detail. Format issues included organization of ideas, physical layout and formatting of text, correspondence with verbal lecture, amount of margin space, and timing of posting.

From the standpoint of content, the amount of information included in Webnotes seems to be a balance that may be difficult to find. Students in the Geography course felt that the information was not detailed enough, while students in Philosophy and Biology felt overwhelmed by the amount of content. Webnotes clearly can be useful as a means to draw attention to important information, and also can serve as a reference point to help students keep up when a lecture moves quickly. We think instructor-supplied Webnotes are particularly effective when they are used to encourage higher-level thinking tasks, such as analysis and application, about course material. The right amount of content to include in Webnotes should be determined not only in relation to the

instructor's judgment about how much material needs to be covered, but also with respect to what level of thinking the students should use in engaging with the material. In some cases presenting less information with emphasis on higher-level learning tasks may be preferable to presenting more information to be merely memorized.

Good organization seems to be overwhelmingly important to students, regardless of the amount of information presented. Student responses indicate that organization was a significant factor in their ability to utilize Webnotes effectively. The amount of margin space and timing of posting are technical details that can make a big difference. Organizing Webnotes according to the structure of the lecture ensures an even flow of ideas. Detailed Webnotes that include visual aids such as diagrams and figures rather than just a skeletal outline allow students to elaborate on the diagram in the same time they would normally take to copy the diagram by hand. Again, because we believe that Webnotes can be used to influence the level of thinking that students use when they engage with course materials, the organization of Webnotes should be developed with an eye to the learning tasks that students are expected to perform. In contexts where higher-level thinking is required, it is appropriate to organize Webnotes in such a way that students are explicitly encouraged to interact with them in the desired way. For example, inclusion of study questions throughout the notes would encourage students to analyze or elaborate the presented material. However, we caution against providing too much information in Webnotes because students come to perceive them as a substitute for attending class regularly.

Because many students experience a strong temptation to use Webnotes as a substitute for attending class lectures, we think Webnotes should be used as a means to enhance class lectures and reinforce their importance to student learning. We believe Webnotes are used most effectively when instructors make them available before lectures and encourage students to bring them to class. If students are explicitly aware that the Webnotes are intended as a guide for note-taking in lecture, and that relying on the Webnotes in lieu of attending lecture will not be sufficient for them to succeed, then students will be less inclined to use Webnotes as an excuse to miss class lectures. Moreover, using the parallel note-taking strategy in class allows the instructor to focus on demonstrating higher-level learning tasks such as analysis and application. If students have content material in front of them, the instructor can shift the emphasis of the lecture presentation from covering basic content to more methodological concerns such as analysis or interpretation.

Instructors who use Webnotes can help their students to make the

best use of this resource by taking class time to demonstrate the parallel note-taking strategy and emphasizing how it addresses student concerns about note-taking and Webnotes. Instructors using Webnotes should discuss with their students how online notes will be used in class, when they will be posted, and should briefly model the parallel note-taking strategy. This demonstration can help students maximize active learning experiences before, during, and after lecture, and can greatly enhance the value of Webnotes in the classroom.

*Suggestions for Future Research*

To the extent that parallel note-taking is a modification of the research-tested strategies of split-page note-taking and annotation, we believe that it is an effective tool for enhanced student learning. However, the application of the parallel note-taking strategy may be different from either of the strategies from which it is derived. For example, when students download Webnotes prior to class and take parallel notes during lecture, note-taking may take on a different character than with the traditional split-page method. In a traditional lecture, part of the task is for students to transcribe information presented by the lecturer. But when the lecturer makes use of Webnotes, the transcription task is minimized and other aspects of effective note-taking may receive more emphasis, such as elaboration, analysis, and synthesis. Hence the characteristics of what should be regarded as high-quality notes may differ between parallel notes and split-page notes, and these differences may indicate how student learning can be most effectively enhanced by the use of Webnotes. This aspect of the parallel note-taking strategy deserves further research.

Some students now bring laptop computers into the classroom and type their lecture notes. We have witnessed very little use of laptops in our own classrooms or at our University in general, and for that reason chose to develop a strategy focused on traditional pen-and-paper notes. For students who choose to use laptops for note-taking, a comparable strategy would be to convert the professor's notes to a word processing document, and then supplement those notes with their own lecture notes, perhaps in a different font so as to differentiate the two texts. Use of this technology as a means of interacting with Webnotes deserves more research, particularly in contexts where student laptop usage is more prevalent.

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