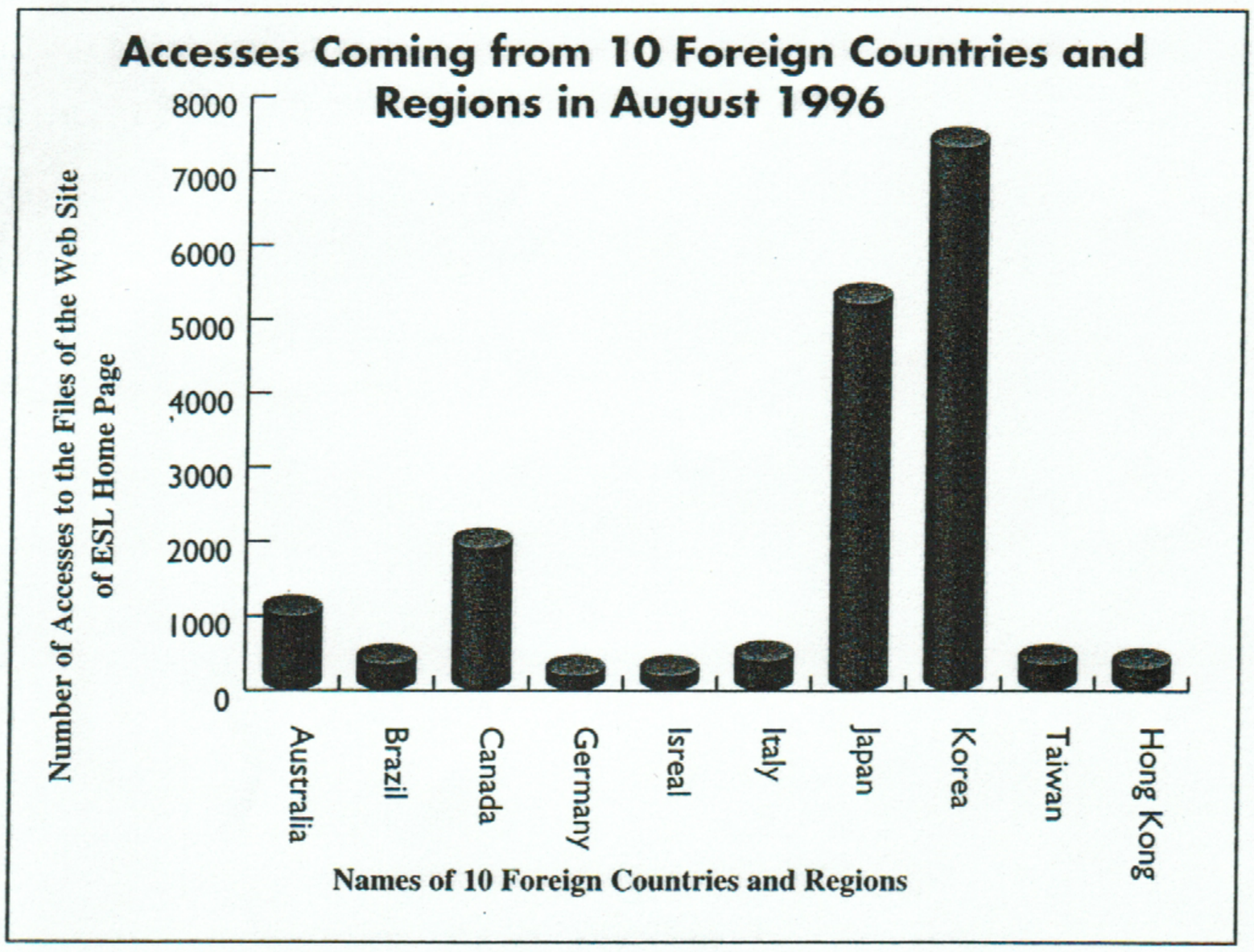

predicting the future is always a risky undertaking, some short-term Web developments are clear. "Streaming" and "plug-in" technologies now under development will soon allow the delivery of good quality audio and video to Web users in real time without a download delay. This will mean that only a single copy of multimedia materials will need to be stored, maintained, and upgraded, saving a good deal of disk space and confusion. New programming facilities like JavaScript and its parent language Java will allow a great deal of interactivity without overburdening Web servers. When these technologies mature in a year or two, the Web will become a full-featured programming environment capable of delivering sophisticated multimedia courseware.

What direction should courseware development take on the Web? We suggest five areas of focus for ESL-related activities:

1. Judging by usage, the ESL community's current top priority is audio material (and video when it becomes available). This is understandable enough because comprehensible, replayable English audio is usually harder to get than English text. There are many opportunities for including audio. To take an example at random, pronouncing dictionaries could reduce mispronunciations, which are often the result of incorrectly guessing the pronunciation of a word when it is encountered for the first time in the context of reading. An online pronouncing dictionary will encourage ESL learners to check the pronunciation of a new word.

2. ESL writers often need reference materials while writing, such as online dictionaries, thesauri, grammar books, writing guides, and encyclopedias. Substantive materials such as news articles, essays, audio clips, or video clips may also be used during the invention phase of writing. The Web could deliver these materials. While writing something in English, an ESL writer can open both a word processor and a Web browser, which usually allows users to save "bookmark" links to various documents over the Internet. Clicking on a saved bookmark will cause the needed corresponding document to appear on the screen instantly; in this way, the student can build up a personalized writing environment. The ESL community should encourage commercial publishers of such reference works to make their products available in a Web-accessible form.

3. The newest Web browsers allow users to post e-mail and bulletin board messages. This opens for ESL composition the possibility of a much wider use of peer editing, collaborative writing, and various peer-audience activities already popular in English composition.

4. Web forms are a convenient and efficient means for building and grading exercises, quizzes and objective tests. The development of template systems should make this as quick and easy as putting the equivalent exercise on paper. Browsers like Netscape support passwords and encryption to guarantee privacy and data security. However, testing activities become really useful only if there is instructional management software in place to collect and store scores, aggregate data, and produce reports for instructors. The whole issue of instructional management in the highly distributed Web environment needs careful study.

5. The Web comprises a vast and continually growing library. A library, however, is only useful if you can find the document you need. Web links and index pages can create some order by organizing documents into categories and hierarchies. Search facilities help, but sometimes fail to retrieve the desired document or else retrieve far too many. The Web can automatically collect detailed information about specialized usage, including document access. Keyword requests can be recorded and analyzed. Such tracking data can tell us how our users interact (or want to interact) with the Web, and consequently what sorts of documents, organization, and keyword coding will be most useful to them. Multiple perspectives may be required; for example, a student moving through a set of documents as part of an exploratory learning assignment may need a different organization from that of an instructor looking for materials to use in class.

Though these five areas seem particularly fruitful directions for the immediate future, there are plenty of other possibilities open to exploration. Indeed, during the next few years the evolving Web will certainly open new possibilities for TESOL courseware; in the process, both instructors and students are sure to gain.

Notes

[1]Yong Zhao served as the first coordinator of the *EX*CHANGE* project and did much of the initial programming. Many people have helped to make *EX*CHANGE* possible, among them are Volker Hegelheimer, Heidi S. Shetzer, Eric McCune, Kim Nguyen-Jahiel, Anita Pandey, Leslie K. Hammersmith, and Michael Lindeman. Professors Gary Cziko, Robert Hart, and James Levin have served as an informal

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