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Notetaking Strategies and Their Relationship to Performance on Listening Comprehension and Communicative Assessment Tasks

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Foreword

The TOEFL® Monograph Series features commissioned papers and reports for TOEFL 2000 and other Test of English as a Foreign Language™ (TOEFL) test development efforts. As part of the foundation for the development of the TOEFL Internet-based test (TOEFL iBT), papers and research reports were commissioned from experts within the fields of measurement, language teaching, and testing through the TOEFL 2000 project. The resulting critical reviews, expert opinions, and research results have helped to inform TOEFL program development efforts with respect to test construct, test user needs, and test delivery. Opinions expressed in these papers are those of the authors and do not necessarily reflect the views or intentions of the TOEFL program.

These monographs are also of general scholarly interest, and the TOEFL program is pleased to make them available to colleagues in the fields of language teaching and testing and international student admissions in higher education.

The TOEFL 2000 project was a broad effort under which language testing at ETS® would evolve into the 21st century. As a first step, the TOEFL program revised the Test of Spoken English™ (TSE®) and introduced a computer-based version of the TOEFL test. The revised TSE test, introduced in July 1995, is based on an underlying construct of communicative language ability and represents a process approach to test validation. The computer-based TOEFL test, introduced in 1998, took advantage of new forms of assessment and improved services made possible by computer-based testing, while also moving the program toward its longer-range goals, which included:

- the development of a conceptual framework that takes into account models of communicative competence
- a research program that informs and supports this emerging framework
- a better understanding of the kinds of information test users need and want from the TOEFL test
- a better understanding of the technological capabilities for delivery of TOEFL tests into the next century

Monographs 16 through 20 were the working papers that laid out the TOEFL 2000 conceptual frameworks with their accompanying research agendas. The initial framework document, Monograph 16, described the process by which the project was to move from identifying the test domain to building an empirically based interpretation of test scores. The subsequent framework documents, Monographs 17-20, extended the conceptual frameworks to the domains of reading, writing, listening, and speaking (both as independent and interdependent domains). These conceptual frameworks guided the research and prototyping studies described in subsequent monographs that resulted in the final test model. The culmination of the TOEFL 2000 project is the TOEFL iBT, which was introduced in September 2005.

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Abstract

Utilizing a pre- and posttest research design, with an instructional intervention of good practices in notetaking, the notes taken by examinees during a computer-based listening comprehension test prior to and following the instructional intervention were examined for particular notetaking strategies. Questionnaires probed perceptions of the frequency of use and helpfulness of the notetaking strategies. Also investigated were relationships between the strategies and performance on a multiple-choice listening comprehension measure and integrated listening/writing and listening/speaking tasks and whether the brief instructional intervention affected examinees' notes and performance on the three tasks.

Results showed that examinees made little use of efficiency and marked organizational notetaking strategies. While the intervention had no effect on examinees' notetaking strategies or on their task performance, students' posttest notetaking strategies and task performance were significantly related to their pretest notetaking strategies and task performance. Moreover, notetaking and test performance were moderately related: Two notetaking strategies that most consistently related to performance on all three tasks were the number of content words in the notes and the number of test answers recorded in the notes. Efficiency strategies represented a cognitively complex category worthy of further investigation.

Key words: Testing, listening comprehension, notetaking, content analysis of notes, integrated tasks

Acknowledgments

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I also wish to thank the consultants at the cooperating universities who were responsible for overseeing installation of the computer-based test on their respective campus, recruitment of participants, and administration of the study materials to participants: Alfred D. Stover (University of Arizona), John Haught (UNLV), and Heather Boldt and Jennifer Murphy (GSU). I wish to single out for particular thanks Beverly Ruiz (University of Indiana), who single-handedly tested more participants than anyone else at great personal expenditure of her time. She has my undying thanks for her efforts, which went above and beyond the call of duty. Thanks also go to those at GSU who rated the written and spoken responses: Jennifer Murphy (writing), Margareta Larsson (writing and speaking), and Frank Smith (speaking). At ETS, I wish to thank Mary Enright, Susan Nissan, Tom Florek, Daniel Eignor, and Jan Rotolo.

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Introduction

Mini-lectures comprise a substantial portion of the listening materials on the TOEFL® and other listening comprehension tests. Previous research has demonstrated the potential benefit of notetaking during listening to lectures (Carrell, Dunkel, & Mollaun, 2002, 2004). Given that the TOEFL program permits notetaking on the listening comprehension section of the new TOEFL-iBT (in fact, notetaking will be permitted throughout the test—see *Frequently Asked Questions About the Internet-Based Test*, n.d.), the relationship between notetaking and lecture comprehension is relevant for assessment as well as instruction. The purpose of this study was to examine the relationship between the content of notes taken by examinees during mini-lectures and their performance on a listening comprehension measure and integrated listening/speaking and listening/writing tasks. There were four research objectives. The first was to examine the content of notes taken by English as a second language/English as a foreign language (ESL/EFL) examinees while listening to mini-lectures on a computer-based listening comprehension test. The second objective was to examine the relationship between the content of examinees' notes and performance on multiple-choice listening comprehension tasks and integrated listening/writing and listening/speaking tasks. The third objective was to examine the effects of a brief notetaking instructional intervention on the notes, as well as on task performance. The fourth objective was to investigate examinees' perceptions of their notetaking strategies as well as their perceptions of the helpfulness of those notetaking strategies in their performance on the listening comprehension measure and speaking and writing tasks based on the lectures.

The computer-based test used in this study was drawn from LanguEdge (ETS, 2002a), instructional courseware intended to provide teachers and students experience with communicative assessments. LanguEdge included tasks that require the integration of language skills and represented potential prototypes of future TOEFL assessment tasks. The existence of these integrated tasks provided an opportunity to explore how notetaking impacts performance on a multiple-choice listening comprehension measure as well as on integrated listening/writing and listening/speaking tasks.

Literature Review

Taking lecture notes is widely accepted as a useful strategy for augmenting student attention and retention of academic discourse. Notetaking is intuitively appealing to the lecture-listener and is generally viewed as a way to facilitate the process of learning and remembering

lecture material. According to Kiewra (1989), notetaking is beneficial for at least two reasons. First, notetaking aids lecture learning by activating attentional mechanisms and engaging the learner's cognitive processes of coding, integrating, synthesizing, and transforming aurally received input into a personally meaningful form. Second, notetaking is seen as beneficial because the notes taken serve as an external repository of information that permits later revision and review to stimulate recall of the information heard.

A number of researchers, focusing principally on native English-speaking (L1) students, have investigated the issue of lectures and student learning (Armel & Shrock, 1996; Barnett, DiVesta, & Rogozinski, 1981; Cohn, Cohn, & Bradley, 1995; Fisher & Harris, 1973; Kiewra, 1983, 1987, 1989; Kiewra, Benton, Kim, Risch, & Christensen, 1995; Kiewra, DuBois, Christensen, Kim, & Lindberg, 1989; Kiewra, Mayer, Christensen, Kim, & Risch, 1991). Researchers studying nonnative-English speakers (L2) have also examined whether or not taking notes facilitates lecture learning and what kind of notes listeners take when listening to mini-lectures (Bilbow, 1989; Carrell, Dunkel, & Mollaun, 2002, 2004; Chaudron, Cook, & Loschky, 1988; Chaudron, Loschky, & Cook, 1994; Clerehan, 1995; Cushing, 1991, 1993; Dunkel, 1985, 1988a, 1988b; Dunkel & Davy, 1989; Hale & Courtney, 1994; Liu, 2001; Faraco, Barbier, & Piolat, 2002). A few researchers have looked at cultural aspects of lecture listening from an ethnographic perspective, noting that notetaking is only one of many strategies used for lecture comprehension and may not be an important strategy in many contexts (e.g, Benson, 1994; Flowerdew & Miller, 1992, 1995).

In one of the first investigations of the relationship between L2 learners'notetaking and listening comprehension, Chaudron, Cook, and Loschky (1988) investigated the effect on comprehension tests of the availability of notes taken during lecture listening. Chaudron et al. found that retaining or not retaining notes taken while listening to short (six- or seven-minute) lectures did not affect performance on multiple-choice or cloze listening comprehension measures. They further investigated a number of quantitative and qualitative measures of the notes and their relationships to successful short-term recall. Utilizing multiple choice and cloze comprehension tests, Chaudron et al. concluded that "certain [notetaking] measures are more related to successful comprehension performance than others, on a lecture-specific basis" (p. 15). For example, three measures (symbols, abbreviations, and total words) were significantly

correlated with multiple-choice test scores on one lecture, but not with multiple-choice test scores on two other lectures.

In another early investigation, Dunkel (1988a) examined the relationship between the content of L2 students' lecture notes and test performance. Dunkel scored the notes taken by L1 and L2 listeners during a 23-minute mini-lecture for five quality indices. Dunkel's results suggested that, when considered together as one group, L1 and L2 notetakers who scored high on the postlistening test had incorporated a large amount of information in their notes and had detected and noted information that subsequently appeared on the post lecture quiz. Interestingly, for both L1 and L2 test takers, the index total number of words was inversely related to the dependent variable, suggesting that test achievement was not directly related to the quantity of the notes taken "but rather to (a) terseness of notations (embodied in the information units) and (b) inclusion of potential test information (embodied in the test-answerability index)..." (pp. 269-270). For the L2 learners considered as a separate group, with respect to questions about general concepts from the lecture (not details), only total number of words and information units were statistically significantly related to test performance, the former negatively and the latter positively. With respect to questions about details from the lecture, only the number of information units and completeness were statistically significantly related to test performance, the former positively and the latter negatively. These results demonstrated that the quality of notes taken by L2 learners affects performance on tests that assess different types of learning.

Notetaking is apparently also related to individual differences among L2 learners. Cushing (1993) examined the relationship between academic status (noncredit, undergraduate, or graduate student), language proficiency, and notetaking. Similar to Dunkel's (1988a) findings, good notes were those that contained the most information in the fewest number of words. These results suggested that individual differences, such as listening comprehension proficiency (high versus low) and academic status affect the content and quality of notes taken and the retention of information heard.

In another study of the content of notes, Cushing (1991) employed a qualitative analysis of sets of the notes taken by the high and low proficiency L2 listeners when students were provided an outline of the lecture to guide their notetaking. Her results indicated the following: (a) high proficiency students tended to take more complete notes than low proficiency students; (b) high proficiency students made somewhat better use of the notetaking guide than did low

proficiency students; (c) overall, there was not a great deal of incorrect information in the notes, although 40% of the low proficiency students had written wrong or incomplete information in blanks in the notetaking guide; (d) lower proficiency students did not distinguish between relevant and irrelevant information as well as higher proficiency students; (e) graduate students tended to fill in the blanks on the notetaking guide more completely (although not always more accurately) than did either undergraduate or noncredit students, suggesting perhaps that they approached the task more seriously.

Cushing provided suggestions for future qualitative analyses of notes. She suggested that future investigations of the content of notes should include analysis of: (a) content (main ideas, important details, mention of the connection between ideas, and inclusion of the presence/absence of trivial details and unconnected words from the lecture); (b) organization (i.e., the macro-level strategies or organization that indicates progression of ideas throughout the text, as well as the micro-level strategies or organization that suggest the relationship between the main ideas and details; and (c) notetaking efficiency (abbreviations, symbols, content versus function words, paraphrasing versus verbatim transcription, complete sentences versus key phrases); and (d) features of notetaking specific to L2 speakers (e.g., use of the L1, problems with understanding content, and problems of understanding the structure of the text).

Noting that "with the exception of Dunkel's work, the literature has not offered a cross cultural focus on the lecture notetaking of groups of L1 and L2 students" (p. 137), Clerehan (1995) pointed out that after years of research on a vast array of features of students' academic English, we actually have little idea of what is being taken down in lectures, and whether it matters. To address the situation, Clerehan analyzed the hierarchical propositional structure of notes taken by L1 and L2 students from a lecture on commercial law and compared those to the hierarchical propositional structure of the original lecture. The investigation was based on the identification of the different levels of the lecture discourse to see how much of the propositional structure (Level 1: headings; Level 2: propositions related to the headings (rules of law); Level 3: illustrative case examples) students were recording. In general, L2 notetakers recorded significantly fewer of the top-level elements than did L1 students. Moreover, Clerehan found that the L2 group failed to adequately record 19% of Level 1, 43% of Level 2, and 43% of Level 3 elements. The researcher posited if the L2 law notetakers "were revising the topic from their lecture notes and from the textbook, these students, unlike their L1 peers, would need to perform

what resembles a jigsaw operation to retrieve the full meaning" (p. 145). By contrast, the L1 students consistently recorded 99-100% of the principal elements, and they did not show an increase in their omissions down the hierarchy from Level 1 to Level 3, as the L2 students did.

The study by Carrell, Dunkel, and Mollaun (2002, 2004) was the first to show a facilitating effect on L2 listening comprehension when a group of examinees with heterogeneous L1s was allowed to take and refer to notes during mini-lecture listening. This study, however, did not examine the content of the notes taken by examinees, nor, therefore, the relationship of the content of the notes to test performance.

In a more recent study of the functions of notetaking and the content of L2 listeners' notes in the context of a group of Chinese EFL learners, Liu (2001) found that taking and having one's notes available during question answering had a significant effect on the recognition of specific information (but not general information) in both immediate and delayed multiple-choice test performance. A follow-up study reported in the same thesis investigated the relationship between three qualitative features of the Chinese students' notes and test performance: number of content words, number of words spelled out fully, and number of notations. Liu found significant positive correlations between number of content words and lecture-specific information (as opposed to general information), as well as significant negative correlations between number of words in full spelling and lecture-specific information (again as opposed to general information). Liu concluded that learners should be encouraged to "take down more content words when required to recall specific information," and as it might be a lost cause to spell out words fully, to establish a "personalized shorthand system" (2001, abstract).

In another recent study comparing notetaking in French by L1 and L2 undergraduate students from the perspective of cognitive load and working memory, Faraco, Barbier, and Piolat (2002) scored notes taken during students' listening to a 12-minute audiotaped lecture for volume and content (i.e., number of words as a percentage of total words spoken by the lecturer and as percentage of basic units, conceptual units, and major units) and procedures (i.e., abbreviations, icons [arrows, hyphens, etc.] and reformulations with words other than those produced by the lecturer). For all participants taken together (native speakers of French, high proficiency second language learners of French, and lower proficiency second language learners of French) they found significant positive correlations between comprehension scores and both abbreviations and icons and a significant negative correlation between comprehension and

reformulations. Presumably, if notetakers are taking time to reformulate or paraphrase they are missing what's coming next. Faraco et al. also found that high proficiency nonnative speakers actually took down more content than native speakers or low proficiency nonnative speakers.

Research Questions

Research Question 1: What strategies do examinees use in taking notes on the academic lectures in LanguEdge?

Research Question 2: Are these notetaking strategies affected by the instructional intervention on notetaking?

Research Question 3: (a) What strategies do examinees report using in taking notes and how helpful do they think these strategies are for their performance on the multiple-choice listening comprehension task and the integrated listening/writing and listening/speaking tasks in LanguEdge? (b) Are these reports affected by the instructional intervention?

Research Question 4: Are examinees' notetaking strategies related to their performance on the multiple-choice listening comprehension task and the integrated listening/writing and listening/speaking tasks in LanguEdge?

Research Question 5: Is examinees' performance on the multiple-choice listening comprehension task and the integrated listening/writing and listening/speaking tasks in LanguEdge affected by the instructional intervention?

Methodology and Design

Participants

A total of 216 participants generated sufficiently complete data to be included in the study. Participants were international students studying in the United States; they ranged in listening comprehension proficiency from low-intermediate to high, as measured by their scores on the pretest listening comprehension measure (mean scale score = 13.89, S.D. = 5.221, range 1-25, maximum possible scale score = 25). Eligible participants were any nonnative speakers of English who were ready to attempt TOEFL. Participants, who were paid for their participation, were drawn from the international student enrollees in the intensive English program (IEP) or matriculated ESL programs of several cooperating universities: The University of Indiana (IU), The University of Arizona (UAZ), Georgia State University (GSU), and the University of Nevada—Las Vegas (UNLV). Relevant participant characteristics are detailed in Table 1.

Table 1

Relevant Participant Characteristics

Characteristic		*N*	Years	%
Gender	Female	128		
	Male	88		
Age	Mean		26.85	
	Range		17–59	
Countries	Korea	61		
	Japan	22		
	PRC	22		
	Taiwan	18		
	Mexico	14		
	Venezuela	6		
	Indonesia	6		
	Brazil	5		
	Other	56		
Native languages	Korean	61		
	Chinese	42		
	Spanish	27		
	Japanese	22		
	Other	164		
Anticipated study	Engineering, Science, & Mathematics			29
	Social Sciences & Education			27
	Business & Economics			23
	Arts & Fine Arts			12
	Other & undecided			7
	Not specified			2
Time in U.S.	1 month or less	87		
	3 months or less	112		

To ensure that newly arrived foreign students (i.e., students such as TOEFL's EFL examinees) as well as longer-time resident foreign students (i.e., students such as TOEFL's ESL examinees) were included in the sample, testing was done at the beginning of an instructional

term, when new students were arriving in the United States. This timing was also intended to mitigate the effects of any instruction on notetaking in the institution's IEP/ESL curriculum. Testing was done in the summer and fall of 2003 and winter of 2004.

Participants were each paid an incentive of $25 for their participation, in the form of a gift certificate at their university bookstore. To motivate participants to do their best on the posttest, they were told at the end of pretesting that if their posttest score equaled or exceeded their pretest scores, they would receive an additional $25 bonus.[1]

Materials Used in the Study

The computer-based test. Pre- and posttests consisted of the listening comprehension sections of two forms of the computer-based LanguEdge tests. Each test form consisted of two conversations and four academic lectures; both the conversations and the lectures are based on speech commonly found in North American colleges and universities and reflect that found in introductory-level academic settings on a variety of academic subject matters (ETS, 2002a). Each conversation was followed by five multiple-choice questions, and each lecture was followed by six multiple-choice questions. In Form 2 of the test one lecture was followed by only five multiple-choice questions, but one of those questions, with more than one correct response, was worth 2 points. All other multiple-choice items were worth 1 point.

Multiple-choice questions included conventional four-choice questions; most of those were one-correct-response multiple-choice items, but some were innovative items that required more than one correct response. For example, one such item required the examinee to click on two correct answers. The question, which was worth 2 points, required participants to correctly categorize four examples. Partial credit (1 point) was given for correctly categorizing two of the four examples.

In addition, an integrated speaking question followed the multiple-choice questions after the third lecture, and an integrated writing question followed the multiple-choice questions after the fourth lecture.

The topics of the conversations and lectures were as follows: Form 1: Conversation 1 (Applying to Graduate School); Conversation 2 (Review for Biology Exam on Genes); Lecture 1 (Botany/Root Systems); Lecture 2 (Business/Organization of Management); Lecture 3 (Environmental Science/Water Resources); Lecture 4 (Philosophy/ Ethics/Plato). Form 2:

Conversation 1 (Poetry Club); Conversation 2 (Research Paper); Lecture 1 (Astronomy/ Bode's Law); Lecture 2(Botany/Manila Hemp); Lecture 3 (Philosophy/Aristotle); Lecture 4 (Psychology/Behaviorism).

The conversations were delivered at speaking rates of between 185 and 206 words per minute; the lectures were delivered at speaking rates between 143 and 208 words per minute. Conversations and lectures were four to six minutes in length.

Students controlled the timing of the assessment tasks, within general parameters. They had 25 minutes total in which to respond to the 33 or 34 multiple-choice comprehension questions (time limit does not include the time used to deliver the six aural stimuli). To respond to the integrated speaking question, students had 60 seconds to review their notes and prepare a response and 90 seconds to record their oral response. To respond to the integrated writing question, students had 15 minutes total within which to plan and to write a response based on the information in the lecture, using the computer keyboard. They were informed that an effective response would typically be between 125 and 200 words.

Each participant took one form as the pretest and the other form as the posttest. Approximately one half of the participants (N = 107) took Form 1 as the pretest and Form 2 as the posttest, and the other half (N = 109) vice versa.

Pre- and posttest questionnaires. A debriefing questionnaire was administered after the pretest and again after the posttest. Utilizing a 1-5 scale, from least to most, the questionnaire probed examinees' perceptions about the frequency of various notetaking strategies they used while taking the tests, as well as their perceptions about the helpfulness of those notetaking strategies in their performance on the tests. (See Appendix A for a copy of the pretest questionnaire.) At the end of the Session 1 questionnaire, participants were informed about the bonus incentive if their scores on the Session 2 computer test equaled or exceeded their scores on the Session 1 computer test. The posttest questionnaire was identical to the pretest questionnaire, minus the statement about the incentive.

Instructional intervention. An instructional intervention detailing good practices in notetaking was developed. It was designed to be used without any support from an instructor or any discussion, similar to the written notetaking guidelines that might be provided to examinees in advance of their taking the TOEFL. The tips or guidelines included were those that the research literature has shown to help students take notes during a lecture. Many of the practices

were in the form of do's and don'ts. Students were told that this advice could help them take good notes and help them answer questions on a listening comprehension test that follows a lecture. To ensure that they read and understood each of the good practices, students were asked to place their initials in a space provided in the right margin next to each practice.

The good practices were drawn from various sources on effective notetaking during lecture listening, and they were intended to represent the kind of notetaking advice that could be presented to examinees in printed test preparation material. Moreover, the items on the notetaking strategies questionnaire administered after the pretest and after the posttest were carefully coordinated with the do's and don'ts on the best practices intervention. (See Appendix B for a copy of the instructional intervention.) There were no prior expectations about the effect of the instructional intervention.

Other instruments. Additional instruments employed in the study included a handout of information about the study for participant recruits, an informed consent form, a biodata form soliciting relevant participant data, and a packet of notetaking paper with directions for use in taking notes during each computer-based test. (Copies of these instruments are available from the researcher.)

Procedures

The testing was conducted in the language resource centers or computer laboratories of the cooperating universities. An ESL specialist affiliated with the IEP or ESL program at each of these institutions functioned as the campus administrator for the study. These individuals were responsible for getting the LanguEdge computer-based tests installed on university computers, and they were also responsible for administering all tests and study materials at their institutions. Campus coordinators were also instructed to schedule administration of pre- and posttests, ideally with not longer than 2 weeks between the two. The mean number of days between pre and posttesting was 8.68 days, while both the median and mode were 8 days. Seven participants were posttested more than two but less than 3 weeks later.

Participants on each campus were randomly assigned a participant number. The computer-based tests were set up so that odd-numbered participants automatically received Form 1 as the pretest and Form 2 as the posttest; even-numbered participants automatically received Form 2 as the pretest and Form 1 as the posttest. Prior to posttesting, about 50% of the even-numbered and 50% of the odd-numbered participants were randomly assigned to a notetaking

instructional intervention group (N = 110), and the other 50% were randomly assigned to the no-intervention group (N = 106). Intervention and no-intervention participants were posttested at different times.

Participants were tested in two sessions. During Session 1 campus coordinators first administered and reviewed with participants the informed consent form, the biodata form, and the information about the study packet. They then handed out and reviewed with participants the packet of notetaking paper. Before beginning the computer test, students were permitted to stand and stretch their legs. The computer-based test began with a self-paced tutorial followed by the computer-based test. Upon completion of the computer-based test, students raised their hands and turned in their notetaking packet. They were then given the Session 1 questionnaire on notetaking strategies. At the end of the Session 1 questionnaire they were informed about the possible bonus for equal or better performance on the Session 2 test. Session 1 ended for each participant when they turned in the Session 1 questionnaire.

Session 2 for intervention participants began with the intervention. The good practices in notetaking sheet (described in Appendix B) was handed out to participants who had been randomly assigned to the intervention groups prior to taking the posttest. Participants took as much time as they desired to study the handout, without any discussion or practice. Most completed the intervention task in 15-20 minutes. When they were finished with the intervention, they raised their hands and turned in the good practices handout. Intervention students were also permitted to stand and stretch their legs before beginning the computer-based test. From this point onward, Session 2 was the same for intervention and no-intervention participants. Session 2 continued with test administrators handing out new, clean notetaking packets and again reviewing these with participants. Upon completion of the Session 2 computer test, students raised their hands and turned in their notetaking packets. They were given the Session 2 questionnaire on notetaking strategies. Session 2 ended for each participant when they turned in the Session 2 questionnaire.

Content Analysis of Notes

The notes taken by examinees on the pretest and on the posttest (lectures only) were subjected to content analysis; notes taken on the conversations were not included in the analysis. After an extensive review of the relevant literature on notetaking strategies relevant to second language listening comprehension test performance (specifically Chaudron, Cook, & Loschky,

1988; Cushing, 1991, 1993; Dunkel, 1988a; Liu, 2001), eight categories were identified for the analysis of examinees' notes. The content analysis addressed many of the same notetaking strategies addressed on the questionnaires and in the good practices intervention, including, for example, the extensiveness of the notes, the content and efficiency of the notes, and the organization of the notes.

1. Total notations of any kind for the lecture (words; numerals; symbols; abbreviations, in the L1 or L2 or any other language), defined as any marks, legible or illegible, and separated by spaces. This is a measure of the extensiveness or length of the notes.
2. Number of content words from the lecture (either recorded verbatim from the lecture or correctly paraphrased). Content words from the lecture reflect a focus on lecture content, as well as notetaking efficiency if, concomitantly, function words are omitted.
3. Number of abbreviations, symbols, and paraphrases from the lecture. All of these represent an *encoding* or *transformation* of verbatim information into the listener's own comprehension system.
4. Number of test questions answerable from idea units (IUs) found in the notes. This is a measure of the recognition of important/main ideas and of an examinee's *test wiseness*. Answers to 21 multiple-choice questions on Form 1 and answers to 22 multiple-choice questions on Form 2 could be reasonably expected to be included in participants' notes. If a question had multiple correct responses, credit was given for partial information in the notes.

The last four categories of the content analysis address several aspects of how information in the notes was overtly organized or emphasized. These categories were scored on a 4-point ordinal scale, ranging from 0 = no use of or no evidence of the strategy in the notes, to 3 = very extensive use of, or very extensive evidence of the strategy in the notes.

5. Use of diagrams, outlining, and indentation.
6. Use of arrows.
7. Use of lists.
8. Use of circles, boxes, and underlining.

Categories 5, 6, and 7 reflect the notetaker's overt visual organization of the lecture,[2] and Category 8 reflects the notetaker's emphasis of particular ideas from the lecture.[3]

Notes for each of the lectures were coded separately. Variables were independently coded by two raters and discrepancies resolved by a third rater. For the first four continuous variables, if the difference between the two independent raters' scores was 10% or less, then the final score was the average of the two raters' scores. If the difference between the two raters' scores exceeded 10%, then the third rater resolved the discrepancy. For the last four ordinal variables, if the two raters were within a point of each other, then the final score was the average of the two raters' scores. If the two raters differed by more than 1 point, the third rater resolved the differences. The third rater resolved differences by independently scoring the continuous or ordinal variable and either agreeing with one of the two original raters or determining a score between that of the two raters. The third rater's score was used in the final analyses.

Pearson product-moment correlations were used to assess the interrater reliability[4] for the content analysis of the notes by the two principal raters for the four continuous variables: (a) total notations; (b) number of content words; (c) number of abbreviations, etc.; (d) number of test questions answerable from notes. Cohen's (weighted) kappa coefficient was used to assess the interrater reliability for the content analysis of the notes by the two principal raters for the four rank-order or categorical variables (Cohen, 1960, 1968; Fleiss, 1981; Fleiss, Cohen & Everitt, 1969; Fleiss, Levin, & Paik, 2003): (e) use of diagrams, etc.; (f) use of arrows; (g) use of lists; and (h) use of circles, etc. The results of these tests of interrater reliabilities for these content analysis variables are shown in Table 2.

According to Landis & Koch (1977), the content in Table 3 provides "useful benchmarks" (p. 165) for the sufficiency of interrater agreement with Cohen's kappa coefficient.

In sum, all eight of these reliabilities in Table 2 are strong or substantial, indicating acceptable levels of interrater reliability. Therefore, all eight of the variables were included in the final analyses.

Scores on each of the continuous variables in the content analysis of the notes (total notations, number of content words, number of abbreviations, and number of test questions answerable from notes) were summed across all four lectures for each form of the test to arrive at a score for that variable for the participant's entire set of notes for that form of the test. These total scores were used in the final data analyses.

Table 2

Results of Interrater Reliabilities Tests

Variables	Pearson's *r*	Linear weighted kappa	Std. error	Interrater reliability
Total notations	.99*	--	--	strong
Content words	.94*	--	--	strong
Abbreviations, etc.	.83*	--	--	strong
Test answers	.85*	--	--	strong
Diagrams, etc.	--	.68	.0129	substantial
Arrows	--	.77	.0108	substantial
Lists	--	.63	.0206	substantial
Circles, etc.	--	.79	.0094	substantial

Note. N = 1,728.

* $p < .0001$.

Table 3

Useful Benchmarks for the Sufficiency of Interrater Agreement With Cohen's Kappa Coefficient

Kappa	Strength of agreement
< .00	Poor
.00 to .20	Slight
.21 to .40	Fair
.41 to .60	Moderate
.61 to .80	Substantial
.81 to 1.00	Almost perfect

Because of the difference between Form 1 and Form 2 of the test in the maximum number of test questions potentially answerable from the notes (21 versus 22), the total numbers of test answers found in participants' notes were converted to proportions. Thus, for example, if a participant's notes contained information related to the answers to 10 of the 21 questions for Form 1, their score in this category was converted to the proportion .476. If a participant's notes

contained information related to the answers to 10 of the 22 questions for Form 2, their score in this category was converted to the proportion .455. These proportion scores were used in the final data analyses.

Scores on the ordinal variables in the content analysis of the notes (use of diagrams, etc.; use of arrows; use of lists; and use of circles, etc.) were averaged across all four lectures for each form of the test to arrive at a score for that variable for the entire set of notes for that form of the test. These averaged scores were used in the final data analyses.

Scoring of Other Instruments

The raw listening comprehension scores of the computer-based tests' multiple response items (0-34) were converted to scale scores according to the *Score Interpretation Guide: LanguEdge Courseware* (ETS, 2002b, p. 7). The scale scores, which ranged from 1-25, were used in the final data analyses.

The integrated speaking and written responses were scored on 5-point holistic scales according to the guidelines for each task in the *Handbook for Scoring Speaking and Writing: LanguEdge Courseware* (ETS, 2002c). Two independent raters each rated all of the spoken responses, and two other independent raters each rated all of the written responses. Raters were experienced ESL teachers with master's degrees in teaching English to speakers of other languages and extensive experience in rating oral and written assessments for nonnative speakers of English. They were trained with the information provided in the scoring handbook by a senior rater (ETS, 2002c). This senior rater served as third rater in the rare cases of discrepancy between the two initial raters. If the two independent raters differed by only 1 point, the scores they arrived at were averaged. If the two independent raters differed by more than 1 point, the score discrepancy was resolved by a third independent rater. It should be noted that cases in which the two independent raters for each of the speaking and writing responses differed from each other by more than 1 point were extremely rare. Interrater reliabilities for these ordinal scales were measured by Spearman's rho and linear weighted kappa coefficients. For the ratings of the speaking and writing, see Table 4.

Table 4

Ratings of Integrated Speaking and Written Responses

	N	Spearman's rho	Linear weighted kappa	Std. error
Speaking	426[a,b]	.91*	.84	.0158
Writing	432[b]	.87*	.71	.0201

[a] Two spoken responses on the pretest and one on the posttest were unintelligible due to static and could not be scored; consequently, they were treated as missing data. [b] With respect to the writing data, it should be noted that the two raters disagreed by more than 1 point in only 2 out of 432 ratings. In the ratings of the speaking data, the two raters disagreed by more than 1 point in only 3 out of 426 ratings.

* $p < .0001$.

The 22 items on the pre- and posttest questionnaires were organized into the same categories as the do's and dont's on the good practices in notetaking handout. These categories are similar to categories in the content analysis of the notes. The 22 items from the questionnaires and the composite categories into which they were grouped are shown in Table 5.

Table 5

The 22 Questionnaires Items and Their Composite Categories

Composite categories	Item no.	
	Do	Don't[a]
General	13	15
Content (main points, facts, important details)	16, 17, 18	19, 20
Efficiency (abbreviations, symbols, content words, etc.)	1, 2, 3, 8	4
Organization	5, 6, 7, 9, 10, 11, 12, 14	
Review of notes	21, 22	

[a] Reverse scale on all items.

Composite scores for each of these subscales were computed separately for the frequency and helpfulness measures for each participant from their responses to the individual questionnaire items. The score for each measure was the mean of the participant's responses to the items on that subscale. When a participant did not respond to all of the items comprising a subscale, rather than have SPSS treat the subscale score as missing and have the *N*-size lowered accordingly, the participant's mean score on the other items in the subscale was calculated and used as the subscale score. However, if a participant did not respond to any of the items in a subscale, the subscale score was treated as missing.

Statistical Analyses

Statistical analyses included means, standard deviations, repeated measures analyses of variance, Pearson product-moment correlations, one-way analyses of covariance, Spearman's rho, coefficient alpha, and Cohen's kappa coefficient. The alpha level for statistical significance was set at $p < .05$. Given the expectations for the direction of the correlations, one-tailed significance tests were used.

Results

Research Question 1—The Prevalence of the Notetaking Strategies

Research Question 1 was addressed descriptively, utilizing means and standard deviations for the eight variables in the content analyses of the notes. Only the notes from the pretest session were included in these analyses, with separate analyses for the intervention and no intervention groups. The left side of Table 6 gives the means and standard deviations for the content analysis variables from the pretest session notes.

Extensiveness of the notes ranged from zero notations (no notes taken) to a maximum of 572 total notations across four lectures. The mean number of notations was approximately 220 for both groups. The large standard deviations for both groups on the notations reveal the wide variety in the extensiveness of the notes. Only one participant did not take any notes on any of the lectures in the pretest; some participants took notes on some of the lectures, but not on others. Most participants took some notes on all the lectures. The mean number of content words was about 125 for both groups, and the maximum number of content words was about 350 for both groups.

Table 6

Descriptive Statistics for Notetaking Strategies, by Session and by Group

Notetaking strategy	Pretest			Posttest		
	Mean	S.D.	Range	Mean	S.D.	Range
No intervention group (N = 106)						
Total notations	220.58	105.76	0–572	247.60	107.58	0–498
Content words	125.02	64.59	0–368	139.89	61.50	0–307
Abbreviations, etc.	8.62	7.98	0–48	9.65	8.00	0–49
Test answers	.22	.13	0–.55	.22	.13	0–.52
Diagrams, etc.	.72	.66	0–2.6	.83	.66	0–2.8
Arrows	.99	.64	0–3.0	1.11	.74	0–3.0
Lists	.20	.31	0–1.5	.31	.42	0–2.8
Circles, etc.	1.08	.84	0–3.0	1.25	.91	0–3.0
Intervention group (N =110)						
Total notations	223.23	126.11	0–572	260.65	123.81	0–700
Content words	128.79	73.06	0–348	144.85	68.26	0–433
Abbreviations, etc.	8.77	8.87	0–59	12.61	10.50	0–50
Test answers	.21	.16	0–.71	.24	.14	0–.62
Diagrams, etc.	.73	.74	0–3.0	.86	.70	0–2.9
Arrows	.94	.70	0–3.0	1.16	.76	0–3.0
Lists	.30	.39	0–1.5	.36	.41	0–2.0
Circles, etc.	1.02	.85	0–2.9	1.19	.85	0–3.0

The total number of abbreviations, symbols, and paraphrases was extremely small for each group prior to the intervention, averaging approximately eight across all four lectures. Although this category included paraphrases as well as abbreviations and symbols, there were very few paraphrases. Rather, the category consisted almost exclusively of abbreviations and symbols. By and large, the notes contained the same lexical items spoken by the lecturer, albeit occasionally in abbreviated or symbolic form.

On average, only approximately 20% of the multiple-choice test questions were answerable from content included in participants' notes. This indicates that notetakers generally

included content relevant to only about one fifth of the important ideas or supporting information from the lecture.

The three notetaking strategies related to the organization of the notes (use of diagrams, etc.; use of arrows; and use of lists) all show average utilization below the 1-level on the 4-level scale (0, 1, 2, 3). Thus, these organizational devices were not used extensively in the notes. The use of circles, boxes, and underlining (reflecting emphasis on important information) was utilized on average slightly above the 1-level on the 4-level scale. This indicates that notetakers utilized these devices to some extent. It should be noted, however, that in this content analysis of the notes, no determination was made as to whether the words circled, boxed, or underlined were actually the important information in the lecture. Thus, the use of this device cannot be assumed to necessarily reflect correct recognition of the importance of ideas from the lecture. All one can assume is that the circled, boxed, or underlined information was deemed to be important by the notetaker.

Research Question 2——Effects of Intervention on Notetaking Strategies

The overlap among the notetaking strategies is evidenced by their intercorrelations, reported in Table 7. Obviously, the variables overlap to a great extent, so one would obviously expect the number of total notations, that is, the number of content words and number of abbreviations, and so on—and even the number of test answers found in the notes—to covary. The pre- and posttest correlations for the notetaking strategies utilized by the no intervention group, reported in the top of Table 7 along the diagonal, is a measure of the test-retest reliability of the participants' behavior vis-à-vis the notetaking strategies (as distinct from the reliability of the ratings for these measures). Only the use of diagrams (for both groups) and arrows (for the no intervention group) failed to significantly correlate between the pretest session and the posttest session, suggesting otherwise consistent behavior on the part of participants with regard to the use of the notetaking strategies.

To analyze the effects of the instructional intervention on notetaking strategies, a 2 x 2 ([pretest—posttest] × [intervention—no intervention]) repeated measures (or mixed model) analysis of variance was conducted for each pair of pretest-posttest notetaking variables, with session (pretest versus posttest) being a repeated, within-subjects variable and group (intervention versus no intervention) being a between-subjects variable. Given the large number of significance tests, alpha levels were adjusted by the Bonferroni procedure and set at $p < .006$.

Both statistical and practical significance (measured by effect size, as indexed by eta-squared; Kirk, 1996) were considered in evaluating the results (Wilkinson, 1999).

Table 7

Overlap Among Notetaking Strategies as Evidenced by Intercorrelations, by Session and by Group

	Total not.	Content	Abbr.	Test ans.	Diag.	Arrows	Lists	Circle
No intervention group[a]								
Total notations	.59*	.91*	.46*	.76*	.17	.46*	.13	.27*
Content words	.87*	.66*	.45*	.76*	.26*	.36*	.10	.10
Abbreviations, etc.	.36*	.44*	.61*	.43*	.08	.23	.11	.10
Test answers	.60*	.68*	.36*	.47*	.06	.50*	.07	.08
Diagrams, etc.	.07	.23	.19	.07	–.20	.05	.25*	.03
Arrows	.54*	.39*	.18	.45*	.08	.19	.07	.14
Lists	.15	.21	.10	.19	.54*	.15	.24*	.02
Circles, etc.	.46*	.18	.05	.08	–.09	.29*	.00	.72*
Intervention group[b]								
Total notations	.75*	.95*	.56*	.77*	.52*	.64*	.36*	.41*
Content words	.92*	.78*	.54*	.80*	.55*	.57*	.35*	.27*
Abbreviations, etc.	.53*	.54*	.62*	.44*	.31*	.51*	.37*	.03
Test answers	.68*	.70*	.39*	.53*	.39*	.55*	.26*	.20
Diagrams, etc.	.22	.33*	.27*	.12	.03	.32*	.59*	.15
Arrows	.53*	.39*	.40*	.49*	.04	.58*	.12	.29*
Lists	.31*	.32*	.21	.17	.47*	.10	.29*	.08
Circles, etc.	.50*	.33*	.06	.25*	.03	.28*	–.01	.75*

Note. Pretest correlations are above the diagonal; posttest correlations are below the diagonal; pretest-posttest correlations are along the diagonal.

[a] $N = 106$. [b] $N = 110$.

* $p < .006$ (Bonferroni adjustment for multiple comparisons, one-tailed).

See Table 6 for the relevant descriptive statistics for each of the content analysis variables: means, standard deviations, and *N*-size, by pretest and posttest sessions and by intervention and no intervention groups. Tables 8, 9, 10, 11, 12, 13, 14, and 15 provide the related repeated measures ANOVA results for each of the respective content analysis variables, with group (intervention versus no intervention) as the between subjects effect and session (pretest session versus posttest session) as the within-subjects effect.

As can be seen from these tables, there were no statistically significant increases due to the brief instructional intervention.

For most of the notetaking strategies (all except diagrams, etc. and lists), there were statistically significant increases between the pretest session and the posttest session, probably representing a practice effect. Participants took more total notations and also used more content words and abbreviations and symbols in the second session compared to the first session. The number of test answers reflected in their notes also increased, and they used more arrows to relate ideas in their posttest notes. They also used greater emphasizing and highlighting strategies with circles, boxes, and underlining in the posttest session. The eta-squared values, ranging from .035 to 1.09, with most in the .06-.09 range, suggest that these statistically significant effects of session (pretest-posttest) were modest.

Table 8

Repeated Measures ANOVA of the Effects of Group (Intervention Versus No Intervention) and Session (Pretest Versus Posttest Session) on the Notetaking Strategy: Total Notations

Source	*df*	*F*	*p*	Eta-squared
Between subjects				
Group	1	.29	.589	.001
Error	214			
Within subjects				
Session	1	26.10*	.000	.109
Group × session	1	.68	.411	.003
Error	214			

* $p < .006$ (Bonferroni adjustment for multiple comparisons).

Table 9

Repeated Measures ANOVA of the Effects of Group (Intervention Versus No Intervention) and Session (Pretest Versus Posttest Session) on the Notetaking Strategy: Content Words

Source	*df*	*F*	*p*	Eta-squared
Between subjects				
Group	1	.27	.608	.001
Error	214			
Within subjects				
Session	1	21.16*	.000	.090
Group × session	1	.03	.860	.000
Error	214			

* $p < .006$ (Bonferroni adjustment for multiple comparisons).

Table 10

Repeated Measures ANOVA of the Effects of Group (Intervention Versus No Intervention) and Session (Pretest Versus Posttest Session) on the Notetaking Strategy: Abbreviations

Source	*df*	*F*	*p*	Eta-squared
Between subjects				
Group	1	2.04	.155	.009
Error	214			
Within subjects				
Session	1	20.81*	.000	.089
Group × session	1	6.94	.009	.031
Error	214			

* $p < .006$ (Bonferroni adjustment for multiple comparisons).

Table 11

Repeated Measures ANOVA of the Effects of Group (Intervention Versus No Intervention) and Session (Pretest Versus Posttest Session) on the Notetaking Strategy: Test Answers

Source	*df*	*F*	*p*	Eta-squared
Between subjects				
Group	1	.59	.445	.003
Error	214			
Within subjects				
Session	1	7.81*	.006	.035
Group × session	1	.00	.967	.000
Error	214			

* $p < .006$ (Bonferroni adjustment for multiple comparisons).

Table 12

Repeated Measures ANOVA of the Effects of Group (Intervention Versus No Intervention) and Session (Pretest Versus Posttest Session) on the Notetaking Strategy: Diagrams

Source	*df*	*F*	*p*	Eta-squared
Between subjects				
Group	1	.07	.778	.000
Error	214			
Within subjects				
Session	1	3.21	.075	.015
Group × session	1	.04	.850	.000
Error	214			

Table 13

Repeated Measures ANOVA of the Effects of Group (Intervention Versus No Intervention) and Session (Pretest Versus Posttest Session) on the Notetaking Strategy: Arrows

Source	*df*	*F*	*p*	Eta-squared
Between subjects				
Group	1	.00	.999	.000
Error	214			
Within subjects				
Session	1	13.77*	.000	.060
Group × session	1	.92	.338	.004
Error	214			

* $p < .006$ (Bonferroni adjustment for multiple comparisons).

Table 14

Repeated Measures ANOVA of the Effects of Group (Intervention Versus No Intervention) and Session (Pretest Versus Posttest Session) on the Notetaking Strategy: Lists

Source	*df*	*F*	*p*	Eta-squared
Between subjects				
Group	1	3.49	.063	.016
Error	214			
Within subjects				
Session	1	7.06	.008	.032
Group × session	1	.58	.448	.003
Error	214			

Table 15

Repeated Measures ANOVA of the Effects of Group (Intervention Versus No Intervention) and Session (Pretest Versus Posttest Session) on the Notetaking Strategy: Circles

Source	*df*	*F*	*p*	Eta-squared
Between subjects				
Group	1	.30	.585	.001
Error	214			
Within subjects				
Session	1	15.48*	.000	.067
Group × session	1	.03	.869	.000
Error	214			

* $p < .006$ (Bonferroni adjustment for multiple comparisons).

Research Question 3a—Perceptions of Notetaking Strategies

Table 16 provides the descriptive statistics for the composite scores from the pre- and posttest session questionnaires, by session and by group. Responses to the pretest session questionnaire were utilized to address Research Question 3a.

As can be noted from the pretest session responses, participants reported that the notetaking strategies that involved content (i.e., getting the main ideas and important facts, as opposed to writing down irrelevant comments or trying to write down everything the lecturer said) were the strategies they used most frequently and found to be most helpful. The next most frequently utilized and helpful notetaking strategies were those involving efficiency (using abbreviations, symbols, paraphrases, and omitting function words and using only content words) and review of notes (after the lecture to confirm comprehension and to answer test questions). Notetaking strategies involving the organization of the notes (e.g., using diagrams, numbers, lists, arrows, and highlighting) were reported as being used less frequently and as being less helpful. General notetaking strategies such as using neat handwriting and writing down unconnected words were reported as being used least frequently and as being least helpful.

Table 16

Perceptions of Frequency and Helpfulness of Notetaking Strategies: Descriptive Statistics, by Session and by Group

		Pretest			Posttest		
		N	Mean	SD	*N*	Mean	SD
General—Freq.	NI	101	2.60	.843	101	2.69	.782
	I	103	2.58	.829	106	2.98	.791
Content—Freq.	NI	100	3.70	.623	101	3.70	.565
	I	102	3.67	.641	105	3.92	.611
Efficiency—Freq.	NI	98	3.17	.729	100	3.25	.661
	I	98	3.13	.666	104	3.39	.666
Organization—Freq.	NI	94	2.77	.754	99	2.96	.759
	I	100	2.80	.765	102	3.19	.791
Review—Freq.	NI	104	3.07	.990	101	3.26	.969
	I	107	3.22	.972	110	3.41	.949
General—Help	NI	95	2.96	.622	93	3.07	.839
	I	101	3.20	.749	98	2.98	.704
Content—Help	NI	92	3.69	.671	89	3.74	.724
	I	98	3.85	.653	98	3.80	.641
Efficiency—Help	NI	100	3.25	.649	88	3.43	.688
	I	99	3.35	.673	90	3.36	.660
Organization—Help	NI	94	3.23	.826	88	3.33	.882
	I	94	3.28	.827	93	3.24	.859
Review—Help	NI	99	3.44	.943	95	3.43	1.08
	I	108	3.51	.980	103	3.39	.934

Note. NI = no intervention group; I = intervention group.

Research Question 3b—Effects of the Intervention on Perceptions of Notetaking Strategies

The relationships among the questionnaire subscales for perception of the frequency and helpfulness of the notetaking strategies are indicated by the intercorrelations reported in Table 17 (frequency subscales) and Table 18 (helpfulness subscales). Obviously there are some, but not extensive, relationships among the subscales. The pretest-posttest correlations for the frequency and helpfulness subscales for the no intervention group, reported along the diagonal at the top of Tables 17 and 18, respectively, are measures of the test-retest reliability of the participants' behavior vis-à-vis the questionnaire items (as distinct from the reliability of the ratings for these measures). The frequency subscales show consistent correlations for both groups between pre- and posttest session questionnaire responses; the helpfulness subscales show inconsistent behavior of both groups of participants between pre- and posttest questionnaire responses.

The reliability of the questionnaires as measured by coefficient alpha is reported by group and by session in Table 19. The reliability is low for some of the subscales, especially those with a small number of items per subscale.

To address the effects of the intervention on participants' perceptions of the frequency of use of the notetaking strategies, a repeated-measures ANOVA was run for each frequency subscale. These are reported in Tables 20, 21, 22, 23, and 24.

There were statistically significant increases due to session for all five of the subscales related to participants' perceptions of the frequency of their use of the notetaking strategies, probably reflecting a practice effect. As students gained experience from taking notes for the test, as well as from taking the test, they increased their perceptions of the frequency with which they used various notetaking strategies. However, although the results are statistically significant, the eta-squared results suggest that the effects were modest.

When the results were adjusted for multiple significance tests via the Bonferroni procedure, there were no statistically significant differences in students' perceptions of the frequency of their use of any of the notetaking strategies due to the intervention, nor were there any significant interactions between intervention and session.

Table 17

Overlap Among Questionnaire Frequency Subscales as Evidenced by Intercorrelations, by Session and by Group

	General	Content	Efficiency	Organization	Review
			No intervention group		
General	.55*	.08	–.13	-.06	.13
N	99	98	96	94	100
Content	.00	.57*	.14	.37*	.28*
N	101	99	96	92	100
Efficiency	–.30*	.26*	.45*	.23	.13
N	100	100	96	92	98
Organization	–.07	.45*	.37*	.48*	.41*
N	98	98	98	90	94
Review	.02	.27	.18	.39*	.58*
N	100	100	99	98	101
			Intervention group		
General	.36*	–.14	–.04	–.15	.04
N	101	100	97	97	103
Content	–.12	.52*	.27*	.33*	.14
N	103	101	96	98	102
Efficiency	–.09	.29*	.47*	.43*	.15
N	103	103	97	94	98
Organization	–.02	.46*	.55*	.52*	.29*
N	101	101	101	95	100
Review	.15	.34*	.38*	.49*	.53*
	106	105	104	102	107

Note. Pretest correlations are above the diagonal; posttest correlations are below the diagonal; pretest-posttest correlations are along the diagonal.

* $p < .01$ (Bonferroni adjustment for multiple comparisons, one-tailed)

Table 18

Overlap Among Questionnaire Helpfulness Subscales as Evidenced by Intercorrelations, by Session and by Group

	General	Content	Efficiency	Organization	Review
			No intervention group		
General	.03	.04	.02	–.03	.09
N	84	89	94	91	94
Content	–.03	.09	.36*	.43*	.25*
N	88	77	92	90	91
Efficiency	.02	.53*	.05	.53*	.42*
N	88	86	83	94	97
Organization	.01	.38*	.51*	–.31*	.65*
N	87	85	86	78	93
Review	.16	.20	.44*	.57*	.08
N	920	89	88	87	89
			Intervention group		
General	.18	.26*	.13	.02	.10
N	89	97	98	91	101
Content	–.03	.09	.16	.32*	.32*
N	96	87	98	90	98
Efficiency	–.21	.25*	–.18	.45*	.20
N	89	89	81	91	99
Organization	–.02	.41*	.48*	–.18	.50*
N	91	92	86	77	94
Review	–.03	.13	.40*	.45*	.01
N	98	97	90	92	101

Note. Pretest correlations are above the diagonal; posttest correlations are below the diagonal; pretest-posttest correlations are along the diagonal.

* $p < .01$ (Bonferroni adjustment for multiple comparisons, one-tailed).

Table 19

Reliability of the Questionnaire Data as Measured by Coefficient Alpha, by Session and by Group

Subscale		Frequency		Helpfulness	
		Pretest	Posttest	Pretest	Posttest
General (2 items)					
	NI	.08	–.36	.61	.30
	Cases	101	101	95	93
	I	–.18	–.63	.42	.25
	Cases	103	106	101	98
Content (5 items)					
	NI	.43	.69	.48	.37
	Cases	100	101	92	89
	I	.63	.59	.44	.50
	Cases	102	105	98	98
Efficiency (5 items)					
	NI	.56	.49	.75	.61
	Cases	98	100	100	88
	I	.38	.46	.48	.58
	Cases	98	104	99	90
Organization (8 items)					
	NI	.76	.77	.83	.83
	Cases	94	99	94	88
	I	.72	.79	.81	.83
	Cases	100	102	94	93
Review (2 items)					
	NI	.59	.49	.70	.52
	Cases	104	101	99	95
	I	.44	.41	.62	.49
	Cases	107	110	108	103

Note. NI = no intervention group; I = intervention group.

Table 20

Repeated Measures ANOVA of the Effects of Group (Intervention Versus No Intervention) and Session (Pretest Versus Posttest Session) on the Perceptions of Frequency of General Notetaking Strategies

Source	*df*	*F*	*p*	Eta-squared
Between subjects				
Group	1	1.75	.187	.009
Error	198			
Within subjects				
Session	1	15.94*	.000	.074
Group × session	1	4.54	.020	.027
Error	198			

* $p < .01$ (Bonferroni adjustment for multiple comparisons).

Table 21

Repeated Measures ANOVA of the Effects of Group (Intervention Versus No Intervention) and Session (Pretest Versus Posttest Session) on the Perceptions of Frequency of Content Notetaking Strategies

Source	*df*	*F*	*p*	Eta-squared
Between subjects				
Group	1	1.57	.212	.008
Error	198			
Within subjects				
Session	1	8.55*	.004	.041
Group × session	1	8.55*	.004	.041
Error	198			

* $p < .01$ (Bonferroni adjustment for multiple comparisons).

Table 22

Repeated Measures ANOVA of the Effects of Group (Intervention Versus No Intervention) and Session (Pretest Versus Posttest Session) on the Perceptions of Frequency of Efficiency Notetaking Strategies

Source	*df*	*F*	*p*	Eta-squared
Between subjects				
Group	1	.42	.519	.002
Error	191			
Within subjects				
Session	1	12.73*	.000	.062
Group × session	1	2.30*	.131	.012
Error	191			

* $p < .01$ (Bonferroni adjustment for multiple comparisons).

Table 23

Repeated Measures ANOVA of the Effects of Group (Intervention Versus No Intervention) and Session (Pretest Versus Posttest Session) on the Perceptions of Frequency of Organization Notetaking Strategies

Source	*df*	*F*	*p*	Eta-squared
Between subjects				
Group	1	2.58	.110	.014
Error	183			
Within subjects				
Session	1	27.06*	.000	.129
Group × session	1	5.90	.016	.031
Error	198			

* $p < .01$ (Bonferroni adjustment for multiple comparisons).

Table 24

Repeated Measures ANOVA of the Effects of Group (Intervention Versus No Intervention) and Session (Pretest Versus Posttest Session) on the Perceptions of Frequency of Review Notetaking Strategies

Source	*df*	*F*	*p*	Eta-squared
Between subjects				
Group	1	1.33	.251	.006
Error	206			
Within subjects				
Session	1	8.25*	.005	.038
Group × session	1	.005	.946	.000
Error	206			

* $p < .01$ (Bonferroni adjustment for multiple comparisons).

To address the effects of the intervention on participants' perceptions of the helpfulness of the use of the notetaking strategies, a repeated measures ANOVA was run for each helpfulness subscale. These are reported in Tables 25, 26, 27, 28, and 29.

Each of the five variables related to participants' perceptions of the helpfulness of the notetaking strategies was nonsignificant for the intervention, the session, and the interaction between intervention and session using the repeated measures ANOVA.

Research Question 4—Relationships Between Notetaking and Performance on LanguEdge Listening Comprehension Tasks

The overlap among the three LanguEdge measures (multiple-choice listening comprehension questions, integrated speaking, and integrated writing) is indicated by the intercorrelations reported in Table 30. There is obviously extensive overlap among the assessment measures. The pretest-posttest correlations for the no intervention group, reported along the diagonal at the top of Table 30, are measures of the test-retest reliability of each of the three measures.

Table 25

Repeated Measures ANOVA of the Effects of Group (Intervention Versus No Intervention) and Session (Pretest Versus Posttest Session) on the Perceptions of Helpfulness of General Notetaking Strategies

Source	*df*	*F*	*p*	Eta-squared
Between subjects				
Group	1	1.12	.291	.007
Error	171			
Within subjects				
Session	1	1.82	.179	.011
Group × session	1	4.60	.033	.026
Error	171			

Table 26

Repeated Measures ANOVA of the Effects of Group (Intervention Versus No Intervention) and Session (Pretest Versus Posttest Session) on the Perceptions of Helpfulness of Content Notetaking Strategies

Source	*df*	*F*	*p*	Eta-squared
Between subjects				
Group	1	3.06	.082	.019
Error	162			
Within subjects				
Session	1	.17	.684	.001
Group × session	1	.08	.782	.000
Error	162			

Table 27

Repeated Measures ANOVA of the Effects of Group (Intervention Versus No Intervention) and Session (Pretest Versus Posttest Session) on the Perceptions of Helpfulness of Efficiency Notetaking Strategies

Source	*df*	*F*	*p*	Eta-squared
Between subjects				
Group	1	.01	.916	.000
Error	162			
Within subjects				
Session	1	2.30	.132	.014
Group × session	1	.108	.300	.007
Error	162			

Table 28

Repeated Measures ANOVA of the Effects of Group (Intervention Versus No Intervention) and Session (Pretest versus Posttest Session) on the Perceptions of Helpfulness of Organization Notetaking Strategies

Source	*df*	*F*	*p*	Eta-squared
Between subjects				
Group	1	.002	.964	.000
Error	153			
Within subjects				
Session	1	1.03	.311	.007
Group × session	1	.31	.579	.002
Error	153			

Table 29

Repeated Measures ANOVA of the Effects of Group (Intervention Versus No Intervention) and Session (Pretest Versus Posttest Session) on the Perceptions of Helpfulness of Review Notetaking Strategies

Source	*df*	*F*	*p*	Eta-squared
Between subjects				
Group	1	.06	.813	.000
Error	188			
Within subjects				
Session	1	.71	.401	.004
Group × session	1	.71	.401	.004
Error	188			

Table 31 presents the Pearson product-moment correlations between the notetaking variables and the LanguEdge multiple-choice listening comprehension task (utilizing the scaled scores, including both conversations and lectures). Tables 32 and 33 present the Pearson product-moment correlations between the notetaking variables and the LanguEdge integrated listening/writing and integrated listening/speaking tasks, respectively. The tables and the analyses were done separately for the pretest and posttest data for the intervention and no intervention groups. Given the large number of correlations calculated, and hence the large number of significance tests, the significance level for these results was adjusted by the Bonferroni procedure to $p < .006$.

Overall, a large number of the correlations—well over half—were statistically significant at the Bonferroni adjusted level of $p < .006$. None of the statistically significant correlations reported in Tables 31, 32, and 33 show systematic relationships between intervention (intervention versus no intervention) or between session (pretest session versus posttest session) and performance on any of the three tasks of the LanguEdge computer-based listening test.

With respect to Table 31 there were four main findings. The multiple-choice listening comprehension task was significantly correlated, across groups and sessions, with (a) the number of content words included in the notes, (b) the number of abbreviations and symbols in the notes, (c) the number of test answers included in the notes, and (d) the use of arrows in the notes.

As Tables 32 and 33 show, the positive correlations for number of content words and number of test answers with the multiple-choice task, irrespective of the intervention or the session, were similarly found for the two integrated tasks: listening/writing and listening/speaking, again consistently across groups and sessions.

Table 30

Overlap Among the LanguEdge Assessment Measures as Evidenced by Intercorrelations, by Session and by Group

	Multiple-choice	Integrated writing	Integrated speaking
		No intervention	
Multiple-choice	.78*	.71*	.59*
N	106	106	104[a]
Integrated writing	.69*	.52*	.58*
N	106	106	104[a]
Integrated speaking	.59*	.51*	.63*
N	105[a]	105[a]	103[a]
		Intervention	
Multiple-choice	.78*	.64*	.61*
N	110	110	110
Integrated writing	.62*	.50*	.48*
N	110	110	110
Integrated speaking	.67*	.64*	.65*
N	110	110	110

Note. Pretest correlations are above the diagonal; posttest correlations are below the diagonal; pretest-posttest correlations are along the diagonal.

[a] Two spoken responses on the pretest and one on the posttest were unintelligible due to static and could not be scored; consequently, they were treated as missing data.

* $p < .01$ (Bonferroni adjustment for multiple comparisons, one-tailed).

Table 31

Pearson Product-Moment Correlations Between the Multiple-Choice Listening Comprehension Task and the Notetaking Strategies, by Session and by Group

	Pretest		Posttest	
	NI	I	NI	I
N	106	110	106	110
Total notations	.29*	.48*	.22	.36*
Content words	.30*	.49*	.28*	.43*
Abbreviations, etc.	.34*****	.36*	.25*	.31*
Test answers	.41*	.63*	.42*	.61*
Diagrams, etc.	.18	.29*	.16	.23
Arrows	.31*****	.32*	.25*	.26*
Lists	.17	.19	.08	.14
Circles, etc.	–.09	.12	.06	.06

Note. NI = no intervention group; I = intervention group.

***** $p < .006$ (Bonferroni adjustment, one-tailed).

Table 32

Pearson Product-Moment Correlations Between the Integrated Listening/Writing Task and the Notetaking Strategies, by Session and by Group

	Pretest		Posttest	
	NI	I	NI	I
N	106	110	106	110
Total notations	.32*	.38*	.22	.48*
Content words	.37*	.40*	.27*	.49*
Abbreviations, etc.	.29*	.24*	.23	.28*
Test answers	.52*	.48*	.42*	.69*
Diagrams, etc.	.04	.19	.00	.02
Arrows	.34*	.29*	.26*	.38*
Lists	.08	.06	.02	.07
Circles, etc.	–.05	.08	.06	.23

Note. NI = no intervention group; I = intervention group.

***** $p < .006$ (Bonferroni adjustment, one-tailed).

Table 33

Pearson Product-Moment Correlations Between the Integrated Listening/Speaking Task and the Notetaking Strategies, by Session and by Group

	Pretest		Posttest	
	NI	I	NI	I
N	104[a]	110	105[a]	110
Total notations	.32*	.50*	.21	.28*
Content words	.28*	.54*	.25*	.31*
Abbreviations, etc.	.29*	.32*	.26*	.25*
Test answers	.29*	.51*	.39*	.50*
Diagrams, etc.	.18	.32*****	.13	.11
Arrows	.31*	.34*	.27*	.21
Lists	.16	.17	.16	.02
Circles, etc.	.10	.21	–.04	.14

Note. NI = no intervention group; I = intervention group.

[a] Two spoken responses on the pretest and one on the posttest were unintelligible due to static and could not be scored; consequently, they were treated as missing data.

***** $p < .006$ (Bonferroni adjustment, one-tailed).

Research Question 5—Effects of the Intervention on LanguEdge Assessment Tasks

Table 34 reports the estimated marginal means and standard errors of the covariance adjusted posttest scores on all three of the LanguEdge assessment tasks by groups. Tables 35, 36, and 37 report the effects of the intervention on performance on the posttest LanguEdge assessment tasks: multiple-choice listening comprehension items, integrated listening/writing, and integrated listening/speaking, respectively, as analyzed by one-way analyses of covariance using the corresponding pretest LanguEdge score as the covariate. The Bonferroni adjustment for the three multiple significance tests lowered the significance level to $p < .017$.

As Tables 35, 36, and 37 show, the intervention had no significant impact upon performance on any of the three assessment tasks.

Table 34

Estimated Marginal Means and Standard Errors of Posttest Assessment Tasks, by Group

	Group	*N*	Mean	Std. Error
Multiple-choice	NI	106	14.92	.299
Listening comprehension	I	110	14.73	.294
Integrated writing task	NI	106	2.05	.093
	I	110	2.17	.091
Integrated writing task	NI	103	2.55	.101
	I	110	2.65	.098

Note. NI = no intervention group; I = intervention group.

Table 35

Effects of Intervention on Performance on LanguEdge Posttest Multiple-Choice Listening Comprehension Task—One-Way ANCOVA With Pretest Multiple-Choice Task as Covariate

Source	*df*	*F*	*p*	Eta-squared
Pretest multiple-choice	1	336.67*	.000	.612
Group	1	.21	.648	.001
Error	213			

* $p < .017$ (Bonferroni adjustment for multiple comparisons).

Table 36

Effects of Intervention on Performance on LanguEdge Posttest Integrated Listening/Speaking Comprehension Task—One-Way ANCOVA With Pretest Integrated Listening/Speaking Task as Covariate

Source	*df*	*F*	*p*	Eta-squared
Pretest multiple-choice	1	144.45*	.000	.408
Group	1	.49	.486	.002
Error	210[a]			

[a] Two spoken responses on the pretest and one on the posttest were unintelligible due to static and could not be scored; consequently, they were treated as missing data.

* $p < .017$ (Bonferroni adjustment for multiple comparisons).

Table 37

Effects of Intervention on Performance on LanguEdge Posttest Integrated Listening/Writing Comprehension Task—One-Way ANCOVA With Pretest Integrated Listening/Writing Task as Covariate

Source	*df*	*F*	*p*	Eta-squared
Pretest multiple-choice	1	73.57*	.000	.257
Group	1	.83	.364	.004
Error	213			

* $p < .017$ (Bonferroni adjustment for multiple comparisons).

Summary and Interpretation of Findings

With one exception, all participants took at least some notes on the eight lectures. This suggests that participants believed that notetaking would be beneficial prior to their testing on listening comprehension. In the posttest session, participants in both the intervention and no intervention groups significantly increased in their use of six of the eight notetaking strategies over the pretest session. This may reflect the effects of practice or experience with the test and with notetaking for the test (a kind of increased *testwiseness*). There were no statistically significant effects of the intervention on the prevalence of the notetaking strategies.

Participants' notes contained only about 20% of the information that was assessed with multiple-choice test questions, suggesting that participants recorded relatively little of the lecture information assessed in the postlecture test. This result is similar to that of Dunkel who noted that her L2 participants "did not tend to record the information in their notes that subsequently appeared on the postlecture quiz" (1988a, p. 272). It is possible that some of the information covered in the lectures was remembered but not recorded in the notes. For instance, Kiewra, Mayer, et al. (1991) found that L1 students recorded approximately 40% of the information presented in lectures yet still performed well on tests designed to assess content covered in the lectures. Clearly there are other factors aside from notetaking that affect performance on tests of listening comprehension.

While the majority of the notations consisted of content words, many of the other notations consisted of arrows, boxes, circles, sketches, lines, and so on. Relatively few of the notations were structure or function words. Interestingly, there was relatively little utilization of

abbreviations or symbols and virtually no use of paraphrasing. Participants generally wrote down, in full spelling, content words used by the lecturer. In that sense their notes reflected little efficiency. Some of the notations were in the participants' native or other language. One participant's notes used not only English, but also some Chinese and Spanish.

Most participants organized their notes using an unmarked strategy, simply following the linear order of the lecture. Because of the overwhelming prevalence of this strategy and its default nature, it was not included in the analysis. Of the marked organizational strategies included in the analysis, participants organized their notes by linking information from the lecture with arrows; infrequently they used other organizational devices such as diagrams, indentations, outlining, or lists.

Participants emphasized particular information from the lecture with circles, boxes, and underlining. However, this study did not investigate whether the use of these emphatic devices correctly reflected recognition of the important or salient information from the lecture. That issue warrants further research.

Students perceived that notetaking strategies related to the content of the notes were used most frequently and were the most helpful to them. The next most frequently utilized and helpful notetaking strategies were those related to the efficiency of notes and review of notes. Strategies involving the organization of the notes were reported as least frequently used and least helpful. This finding corroborates the unmarked organizational notetaking strategy used by most participants.

In both the intervention and no intervention groups, participants' perceptions of the frequency of their use of notetaking strategies increased statistically significantly between sessions. In both groups, participants' perceptions of the helpfulness of the notetaking strategies did not change significantly between sessions. The intervention had no effect on either participants' perceptions of frequency of use or their perception of the helpfulness of the notetaking strategies. Interestingly, participants from both groups demonstrated greater use of notetaking strategies from the pretest session to the posttest session, yet they did not report that these strategies were helpful.

Relationships between notetaking strategies and performance on the three LanguEdge assessment tasks are complex, depending upon the notetaking strategy and the task. Positive correlations were found between the number of total notations and task performance, but not

consistently across groups and sessions. Liu (2001) included this measure [total notations] but did not find significant results with it, whereas Dunkel (1988a) found total words (the sum of words, symbols, abbreviations) to be inversely related to listening comprehension test performance.

The positive correlation between the number of abbreviations and multiple-choice listening comprehension replicates findings by Faraco et al. (2002) and Liu (2001;in the Liu study, he called his measure *words in full spelling*, the opposite of abbreviation, which was negatively related to test performance.)

The positive correlation between the number of test answers in the notes and multiple-choice listening comprehension contrasts with results found by Dunkel (1988a) who obtained insignificant correlations between test answerability and multiple-choice test performance on either general or detail-specific questions. A possible explanation of this difference may be that Dunkel's study used only one lecture, which was considerably longer than each of the four lectures in this study, and that Dunkel's participants did not have access to their notes during question-answering.

The significant correlation between the use of arrows and multiple-choice listening comprehension appears to be unique to this study as previous research has not reported such a relationship. The notetaking strategies that most consistently correlate with performance on all three of the LanguEdge assessment tasks are number of content words and number of test answers found in the notes. The brief, uninstructed intervention had no significant effect on performance on any of the posttest LanguEdge tasks. More predictive of posttest performance was pretest performance.

Discussion—Implications for the Field

The current study has contributed important information to our knowledge of notetaking by second language learners during lecture-listening for the purposes of listening comprehension testing and other communicative assessment tasks, such as writing and speaking in response to listening. In addition to variables investigated in previous studies, new variables were included to expand our understanding of the content and quality of second language listening comprehension examinees' notes.

Under test conditions where they will be tested immediately on the content, second language listening notetakers tend to take down the content words used by the lecturer, doing

little abbreviating or symbolizing and virtually no paraphrasing. While they tend to use other types of notations, including words in their native or another language, the good news is that they tend not to write down English function or structure words, many of which are predictable from context. If they attempt at all to organize their notes in a marked fashion, rather than use diagrams or indentations or other visual indicators of organization, they tend to use arrows linking ideas in the notes. They make little use of lists, but attempt to signal emphasized information by underlining particular words or using circles or boxes around particular words. In short, second language examinees' notes reflect some, but not extensive, use of notetaking strategies related to notetaking efficiency and organization.

The use of content words from the lecture, whether in full spelling or abbreviated or symbolized, is a notetaking strategy significantly correlated with listening comprehension as measured by multiple-choice measures, as well as with other communicative assessment tasks, such as writing or speaking in response to listening. This is a strategy to be strongly encouraged for notetaking during lecture-listening. Using abbreviations and symbols is an efficient notetaking strategy. However, this efficiency strategy only works when the listener remembers what the abbreviation or symbol stands for, or only when the listener correctly paraphrases the information. This is an important corollary to always include with advice regarding the use of such efficiency strategies.

This study included abbreviations, symbols, and paraphrases in the same category. As was noted earlier, while participants made little use of abbreviations and symbols, they made even less use of paraphrases. This may have been a wise decision on their part, given the results of Faraco et al. (2002), who found that reformulations with words other than those produced by the lecturer were negatively correlated with listening comprehension test performance. Second language listening comprehension examinees may find attempting to paraphrase or reformulate the lecturer's words too cognitively demanding when taking notes under time constraints and for immediate testing purposes. Thus, paraphrasing and reformulating, while representing a type of notetaking efficiency, should not be strongly encouraged for second language examinees.

The significant relationship between number of test answers found in the notes and performance on the various assessment tasks suggests that those who were able to write down more information relevant to the tasks were also the ones who scored better on the tasks. Writing down or not writing down the information is probably a matter of proficiency with both listening

and with notetaking. The most significant implication here is that teachers preparing students for listening tests involving notetaking might do well to provide lots of practice so that students get used to taking notes to increase their ability to write and listen at the same time.

At the same time, those who test L2 listening comprehension should be aware of the additional cognitive load that notetaking during listening may place on second language examinees. Even highly proficient L2 learners may find the simultaneous cognitive tasks of comprehending the incoming lecture and producing effective, efficient, and well-organized notes cognitively overloading. Even highly proficient L2 learners may not be able to process the L2 with the level of automaticity (e.g., in word recognition) as native speakers (Segalowitz & Segalowitz, 1993). Therefore, much of their cognitive processing and working memory capacity must be devoted to controlled, effortful comprehension processing. They may also be less able to transfer their L1 notetaking skills, and they may be less well trained in applying notetaking skills with efficiency in the second or foreign language. It may be unrealistic to expect any but the most advanced L2 learners to produce quality notes in the face of the listening comprehension processing they must undertake with limited controlled processing capacity.

A brief instructional overview, such as the one used in this study, provided to examinees immediately prior to listening and testing, without the opportunity of discussion or practice, appears to have little or no effect on either the notetaking strategies used by examinees or on their test performance. For better or worse, in such testing situations, second language listening examinees seem to have already formed their notetaking strategies and may be little affected by information presented in a brief set of guidelines prior to testing. A brief intervention in notetaking strategies immediately preceding testing might not be successful for L2 learners because their problem in a listening-for-testing situation is with managing both the listening and the writing at the same time, not simply accessing useful strategies.

Discussion—Implications for TOEFL

Specific implications for TOEFL, beyond those for the field in general, follow.

Given the results of Faraco et al. (2002) regarding reformulations, it is recommended that future research consider paraphrase as a separate category from abbreviations and symbols. As stated above, although it represents a kind of notetaking efficiency, paraphrasing may be a type of reformulation that so significantly increases cognitive load that L2 listeners may be wise not to attempt paraphrasing or reformulating when taking notes under time constraints and for

immediate TOEFL testing purposes. Thus, whatever guidelines that TOEFEL may provide for examinees should take care not to overemphasize paraphrasing or reformulating the lecturer's words, but encourage the use of abbreviations and symbols (as long as the notetaker remembers the original meaning).

TOEFL notetakers will have to cope with the dual cognitive tasks of taking notes while listening for testing purposes, along with the fact of their less-than-native competence in English as a foreign/second language. They may not be able to internalize and become adept at new notetaking strategies presented to them in a brief guideline prior to their taking a test. Therefore, it may also be wise for TOEFL notetaking guidelines to include statements encouraging examinees to use whatever notetaking strategies have worked for them in the past. This would include both the possibility of taking no notes, for those who need to concentrate on listening and understanding the lecture or who feel that they can understand and remember the lecture well without the aid of notetaking, as well as the possibility of taking notes, for those who find notetaking a helpful aid in remembering the information in the lecture.

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Notes

[1] At GSU, where another recently administered TOEFL study had paid participants $100 for 7–8 hours testing time, it was not possible to recruit participants for the original $25 gift certificates. Therefore, all GSU participants were recruited on the basis of a $50 gift certificate, with the understanding that they would perform their best on all segments of the study. No bonus was given to GSU participants for posttest multiple-choice scores equaling or exceeding the pretest multiple-choice scores, as was done at the other participating institutions. There is no evidence that GSU's participants behaved in any way dissimilar to participants at the other institutions.

[2] It should be noted that these categories ignore default types of organization (e.g., linear ordering of notes reflecting the linear order of the information presented in the lecture or spatially representing information). These were ignored because they were either reflected in everyone's notes (the former) or impossible to quantify (the latter).

[3] The detailed guidelines used by the raters in performing the content analysis of the notes are available from the researcher.

[4] Ratings were pooled across lectures, groups, and sessions in the analyses of rater reliability; hence an *N*-size of 1,728 notes/lectures ($216 \times 4 \times 2$).

Appendix A

Session 1 Questionnaire on Notetaking Strategies

University_____ Participant Number_____

Name_____

TOEFL Study of Listening Comprehension
and Notetaking Strategies

SESSION 1

QUESTIONNAIRE ON NOTETAKING STRATEGIES

Directions: The statements below describe various notetaking strategies you may have used while taking notes for the listening comprehension test you just completed. Please indicate how *frequently* you used each strategy while taking notes. Then, if you used a strategy, please indicate how *helpful* it was to you in answering the test questions. If you never used the strategy, do not indicate its helpfulness. There are no right or wrong answers. We just want to know what you did, not what you think you should have done. Circle the number (5, 4, 3, 2, or 1) that best describes how ***frequently*** you used the strategy **AND** circle the number (5, 4, 3, 2, or 1) that best describes how ***helpful*** the strategy was to you.

Frequency **5 = very frequently, almost all of the time**
4 = frequently, a lot of the time
3 = sometimes, about half the time
2 = not frequently, only occasionally
1 = very infrequently, rarely or never

Helpfulness **5 = very helpful**
4 = helpful
3 = neither helpful nor unhelpful
2 = not helpful
1 = very unhelpful

	Frequency Most < - > Least	**Helpfulness Most < - > Least**
1. I used abbreviations for some words.	5 4 3 2 1	5 4 3 2 1
2. I used shorter or easier words than the lecturer used.	5 4 3 2 1	5 4 3 2 1
3. I used special symbols for some words.	5 4 3 2 1	5 4 3 2 1
4. I wrote complete sentences.	5 4 3 2 1	5 4 3 2 1
5. I organized my notes visually on the page.	5 4 3 2 1	5 4 3 2 1
6. I used diagrams or pictures.	5 4 3 2 1	5 4 3 2 1

	Frequency **Most < - > Least**	**Helpfulness** **Most < - > Least**
7. I used outlining.	5 4 3 2 1	5 4 3 2 1
8. I used content words (nouns, verbs, adjectives, adverbs) and omitted function words (words like *of, to, the*).	5 4 3 2 1	5 4 3 2 1
9. I used numbering.	5 4 3 2 1	5 4 3 2 1
10. I used lists.	5 4 3 2 1	5 4 3 2 1
11. I used arrows.	5 4 3 2 1	5 4 3 2 1
12. I used ways to highlight particularly important information (e.g., circles, underlining).	5 4 3 2 1	5 4 3 2 1
13. I used neat handwriting.	5 4 3 2 1	5 4 3 2 1
14. I separated different ideas from each other.	5 4 3 2 1	5 4 3 2 1
15. I wrote down unconnected words.	5 4 3 2 1	5 4 3 2 1
16. I wrote down the lecturer's main points.	5 4 3 2 1	5 4 3 2 1
17. I wrote down important details about each main point.	5 4 3 2 1	5 4 3 2 1
18. I wrote down important facts, numbers, and names that would be difficult to remember without my notes.	5 4 3 2 1	5 4 3 2 1
19. I wrote down the lecturer's jokes and irrelevant comments.	5 4 3 2 1	5 4 3 2 1
20. I tried to write down everything the lecturer said.	5 4 3 2 1	5 4 3 2 1
21. I reviewed my notes after the lecture to be sure I understood the lecture.	5 4 3 2 1	5 4 3 2 1
22. I used my notes to answer test questions.	5 4 3 2 1	5 4 3 2 1

End of Questionnaire—READ IMPORTANT INFORMATION ON NEXT PAGE

PLEASE NOTE FOR THE NEXT TEST: IF YOUR PERFORMANCE ON THE NEXT TEST IS THE **SAME OR BETTER** THAN YOUR PERFORMANCE ON THE FIRST TEST, YOU WILL RECEIVE AN **ADDITIONAL $25**, OR A TOTAL OF **$50**. IF YOUR PERFORMANCE ON THE SECOND TEST IS NOT AS GOOD OR BETTER, YOU WILL RECEIVE ONLY THE **BASIC $25**.

Appendix B
Instructional Intervention—Good Practices in Notetaking

University_____Participant Number_____

Name_____

TOEFL Study of Listening Comprehension
and Notetaking Strategies

GOOD PRACTICES IN NOTETAKING

The following "tips" or "guidelines" have been shown to help students take notes during a lecture. These are good things to do to help you understand lecture material and to help you create better notes. Following these guidelines should help you to answer questions on a listening comprehension test that follows the lecture.

To ensure that you have read and understood each of the following "good practices," please initial each one in the space provided after the practice. See the example in the right margin next to this sentence: ___PLC__

General

Taking good notes can help you in two ways:
(1) it can help you understand what the lecturer is saying; and _____

(2) it can help you answer questions about the lecture afterward. _____

DO write neatly. If you can't read your notes, they won't help you when you refer to them to answer the questions. _____

DON'T just write down unconnected words that you hear. You may have a hard time remembering how the words relate to the lecturer's main points. _____

Language

It may be more efficient to use only English in your notes, since English is the language of the lecture and English is the language you will use to answer the questions. _____

However, it can sometimes be a good strategy to use your native language for a quick paraphrase or translation, especially if your native language has a short word to replace a longer English word. _____

If you use a language other than English in your notes, it is important to remember the English equivalent of the language you use. _____

Content
DO write down

(1) the lecturer's main points,

(2) important details about each main point, and

(3) any important facts, numbers, names, etc. that would be difficult to remember without the notes.

DON'T write down jokes or unimportant details. You can often tell what is important by listening for:

(1) Words that signal the lecturer's organization (e.g., an example of this is if the lecturer says "the main point is that...")

(2) Changes in the lecturer's voice; a lecturer may speak louder and more slowly to emphasize certain points.

Efficiency
DON'T try to write down everything that the lecturer says. Notes should be efficient, giving the most information in the fewest words.

REMEMBER that writing is much slower than talking. If you try to write down all the words that the lecturer uses, you may miss some important points

DO use:

(1) abbreviations (e.g., "technology" might be recorded in notes as "tech")

(2) symbols (e.g., "oxygen" might be recorded in notes as "O")

(3) shorter synonyms or paraphrases, (e.g., "legislation" might be recorded in notes as "laws"; "livestock" might be recorded in notes as "animals")

(4) content words; omit functions words (like "the" and "a/an") (e.g., "the fossil" might be recorded in notes as "fossil")

REMEMBER, if you use abbreviations or special symbols, you need to remember what they stand for.

DO NOT "over-abbreviate" or over-use symbols; if you do, you might not remember what you meant.

Example: If the lecturer says "intelligence is passed from parents to their children" noting this information in notes as:

p ----> c

may not help you later when you are trying to remember what the lecturer said.

DO NOT WORRY about correct spelling or grammar.

DO try to take full, complete notes, but DO NOT write too much.

Accuracy

Accuracy in notetaking is critical. Listen very carefully when the lecturer is using numbers, as these are very easy to mix up. For example, if the lecturer says "15" it might sound like "50."

Organization

DO try to reflect the organization of the lecture in your notes. For example, is the lecturer is comparing and contrasting ideas? Arguing in favor of a position? Or providing a list of examples of the main point?

Lecturers often use the following strategies to signal the organization of their lecture:

(1) Stating the organization of the lecture at the beginning (e.g., "today we're going to talk about the causes of earthquakes and earthquake prediction.")

(2) Using questions to introduce a main point (e.g., "Why was the earthquake in Armenia so much more powerful than the one in San Francisco?")

(3) Using phrases like "First, next, another, now let's turn to..." to signal transitions from one idea to another one.

(4) Using repetition to emphasize ideas ("to repeat")

(5) Using summarization to help you sum up the main ideas ("to summarize")

DO use these cues to help you organize your notes.

DO use the following visual layout techniques to organize your notes and to reflect the relationships among the elements of information:

(1) diagrams

(2) vertical and horizontal spacing

(3) indentation _____

(4) numbering _____

(5) listing _____

DO organize your notes in a clear visual way that will later help you find important information quickly. _____

DO use some system for highlighting particularly important information (for example, by using underlining, circles, boxes). _____

DON'T write down unconnected words or phrases. _____

DO clearly separate different ideas from each other. _____

Review of Notes

DO review your notes to make sure you have understood the material in the lecture _____

DO review your notes before answering test questions _____

SEE ATTACHED EXAMPLES

Examples:

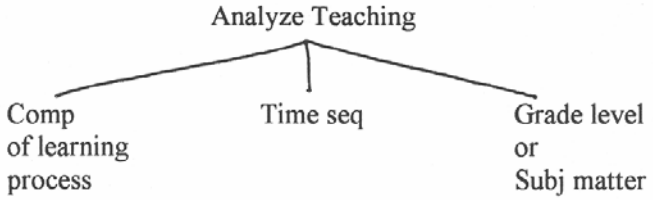
An organization for a lecture comparing and contrasting gender roles of single and married people:

	Men	Women
Single		
Married		

An organization for a lecture describing team sports:

	Type of team sport	
	Non-interactive	Interactive
Contact	wrestling	football
Non-contact	gymnastics	volleyball

An organization for a lecture on teaching: (Excerpts from lecture follow)
"Teaching can be analyzed in the following three ways. It can be analyzed according to the components of the learning process.... It can also be analyzed according to the time sequence of .... It can also be analyzed according to grade level or subject matter...."

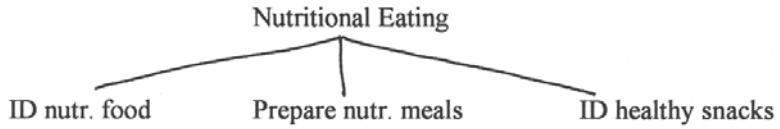


OR

Analyze Teaching

1. Comp of learning process
2. Time seq
3. Grade level or subj matter

An organization for a lecture on nutritional eating: (Excerpts from lecture follow)
"Today we're going to consider nutritional eating, including how to identify nutritional food, how to prepare nutritious meals, and how to identify healthy snacks."

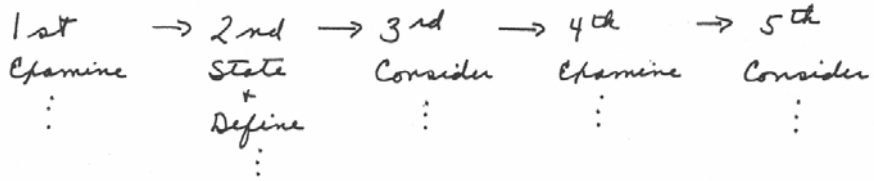


OR

Nutritional Eating

1. ID nutr. food
2. Prepare nutr. meals
3. ID healthy snacks

An organization for a lecture illustrating chronological, cause/effect or other order relationships: (Excerpts from lecture follow)
"In considering a problem for informal group discussion, we should proceed through the following steps in the order indicated. First, we should examine... Second, we should state and define the problem. Third, we should consider... Fourth, we should examine...And fifth, we should consider the steps..."



An organization for a lecture about the consequences of earthquakes, comparing a series of earthquakes of similar intensity, one group in Southern California and another group in Soviet Armenia. The lecturer says that the earthquakes in Southern California caused very little damage, but the earthquakes in Soviet Armenia killed thousands of people and wiped out entire villages. A good notetaker wrote:

So. Calif -----> not killer
Soviet Armenia ----> killer

Clearly this notetaker got the main idea and paraphrased it succinctly and used abbreviations and arrows to represent the cause and effect relationship.

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