A Perspective of CAI and Its Possibilities: Joint Research on the Computer-assisted Technical Japanese Reading System

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In this paper I propose six reasons for using CAI (computer-assisted instruction) for Japanese language teaching. These reasons can be divided into two groups: to take over a portion of the teacher's work and to provide a meeting ground for cooperation with specialists, which will be regarded in the future as one of the most important advantages of using CAI. I shall use the Japan-United States joint research project of developing a computer-assisted technical Japanese reading system as an example of the possibilities of such a role for CAI.

The Roles and Significance of Using CAI

CAI is useful for teaching the Japanese language for the following six reasons:

1. Individual guidance. Knowing the problems of each student and being able to offer appropriate instructions in order to develop his or her ability are important. When using CAI, it is possible to give appropriate guidance to each student according to his or her individual ability and problems. CAI has the flexibility to meet a variety of students' needs. For example, students studying Japanese have different native languages, cultures, motivations, learning modes, ages, specialties, and purposes for learning Japanese.

2. Human interaction. Interaction between the teacher and the students and also among the students is important to language learning. Students learn effectively when they hear other students' reactions to the teacher and notice their mistakes, learning strategies, and the like. Such interactions are not part of the usual classroom instructions, but they can be encouraged in group instructions and pair activities. When using computers, such human interaction also is possible. That is, many students feel embarrassed when they make mistakes in class, but they are not so embarrassed when they make mistakes using CAI because the computer is a tool, not a teacher; therefore they can relax and concentrate on learning. They can discuss problems among themselves and

also freely ask questions of the teacher when they are using CAI.

3. <u>Self-motivation</u>. The ways of teaching language are changing from a teacher-dominated, "teacher → student" style to a learner-centered, "teacher ←→ student" or "student ←→ student" style. Students can take the initiative in learning when they use CAI, thereby promoting a voluntary, self-motivated approach to learning.

4. <u>Division</u> <u>and</u> <u>clarification</u> <u>of</u> <u>study</u>. In well-designed CAI, every course of study is divided into small steps, and so it is possible for students to know which steps they have not yet mastered. This is helpful for learners who need extra time.

5. <u>Speed</u> <u>and</u> <u>accuracy</u> <u>in</u> <u>checking</u> <u>and</u> <u>giving</u> <u>feedback</u>. When using CAI, students can practice more specifically and thoroughly. Also, a computer does not tire in the way that a human teacher does. Thus CAI is most suitable for simple practices like repetition drills.

Taking advantage of these functions of CAI can save time. Recent changes in teaching methods from grammar-oriented teaching to a communicative approach have burdened teachers with extra tasks. For example, teachers are expected to teach not only grammar and other aspects of the language but also communication skills, language proficiency for specific purposes, and understanding of different cultures and, in addition, to act as a counselor. Because a single teacher finds it difficult to carry out all these tasks, CAI is therefore helpful in allowing teachers to concentrate on those tasks that only a human teacher can perform. In addition, there is another role for CAI that has not yet been widely recognized.

6. <u>A</u> <u>meeting</u> <u>ground</u> <u>for</u> <u>cooperation</u> <u>with</u> <u>specialists</u>. Recently, the number of those learning Japanese for a specific purpose, especially in the fields of science and technology, has increased, and accordingly, the need for proficiency in specific "types" of Japanese will also expand in the future. Because teaching science and technology is not the province of Japanese language teachers, cooperation with specialists in these fields is necessary. For example, developing a computer-assisted technical Japanese reading system provides a common meeting ground for both Japanese language teachers and specialists in various fields.

This paper discusses the Japan-United States joint research project of developing a computer-assisted technical Japanese reading system and provides a good example of the possibilities that using CAI offers. The previous works on using CAI for Japanese language education in general from 1979 to the late 1980s are introduced in Otsubo (1988).
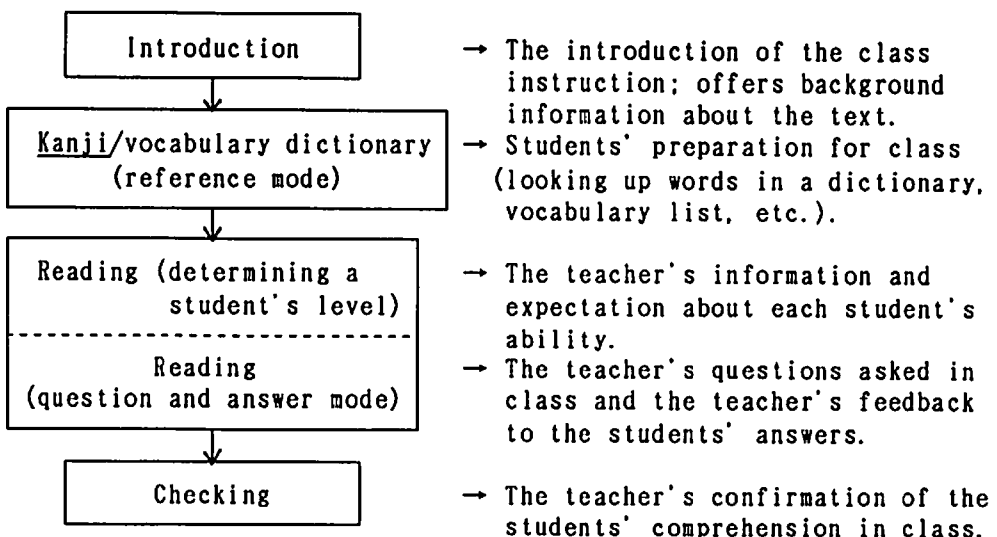
Japan-United Sates Joint Research Project of Developing
a Computer-assisted Technical Japanese Reading System

The Japan-United States joint research project is supported by the
Mombusho International Scientific Research Program (project title:
Development of Effective Teaching Materials and Methods for Building
Reading Skills in Scientific and Technical Japanese; project no. 02044020
in 1990 and no. 03044026 in 1991 and 1992).

First, the project staff observed reading classes in the Massachu-
setts Institute of Technology's Summer Intensive Technical Japanese
Course for eight weeks and selected the reading material for computer
science. Second, they analyzed videotapes of experimental reading
classes in both the United States (MIT) and Japan (University of Tsukuba)
using a method called stimulated recall. Based on this analysis, the
project staff determined the process by which teachers give reading
guidance.

With the assistance of specialists in electrical engineering and
telecommunication, the project staff developed a test version of a
computer-assisted reading system on a Macintosh computer which was then
used in the MIT summer course. The staff observed the students using
the system, gathered data on their history of study, interviewed the
students, conducted questionnaires, and so forth. The test version of
the system will be revised according to the results of the survey,
extension of the functions, and expansion of the text file.

The test version of this system as of the summer of 1991 is as
follows:

Introduction	→ The introduction of the class instruction; offers background information about the text.
Kanji/vocabulary dictionary (reference mode)	→ Students' preparation for class (looking up words in a dictionary, vocabulary list, etc.).
Reading (determining a student's level)	→ The teacher's information and expectation about each student's ability.
Reading (question and answer mode)	→ The teacher's questions asked in class and the teacher's feedback to the students' answers.
Checking	→ The teacher's confirmation of the students' comprehension in class.

CAI can be used in the following three ways:

1. Class preparation. By using the CAI system, students can save time, as they no longer need to consult dictionaries and can prepare more than they can without using the system. Accordingly, they are expected to complete additional assignments relating to their reading comprehension and also to ask better questions in class.
2. Class review. By using the system, students are expected to review what they learned in the class and to improve their reading comprehension.
3. Independent study. By using the system, students working in companies, research institutes, and so on where they do not have an opportunity to learn technical Japanese in class can improve their reading comprehension by themselves.

In MIT's summer intensive course the CAI system was used for class preparation. Using the CAI system for class review is most helpful for learners who need extra time. Independent study is the final goal of this computer-assisted reading system, but in order for it to achieve the same quality as the class instruction given by a human teacher, many technical problems have to be resolved, and so it must wait for the improvement of the computer hardware.

Problems with the Computer-assisted Technical Reading System

Using current personal computer hardware and software, it is possible to use the computer-assisted reading system as a tool for class preparation, class review, or as a partial substitution for class instruction. But to achieve the same level of assistance as a human teacher in class offers, a more advanced CAI system, the so-called intelligent CAI, artificial intelligence CAI, or expert-type CAI is needed, and it still is impossible to operate such a CAI system on a personal computer.

At the present time we are trying to make the CAI system more flexible by changing the course of study according to each student's level (fixed at the first paragraph of the text) and also according to each student's self-assessment. When we can process natural language on a personal computer and also form a technical knowledge database-plus-inference system, we will have a system that can interact with each student.

Another problem is how to cooperate with the specialists in the target field. A computer-assisted technical Japanese reading system

will not be achieved by Japanese language teachers' efforts alone.
Rather, it is necessary to combine Japanese language teachers' knowledge
of Japanese grammar and experience in teaching with specialists'
technical knowledge of the text. In order to develop a technical
knowledge database for this CAI system, we also must determine the
inference strategies that technical specialists use when reading
technical papers.

The Future Uses of CAI

Two major developments are expected that will improve computer-assisted
instruction for Japanese language teaching. One is that CAI will take
over some of the Japanese language teachers' work. Teachers then will
be expected to concentrate more on those tasks that can be performed
only by a human teacher. In fact, the CAI system is able to accomplish
certain functions better than a human teacher can in class.

Another development is broadening the field of technical Japanese
language teaching by cooperating with various technical specialists.
Because students' needs and motivations for learning Japanese will vary
more and more in the future, we can do more than a language teacher
alone can, by developing various CAI systems for technical Japanese.

For these reasons, it is important to develop many types of software
to determine a suitable evaluation standard for CAI systems from both
the teachers and the students' perspectives, and to study the various
uses of CAI systems. For example, once we have a student's history, we
must be able to use such information in designing learning and teaching
activities for that student.

Using a CAI system in this way can be classified as the "use of CAI
from the researchers' viewpoint," as proposed by Hatasa (1991), that is,
effectively using CAI to analyze class instructions and students' learn-
ing processes. When examining the significance of using CAI we are led
to ask, "What should a teacher do in the class?" and our answer should
encourage the improvement of class instruction and also that of educa-
tion as a whole.

Today, personal computers are becoming common tools in our daily
lives. Teachers can consider how to lessen their teaching load by
using a computer, but at the same time they should consider how to
improve the quality of their classroom tasks by asking themselves, "What
can be done effectively by using a computer?" and "What can be done
effectively in class?"

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