Technology as a Tool for Literacy in the Age of Information: Implications for the ESL Classroom

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A curriculum of technology-enhanced and sustained content study helps ESL students develop literacy skills necessary for college work.

To be considered literate in the age of information demands functional, academic, critical, and technological skills. The implications of such a broad definition of literacy are especially profound for ESL students, who must acquire these skills in a second language. Because technology is now viewed as both a necessary component of, and a means to, achieving literacy, it must become an integral part of ESL courses, and the Internet ought to be used as a tool to promote linguistic skills and knowledge construction. This paper describes how to use the Internet as part of a sustained content-based pedagogy to develop ESL students' literacy skills through an activity called "focus discipline research."

Sustained content study, in which students focus their attention on one academic area, has been found to be effective in improving ESL students' literacy skills, more quickly enabling them to pass basic skills assessments and enter the college mainstream (Kasper, "Sustained Content Study and the Internet"; Pally). The extensive body of instructional and informational resources found on the Internet not only facilitates but also promotes extended study of a subject area. Through its extensive collection of reading materials and numerous contexts for meaningful written communication and analysis of issues, the Internet creates a highly motivating learning environment that encourages ESL students to interact with language in new and varied ways and helps them develop and hone the range of literacy skills they need to succeed both in college and in our digital age of information.

To help my ESL students build key literacy skills, I have designed a curriculum of technology-enhanced focus discipline research based on the principles of sustained content study. This paper describes how I use this curriculum in my high-intermediate-level[1] ESL courses. In this curriculum, students choose a focus discipline from among ten content areas represented in their textbook[2] and then pursue sustained independent and collaborative study of that discipline over the semester. Students base their choices on personal interests and/or college majors,

and because they have chosen to do extensive research in those disciplines they are invested in a learning experience that is personally relevant, meaningful, and important. The focus discipline curriculum has yielded a number of educational benefits to my students, including higher pass rates on reading and writing assessments, increased motivation, and greater confidence in their ability to handle academic tasks (as evidenced by their responses to end-of-semester questionnaires).

Technology as a Tool for Instruction

My ESL students hone English language skills, build their knowledge base, and develop overall literacy skills through their use of text-based computer-mediated communication, their intensive reading and research using Internet hypertext documents, and their production of written essays and individual and group research projects based on their research efforts. My ESL class meets six hours per week, in three two-hour blocks, for twelve weeks. Students meet in the computer lab each week for one of those two-hour blocks. Many of my ESL students have computers at home; those that do not have additional access in the college during open computer lab times.

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I design general class activities to teach students vocabulary and language structures and to provide them with day-to-day practice in complex interdisciplinary texts. These general class lessons provide guided instruction on how to dissect a text, search for clues to meaning, and compose cogent responses to inferential questions and essay prompts.

Students work both individually and as members of collaborative learning communities, called focus discipline groups, to complete a range of assignments of progressive complexity.[3] As they research topics in the focus discipline, students read a variety of print texts and hypertexts. ESL students learn to use information technology resources, through which they become familiar with the discourse patterns, rhetorical conventions, and conceptual contents of their chosen fields of study and further their knowledge by networking with peers and experts in those fields.

Although my focus discipline research curriculum makes extensive use of group collaboration within the physical classroom, where students work together to share and build knowledge with others studying the same focus discipline, Internet technologies have allowed me to enhance and expand this curriculum within and beyond the physical classroom as well. I have incorporated a course Web site at *http://kccesl.tripod.com*, a course e-mail discussion list called *CBESL,* and an online course component, called "Interdisciplinary English and the Internet," on Blackboard.com.[4] My class meets in computer lab for one two-hour block per week, and I post weekly computer lab assignments to the announcements area of the Blackboard course. Computer lab work consists of a variety of different activi-

ties, from Internet research to online reader-response exercises to online practice reading and writing tests. All work for the course is categorized into online folders (e.g., research, writing, reading) and remains posted on Blackboard for the entire semester. This enables students to easily access and revisit assignments as necessary throughout the semester.

Within an online environment, collaborative communication takes place primarily through reading and writing, so ESL students are constantly challenged to use, and must quickly hone, skills critical to their success in college. Collaborative online communication provides ESL students with a global audience with whom reading and writing become the means to exchange information and build knowledge. It also enhances their understanding of writing as a social and collaborative act, helps them develop a sense of audience in writing, and encourages them to spend more time on reading and writing tasks.

Recent research (see, e.g., Crook; Kahn) has demonstrated that collaborative computer-based learning yields a number of significant educational benefits to ESL students that can empower them in their efforts to gain full access to an English-speaking academic environment. This is especially true when the collaboration engages students in academic tasks that require independent problem solving and critical thinking (Kasper, "New Technologies, New Literacies"; Warschauer). Through a process of collaborative, constructive, and creative activities, these academic learning communities provide the context for ESL students to create, share, apply, and critique their own new knowledge, rather than just absorb knowledge created by others.

The Course Web Site

Because technology plays an integral role in my sustained content curriculum of focus discipline research, I have designed a Web site, located at *http://kccesl.tripod.com,* as the information hub for the course. The site contains links to pages that provide information on materials, online tools, and learning resources used in the course.

Moreover, the site provides an online venue through which students may share their work with a global audience. With students' permission, their written work is published on the course Web site so that all students may not only learn from one another, but may also engage in an interactive dialogue that continues even after the course has ended. I assign the class a reader-response activity that requires them to read and respond to other student essays published on the course Web page. To broaden students' range of knowledge, I generally choose an essay from a focus discipline that has not been chosen for study during the current semester. The reader-response activity asks students to explain what they learned about the content area from reading the essay; to comment on whether they thought

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the essay was well-organized and easy to follow; to comment on whether the essay used clear and specific examples; to list at least two examples used by the writer and explain why the writer may have used those examples; and to ask the writer one question about the essay topic for the purpose of clarifying information or getting additional information. Composing the responses encourages students to view writing from the perspective of readers and helps to make them aware of the elements that make writing clear or confusing. Students submit their responses in an online form (see *http://kccesl.tripod.com/readresp.html*) that may be forwarded to the original student authors, who may then begin a dialogue with their readers.

For example, students enrolled in fall 2001 read an essay on linguistics that had been written by a student in spring 2000. The topic of the essay was "Describe the language acquisition theories of Noam Chomsky and B. F. Skinner. Then, using examples, compare and contrast these theories." The following is an excerpt from this essay[5]:

> Language has a very important meaning for everyone. We express our feelings, thoughts, emotions, and we communicate with each other through language. The necessity in language communication appears from the first months of our life. When we grow up, our language develops and improves. Psychologists, sociologists and linguists are all very interested in what are the main factors of language development, and how we acquire our native language skills. For example, the linguist Noam Chomsky and the psychologist B. F. Skinner uncovered these themes in their theories [. . .].
>
> While Chomsky insists that people have an inborn feeling of native language, Skinner is sure that they acquire this feeling in the process of communication and cognition of language. Therefore, Chomsky's theory shows that our speech is reproduced automatically, but Skinner's theory demonstrates that it happens by replication.
>
> My son's experience partly supports Chomsky's theory. My son started to create small sentences and phrases when he was approximately one year and six months old. Those phrases and sentences had correct word order according to the rules of our native Russian language. Nobody had taught him specifically; he just produced it naturally. But grammar does not only involve correct word order. I have to explain other grammar aspects to him, and he learns these aspects through communication with environment.
>
> The case of a girl named Genie confirms Skinner's theory. Genie didn't have possibility to learn her native language in detail for a long time. Her social isolation continued from the age of eighteen months to the age of thirteen years, so her resulting native language skills were very poor [. . .].
>
> Although we see different views of one topic, we can conclude that both theories make valid points, and that they complement each other. It means successful language acquisition is result from the knowledge of the grammar and the acquisition of the grammar through communication with environment. We can't develop our native language skills without innate basis, and contrariwise, we can't have only innate knowledge without development through environment [. . .].

When this student essay was published to the Web, it became a text that could be used to teach future students about a key topic in linguistics and to make them more aware of how an audience responds to a piece of writing. The text was quite effective, as evidenced by the following response written by a student in fall 2001:

> I learned that language is very important to everyone [. . .] to improve their feeling and express what they thought. I think this essay has good organization because every single thing they said in the introduction is developed. And there are some examples to clarify what they are talking about. This essay has clear and specific examples [. . .]. She gives the example about her son's experience [. . .] she gives the example about Genie. I think she uses them to explain to us that language is important. And for people to know how it can affect you if you don't try to speak in the basic age. I would like to know how can I produce more my second language?

The reader-response activity gave this student a chance to analyze a piece of writing that had been composed by a peer. Online technology enabled the student reader to post her response to the original student writer, and that writer was given the opportunity to respond to her readers. Here is an excerpt from the writer's response to her reader:

> I am proud to have you read my essay. I appreciate your comments and questions. If you want to produce more in your second language, you must practice every day—read and write a lot. It's not easy, but you will get better. Good luck.

Here technology yielded several key benefits to these ESL learners. It enabled the readers to analyze and respond to writing on a variety of topics that were presented in the course. Students were encouraged to view writing from the perspectives of readers and were given the opportunity to communicate directly with the writers of the texts. Technology provided the student authors not only with the means for having their work read by a wide audience, but also with the opportunity to begin an interactive dialogue through which to discuss it with that same audience. The reader responses exposed the student authors to various perspectives on their writing and research and gave them a chance to open up an electronic dialogue with a variety of readers other than the instructor.

Navigating Print and Hypertext Resources

Students read a variety of texts dealing with topics in their chosen focus disciplines. The readings in the course textbook provide students with background information on a variety of topics in each focus discipline, and each is followed by vocabulary and reading-comprehension exercises, as well as an essay prompt. The background information they gain from the readings in their textbook gives students a foundation for searching the Internet to gather additional information on the various topics studied within each focus discipline.

As students conduct research in their focus disciplines, they make extensive use of hypertext documents available on the Internet. This Internet hypertext provides easy access to multiple cross-references on related topics across several documents, or screens. Hypertext is useful in developing ESL students' reading skills because it enables a natural juxtaposition of ideas and allows a flexible means of exploring those ideas (Tierney et al.). This helps to facilitate students' acquisition of complex knowledge (Warschauer) because by following new and different links during subsequent online sessions student readers are continually creating new texts that expose them to varied perspectives on issues studied. Moreover, because it fosters a nonlinear pattern of exploration and discovery, reading hypertext helps to promote the cognitive flexibility necessary for the integration and consolidation of knowledge gleaned from a variety of sources (Spiro et al.).

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Although hypertext can offer students each of the benefits noted, without instruction in how to navigate hypertext effectively students may become lost in a sea of information, potentially experiencing cognitive overload (Rouet and Levonen). Guided practice that takes students through a hypertext document enables them to acquire the cognitive strategies necessary to navigate and comprehend nonlinear texts. To help my students sort through and evaluate the hypertexts they find on the Internet, I give them a guided research activity (see the appendix). This activity, which is posted on the course Web site, as well as on the online Blackboard course component, teaches students not only how to search for information on the Internet, but also how to evaluate the resources they find there. After completing their search, students share the resources found and their responses to them through focus discipline group work in the classroom. Students also e-mail me the URLs for the sites they have found. I check the sites and then add them to the course Web page. Thus my ESL students help to build the resources on our course site.

Focus Discipline Writing Projects

Each of my students is responsible for producing an individual portfolio of writings, consisting of several progressive essays and a longer research project, all of which deal with key topics in the focus discipline. The portfolio of projects provides the means by which my students' writing skills are assessed and it determines whether they are able to advance to the next level of instruction.

I have designed the focus discipline research topics so that they are progressively structured into two short (i.e., two- to three-page) papers and two longer research projects of five to seven pages each. My students produce multiple drafts of each piece of writing, both long and short. They learn how to cite the sources they

have used to prepare the paper, both within the body of the text and in a bibliography at the end of the text. Students receive both peer and instructor feedback, and with each subsequent revision work to express themselves more fluently, clearly, and correctly.

The short papers are designed to develop language and literacy skills as students gradually build bases of knowledge in their focus disciplines. These developing bases of knowledge are further expanded as students work in collaboration with peers who are studying the same focus discipline. In the physical classroom, focus discipline groups meet to discuss salient issues under study. Students from each focus discipline group then summarize and share what they have learned with the class as a whole. In this way all students develop a foundation in all focus disciplines chosen for study during the semester.

Students build and expand their bases of knowledge as they research and write the short papers. These growing bases of knowledge provide the foundation for the two longer research assignments. For the first assignment, each individual student is responsible for writing a five- to seven-page research project on an assigned topic within the focus discipline. Students must include a section labeled "My Response," in which they explain what they learned from the experience, about both the topic and the process of doing research. They must also explain how they will use this information in the future, in their subsequent college classes or their careers.

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For example, in her research project on eating disorders a young woman from Poland, who had chosen diet and nutrition as her focus discipline, presented a detailed analysis of the causes and effects of anorexia and bulimia. In her analysis, she examined cross-disciplinary relationships as she articulated the social, biological, and psychological factors involved in eating disorders. She also explained how she had applied her newly gained knowledge of eating disorders to events in her own life. She expressed how her research had led her to a greater awareness of the possibility that one of her friends might be suffering from an eating disorder and how she was able to help this friend recognize her problem.

In this excerpt from her project the student expresses what she learned from her research:

> I had never heard about eating disorders until I had to do research and write essays about them. All the information I found about anorexia and bulimia made me realize that so many people are affected and it is a very serious illness. Young people are at the highest risk, but just few make the effort to help them. We usually just name the disorder and move on with our lives.
>
> By surfing the Internet, and reading books about eating disorders I also realized that one of my friends suffers from bulimia. If it wasn't for the ESL class I would have never thought of that. Iwona always tries to lose weight; she talks about it

> constantly, but I always see her eating. All women do that, but she eats and eats and then she feels useless, depressed, and guilty about it. That's what makes her different from other women. I know for a fact that she's been abusing laxatives. I recently spoke to Iwona and told her about my research, the consequences that follow up and the help she can get. Of course, she denied at first that she has any eating problems. But on the very next day she called me and told me all about herself. We cried and laughed but it didn't solve the problem, she still struggles with bulimia. I wish I could use some magic and fix her problem at once, but there is no such thing as magic especially when it comes to eating disorders. I can just promise myself and, more important, her, to stand by her, to support her and advise her. I realized that just by talking to her and letting her know that I care makes her happy. I am really pleased with what I have learned and the fact that I can help someone and be the "expert" makes me feel so good.

The second research project is a group effort; each member of the focus discipline group is required to research and write about one aspect related to the assigned topic. Working together, the group then synthesizes these writings into a coherent group report. For example, students studying business prepared a group project on the history of advertising. Individual students were responsible for researching and writing about different historical periods and the advertising methods employed in those periods. For example, students researched the history of newspaper and magazine advertising, the history of radio advertising, the history of television advertising, and finally the history of Internet advertising. Then, as a group, students had to put all of this research together into a coherent group report. An excerpt from the introduction and the conclusion follows[6]:

> Advertising is a way to sell products to the consumers. Advertising has been going on for thousands of years from the very basic "word of mouth" to newspapers and magazines, radio, television, and the Internet. The newspaper and magazine advertising medium began in the 17th century in England. This advertising medium was passed on to America during the colonial period in the early 18th century. Due to the invention of radio, people then soon used this broadcast medium for advertisement and it became quite popular in the early 1920s. The television era then came along during the middle of the 1940s and people started to utilize this medium for advertising. In the late 1980s and early 1990s, due to the advancement of the Internet and the computer technology which made home PCs more affordable, Internet advertising became one of the most cost effective advertising media for the people [. . .]. Although advertising media have changed over the years, none of the media mentioned in this paper is considered useless or obsolete. There will always be someone who picks one medium over the other due to his or her circumstances, such as traveling, remote working location, vacation, etc.

While designing and composing the group project, students need to simultaneously apply and revise what they have learned about their focus discipline to accommodate the interpretation of information contributed by others in the group. Then in the process of synthesizing knowledge gathered by all members of the group they need to put this understanding to work to enable them to reach their

personal and group goals in a way consistent with their own values. This has often not been an easy task for students, as their responses to feedback questionnaires indicate. Although virtually all students say that they believe this writing assignment is a valuable experience (specifically because it teaches them how to work with other people), they also say that dealing with so many different viewpoints is difficult. However, they indicate that writing in a group does teach them the necessity of listening to and respecting one another's opinions and of working out compromises when there is disagreement among the group members.

The final versions of the focus discipline essays and research projects that my students have produced are extremely thoughtful and coherent examples of strong academic writing that demonstrate not only improved literacy skills, but also a growing ability to critically analyze interdisciplinary relationships. The excerpts provided are typical of the quality of work produced by the students in this course[7]. By focusing on one subject area, which they have chosen to study, students acquire knowledge that is important to them. As the student noted in her project on eating disorders, a growing expertise in the focus discipline offered her the opportunity to experience a new role—that of the expert, the teacher, the knowledge provider. Becoming "content experts" in focus disciplines of choice has fostered in my students a greater confidence in their ability to use English to express, not only personal experiences and opinions, but also newly gained academic knowledge.

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Technology and Changing Roles for Instructor and Student

A technology-enhanced focus discipline research curriculum fosters diverse and changing roles for both student and instructor. My students have taken on multiple roles through their participation in focus discipline groups. Their changing roles have awarded them greater responsibility for their own learning. The focus discipline group offers ESL students the opportunity to become part of a diverse community of learners who work together to construct knowledge. Students begin by researching topics on their own and then join with the group to summarize and evaluate each of the sources found.

The learning environment created through collaborative focus discipline research encourages students to view both themselves and their peers as valid resources for knowledge. Each member of the group brings his or her own unique perspective on the issues and topics studied (as well as his or her own personal reason for studying them). As students participate in social and academic discourse

with focus discipline group members, they are constantly engaged in a process of elaboration and reflection on both their own ideas and those of their peers. This process helps them develop a range of literacies, including functional, academic, sociocultural, and electronic skills.

My role as instructor has also changed in the context of the focus discipline research pedagogy described here. I have become both a knowledge sharer and a resident expert in the subject areas studied in the course. I structure the activities, guide the students in carrying them out, and facilitate the learning process. For example, the focus discipline research topics are instructor-generated; the prompts are designed to provide students with a clear direction for their research. In keeping with the goal of using technology to support and facilitate curricular objectives, I post each focus discipline assignment to the online Blackboard course component. In addition, I e-mail information on useful resources to the class. Because some students are not familiar with Web browsers when they begin the course, these e-mails contain hyperlinks. This makes it easier for all students to access the online resources.

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My role as instructor now goes beyond that of a knowledge provider; I also regularly join each focus discipline group as a "colleague" who listens and poses questions within the context of discussions begun by the students. Therefore, as the instructor, I have become "a sage who guides both on the stage and on the side." I am "a sage" in that I have background in the subject areas studied and have researched and gathered resources in each discipline, and therefore am able to offer students both structure and guidance. Yet, rather than creating knowledge for students in a teacher-centered model, here I join students as they discuss and work through readings, encouraging them to discover and expand knowledge through their own efforts and providing them with constructive feedback throughout the process.

Student Feedback

Because a sustained content curriculum of focus discipline research requires students to play an active role in learning, they should also play an active role in assessing the efficacy of the learning process. To obtain students' reactions to technology-enhanced focus discipline research, I ask them to complete an online end-of-semester questionnaire on the overall learning experience (see for example *http://kccesl.tripod.com/feedbackspring2001.html).* This questionnaire asks students to evaluate the usefulness of doing focus discipline research and the value of working with the focus discipline group and to provide their insights on the experience of writing the individual and group projects. In addition, the questionnaire asks students to describe what they believe to be the most helpful aspect of the course.

In their responses, ESL students have indicated a belief that participating in focus discipline research helped them develop linguistic, academic, social, and technological skills. Specifically, 98 percent of these students have mentioned a greater confidence in their ability to conduct research and report findings, expressing pride in being able to map out a project and see it come to fruition. Ninety percent of the students have expressed enthusiasm generated by mastering new technologies and the excitement of sharing newly gained knowledge with peers and teachers. Ninety-eight percent of the students have stated that the most helpful aspects of the course are having the opportunity to do focus discipline projects and to learn how to use the Internet for research. They say that the experience of conducting and writing up the results of extended research will help them in their future college classes.

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Students have mentioned the ease with which they could find information from a variety of sources; they are also cognizant of the necessity of evaluating Internet resources carefully. Seventy-five percent of students have indicated that they now view all information more critically than they had before; they are less likely to accept something as fact just because it was published, either in print or online. Even students who entered the course with little experience with technology say that completing the various activities in this course has helped them feel confident in their ability to use technology for a variety of tasks and purposes and that the skills they learned in this class will serve them well in their future classes as well as in the workforce.

Students also appreciate being given the responsibility for their own learning, and have said that they benefited from the opportunity to discuss and critique both their own and others' interpretations of resources. They believe that the classroom methodology and the focus discipline group provided them with a supportive context in which to build the skills they needed to monitor learning and effectively articulate the results of their research. Finally, many students have noted that teamwork is a part of many jobs, and that learning how to work with other people will be very helpful when they enter the workforce.

Assessing Students' Writing and Reading Performance

Although students' responses to my focus discipline research curriculum have been very positive, their progress in college depends upon their performance on separate end-of-semester assessments in writing and reading. At my college, writing skill assessment is both formative and summative. Formative assessment of writing skill consists of a portfolio of revised essays produced over the course of the semester; summative assessment consists of a two-hour timed essay examination.

The writing portfolio consists of a cover letter to the reader, two revised pieces, including all drafts, and the timed essay examination. Portfolios are cross-graded by another instructor of the same level course, and this instructor's rating determines the portfolio grade. All instructors' ratings are normed to a departmental standard of what constitutes a passing portfolio. The portfolio may be rated as either S (satisfactory) or U (unsatisfactory) in each of three categories: finding and organizing material, developing and refining ideas, and mechanical accuracy. To pass, a portfolio must be rated as satisfactory in each of these three categories.

Students' reading skill is assessed summatively through a timed departmental final examination that requires them to read and interpret an academic text and to compose short written answers to various types of open-ended questions. Students have two hours to complete the reading examination and must correctly answer a minimum of 65 percent of the questions to pass it. Like the portfolio, the reading examination is cross-graded by another instructor of the same level course, and this instructor's rating determines the reading grade. All instructors' ratings are normed to a department standard of what constitutes a correct answer. According to English department policy, the same instructor may not grade both the reading examination and the portfolio.

In discussing performance data, it is important to note that all ESL classes at my college follow content-based curricula. Some follow a curriculum of mixed content, where students read and write about a variety of content-based issues. However, a number of ESL classes are linked with mainstream courses such as sociology or history, and so follow a sustained content curriculum linked to topics in those mainstream courses. These sustained content classes also engage students in collaborative learning communities; however, they do not incorporate technology as a key component of the course. Although these classes do provide students with a curriculum of sustained content study, they also do not offer students a choice in terms of the subject area they wish to study. Students who register for these classes must study the content of whichever mainstream class is linked with the ESL class. What makes my ESL course unique is that it offers students the opportunity to *choose* a focus discipline; it puts the student in charge of the content of his or her course. In essence, then, the content of my course becomes unique and specific to the interests of each individual student.

The results of end-of-semester assessments indicate that a curriculum of technology-enhanced focus discipline research significantly improves ESL students' performance on individual tests of both reading and writing skills.

Comparisons of student performance in these three types of high-intermediate-level content-based courses yield some interesting and unexpected results. The results of end-of-semester assessments indicate that a curriculum of technology-enhanced focus discipline research significantly improves ESL students' performance on individual tests of both reading and writing skills. This is true whether

the focus discipline curriculum is compared with mixed content-based or with linked sustained-content courses. In contrast, there is little, if any, difference between performance in the mixed-content and linked sustained-content courses.

When pass rates on the portfolio writing assessment are compared, focus discipline research yields an 83 percent pass rate; mixed content-based instruction, a 54 percent pass rate; and linked sustained content, a 53 percent pass rate. The difference between focus discipline research and the other two methods is statistically significant based on a chi-square test ($X^2 = 9.16$; $p < .01$). In terms of their performance on the reading assessment, once again high-intermediate students who engage in technology-enhanced focus discipline research outperform students in both mixed-content and linked sustained-content courses, with pass rates of 69 percent, 46 percent, and 53 percent, respectively. The difference between focus discipline research and the other two methods is marginally significant by a chi-square test ($X^2 = 4.96$; $p < .10$).

Finally, my college allows high-intermediate students who pass both the reading and the writing assessments to skip a level of developmental English instruction. Once again, when compared with students in both mixed-content and linked sustained-content courses, a significantly higher percentage of high-intermediate students who engage in technology-enhanced focus discipline research are able to skip a level of instruction. The percentages are as follows: technology-enhanced focus discipline research, 59 percent; mixed content-based instruction, 33 percent; and linked sustained-content study, 37 percent. The difference between focus discipline research and the other two methods is significant by a chi-square test ($X^2 = 5.04$; $p < .05$).

Conclusion

Incorporating technology into instruction can provide many important benefits to ESL students. Available technologies can greatly enhance both student-teacher and student-student interaction and can afford students increased opportunities for self-directed learning. However, to be most effective, technology must be used to support well-planned curricular goals and should involve carefully designed activities that provide students with meaningful educational experiences. Used appropriately, technology can be a valuable tool in building the skills students need to succeed in college and the workforce.

Note: This research was supported by a grant from The City University of New York PSC-CUNY Research Award Program.

APPENDIX: How to Search for and Evaluate Information on the Internet

Questions to Guide Students' Internet Search for Information:

Directions: Answer the following questions as you search for information on the greenhouse effect on the Internet. Try to make your answers as specific and as descriptive as possible.

- *Step 1:* Open your Web browser, and enter the following URL: http://www.epa.gov/globalwarming/ in the line marked Location. This URL will take you to the EPA Web site on global warming. Be sure that you type the URL *exactly* as it is written on this sheet.
- *Step 2:* Now follow the hypertext links to access each of the Web pages contained on this site on the greenhouse effect by clicking on the underlined words.
- *Step 3:* Now you will practice accessing sites on your own. Answer the following questions to help guide you in your search:
  1. Which keyword should you enter into the search engine to find information on the greenhouse effect?
  2. What do you have to do to access a Web file on the greenhouse effect?
  3. Once you have accessed this file, how do you get information on the greenhouse effect?
  4. After reading the article that you accessed on the Web, write two new things you have learned about the greenhouse effect using this Web site.
- *Step 4:* Now narrow the focus of your search to information on the effect of the greenhouse effect on water and food supplies. Do a new search and answer the four questions above to guide you in this new search.

Questions to Ask When Evaluating Internet Resources:

1. Does the information add anything to what you already know about the topic?
2. Who is providing the information contained on the Internet page?
3. Where did the information come from?
4. Do they provide evidence to support the points they are making?
5. How old is the information?
6. When was the Internet page last updated?
7. How broad is the topic?
8. Is the information provided in a WWW document, a text file, a newsgroup posting, or an e-mail message?
9. Is the information clear and well organized?
10. Who recommended this site as a good source of information?

Notes

1. For the purposes of this paper, the high intermediate level is defined as an entry TOEFL score of 425.

2. The ten subjects represented in the text *Interdisciplinary English* (Kasper) are linguistics, environmental science, computer science, mathematics, business and

marketing, psychology, sociology, physical anthropology, biology, and diet and nutrition.

3. Students choosing business, for example, write on the following topics:

In their first papers, students discuss basic principles in business and marketing. They define and explain the role of marketing utilities and the law of supply and demand in determining the success of a business.

In their second papers, students discuss the psychological factors involved in advertising. They focus on how advertisers use the basic determinants of consumer behavior—needs, motives, perceptions, and attitudes (discussed in their textbook)—in designing product advertisements. They consider the types of advertisements that are most likely to appeal to or change these determinants.

In their individual research projects, students discuss the development of Internet commerce, detailing how the Internet has changed the face of sales and marketing. They examine the advantages and disadvantages of selling and buying products over the Internet. They explain the importance of Web site design, encryption, and online advertisements in e-commerce.

In their group research projects, students bring together all of the information they have gathered to discuss how sales and marketing strategies have changed as a result of developing technology. They do a historical analysis of advertising, beginning with the pretelevision days of the early to mid-1900s. They answer the following questions: What advertising strategies were used in the first half of the twentieth century? How effective were these strategies? How did television change advertising? What were businesses able to do with television that they could not do before? What additional changes occurred in advertising with the development of computer technology? How has developing technology expanded the marketplace for both businesses and consumers?

4. Although a full description of the functionality provided by Blackboard.com is beyond the scope of this paper, interested readers may find additional information at *http://www.blackboard.com*.

5. All samples of student work are used here with their written permission.

6. The full text of the group project may be found at *http://kccesl.tripod.com/ESL91NetProject.grprojs.html*.

7. Additional examples of student writing may be found on the course Web site at *http://kccesl.tripod.com*.

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