

## **UNICODE Based Remote Collaboration for Second Language Acquisition\***

Richard F. Walters (UC Davis)  
Thomas P Amsler (UC Davis)  
Dorothy Chun (UC Santa Barbara)  
Matthias Buschmeier (University of Bielefeld, Germany)

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### **Abstract**

The Distance Learning Laboratory at the University of California, Davis, has been developing a tool to enhance communication and interaction as a part of the process of learning a second language. In July, 2002, we released the first version of Open Remote Collaboration (OpenRCT), which represents a major enhancement to earlier versions of RCT. OpenRCT is platform independent and multilingual (it fully supports UNICODE character sets including Asian languages, Arabic and Hebrew). OpenRCT is multimedia and features a special tool called Textpad that permits students to work collaboratively on assignments. It also has an extensive archived database of students and classes (for ease of class management by faculty) and of student work (for instructors and researchers). OpenRCT is being used in second language courses at UC Davis and UC Santa Barbara. Its further extension to many second language acquisition (L2) programs is under discussion. Instructors have found that incorporating a new approach into their course design and syllabi makes the most effective use of tools such as this. See <http://www.openrct.org> for details.

### **Introduction**

In the last ten years, computer-mediated communication (CMC) has been the focus both of research in second language acquisition as well as pedagogically effective design of applications in language instruction. Studies of asynchronous forms of communication, e.g., e-mail, threaded discussions, forums and bulletin boards, have shown their effectiveness for enhancing linguistic development as well as cognitive, social, and literacy skills [e.g., Biesenbach-Lucas & Weasenforth (2001), González-Bueno (1998), Kern (1996), Lamy & Goodfellow (1999), Müller-Hartmann (2000), Sengupta (2001), Weasenforth et al. (2002)]. There are also a growing number of projects and reports of synchronous, real-time communication, illustrating the benefits of interaction between pairs of learners or among communities of learners. Synchronous CMC allows for negotiation of meaning, task-based activities that further communicative skills and discourse competence, and collaborative learning, which can enhance both linguistic as well as intercultural learning [e.g., Beauvois (1992, 1998), Blake (2000), Chun (1994), Kern (1995), Lee (1997, 2002), Pellettieri (2000), Warschauer (1996, 1997)]. Several years ago, we decided to implement a tool that would support this type of communication, and we added other features that we thought would also be useful.

### **Early Implementation**

Research on developing a platform independent multimedia tool to support this type of interaction began in approximately 1994 with support from the University of California, Davis. A grant from the US Dept of Education (1997-2001) led to introduction of the package into second language acquisition (L2) courses, and enhancement of the tool to facilitate L2 instruction.

OpenRCT was conceived as a way to enhance human communication in the learning process. It was based on the assumptions that learning should be a) student centered, b) activity driven, and c) include human feedback. Most on-line learning tools today focus on techniques to aid the instructor in developing *course content*. This tool is aimed at enhancing the *communication process*. As such we felt that it was important to have not only text, but also sound and annotatable whiteboard as a part of the interactive process. We also felt it was important to allow both live (synchronous) and asynchronous communication. In addition, we recognized the need for platform independence. The original tool, called Remote Technical Assistance (RTA) was implemented based on these design criteria. It used a client-server architecture (Unix server, Windows, Mac and Unix clients). It was multimedia, providing limited multilingual chat, the ability to store and forward sound, and a color-coded, annotatable whiteboard. It was first used in L2 courses, in which students were paired and given assignments that required them to use the target language in dialogs with each other to solve specific tasks. We provided asynchronous messaging, also multimedia, which proved very useful for student-instructor interaction [e.g., Walters, et al., 2000)].

### **Early Applications**

The earlier RTA version of OpenRCT proved successful in several L2 courses on the Davis campus. It was found to be particularly useful in assigning students to work in pairs on various tasks that required communication in the target language. Blake (2000) described the design and evaluation of those assignments and demonstrated the value of synchronous chat records as a window for investigating L2 interlanguage. Early versions were also used at UC Santa Barbara, where, due to various technical difficulties, it was not possible to implement regular or sustained uses of RTA in all the German language classes. However, its use was demonstrated repeatedly in the Teaching Assistant training sessions for German instructors. In Spring 2002, one co-author (Buschmeier) designed an assignment whose goal was to introduce the students to a web site of a German university in preparation for a visit to that country. Students were expected to familiarize themselves with the specific vocabulary they would encounter in every day situations on a German campus. Working in pairs on different assignments provided by sound messaging, students were assigned one of three different tasks, communicating with each other in their native language (L1) or L2 (many used L2), but writing their findings in L2. The availability of chat, a whiteboard and sound in one package proved highly beneficial for this exercise.

Early use of the package revealed the need for two other features. The first was URL sharing, which permitted users to invoke a URL and have it appear on the screens of others connected to the group. The second was a collaborative writing tool called Textpad, which students used to generate reports that they then submitted to their instructor. With these additions, the package succeeded in many ways in enhancing L2 acquisition. Students reacted favorably – students of Japanese at Davis reported that they especially appreciated the opportunity to practice writing Japanese on a computer while solving assigned tasks. An additional benefit was that the instructors were able to study students' interactions through the archived chat sessions, thereby gaining valuable insights into their interactions as well as the efficacy of assigned tasks.

There were, however, a number of problems. Cross platform uses at several campuses (UC Santa Barbara, City College of San Francisco, and others) proved unsatisfactory. In addition, while we soon recognized the need to add an ongoing “team” form of interaction (in which members of the team could participate over time, either synchronously or asynchronously, reviewing dialogs and multimedia components of live chat sessions), it proved extremely difficult to add this and other desired features to the existing code. The client for each platform (Windows, Mac and Unix) required separate code. The Macintosh client in particular fell behind the others for want of

programmers with specific expertise on that platform. Users in schools other than Davis frequently encountered problems with network transmission, student downloading and other areas which were difficult to resolve when communication was delayed. Once specific bugs were identified, fixing them proved to be a formidable task, given the somewhat haphazard evolution of the source code for various components. Furthermore, attempts to find long-term support for the product on a license basis proved unsuccessful, so in 2001, we decided to adopt a new approach, developing an Open Source Software version of the package.

### **Design of OpenRCT (2001-present)**

A number of fundamental changes were introduced in the new RCT design, which began in Spring 2001. The most important change was to move from a copyright package to Open Source code. This change meant that we could build code based on tested Open Source modules without having to develop infrastructure from scratch. This approach proved especially helpful in selection of an Open Source database package (PostgreSQL) and the communications infrastructure (CORBA, omniORB and JacORB). We were also able to build a single client using Java, which runs without change on Windows, Linux-UNIX and Mac OS-10 (Apple does not support Java for earlier versions of its operating system). While the basic design of RCT was not changed, the approach to programming was greatly improved by using version control software and introducing a much more disciplined approach to the code development. Additionally, the modular design made it possible to introduce new elements much more easily than would have been possible with the older design. We were aware that the functionality available through OpenRCT would evolve as new users requested new requirements to be added to the existing structure. It would not be possible to anticipate these requirements, so modular, open-ended design became an essential design criterion.

Implementation of the new design required approximately 15 months up to the public release of the first version. During that time we froze the earlier version (other than a few upgrades to the Macintosh client), and the growing number of users made do as best they could with that version while awaiting arrival of the new Open Source package. The first release of OpenRCT was in July 2002. It included full support of UNICODE characters (meaning that it was able to accommodate all written languages currently supported by UNICODE), had a live chat module, and it included the Team concept described earlier. It was supported by an extensive database infrastructure for setting up classes and for archiving and reviewing interactions. Updates have been appearing approximately every two months, with the prioritized addition of functions from the earlier versions coupled with new items added as suggested by current users. As has happened before, second language courses are serving as the test bed for early adoption of the package. We describe some of these efforts in the next section.

### **Early L2 and Other Applications**

Two experimental applications of OpenRCT version 1.1.0 were attempted at UC Santa Barbara, where the stability of the package and its relatively robust, platform independent client made it possible to assign students tasks working on their individual computers without fear of platform specific problems. One experiment involved second year German L2 students studying Goethe's *Faust*, a challenging course that needed multiple visual and other resources to enable them to understand both the play itself and multiple auxiliary resources.

Students were again split up in pairs and received different assignments via audio recording. The flexible archive and course content features of OpenRCT made it possible to add supplementary images and text materials. One assignment, for instance was, to decipher a German secondary source and comment on its hypothesis in L2. Students could also listen to a recording of

the text and seek additional information from different URL sites listed in the Course Content component of OpenRCT. The most important aspect, however, was that the students had to negotiate their opinions with their partners and had to agree on a response in L2, using the Textpad feature. Students were expected not only to use laboratory computers, but to download OpenRCT on their home computers for continued work during Thanksgiving break. This experience not only augmented their interaction, but it also reduced their dependence on the instructor, who only provided resources and followed their progress remotely. The principal difficulty in this course was a continuing problem for some relatively inexperienced students downloading the software (this problem has been largely solved since).

The second experiment at UC Santa Barbara involved students in a Freshman Seminar entitled "Language and the Internet," in which the language used in different types of CMC was examined and the possible effects on how we write and communicate (in L1) were discussed. The students, all incoming freshmen, used the OpenRCT tools, particularly the chat tool, with ease and enthusiasm. It was striking to note that the language of "chatting" is indeed informal and abbreviated because it is produced so rapidly. This type of communication could potentially influence written language (in L1 and L2) by making it more similar to spoken language.

The Davis campus use was primarily experimental by faculty, including a large number of demonstrations of the package here and elsewhere. One experiment involved science and math students in the School of Education, in which students used OpenRCT for discussions. This experiment was useful because the students and their instructor made valuable suggestions as to minor revisions and additions to the design of the package.

From these and other exposures of OpenRCT to potential uses came a new cycle of revision and prioritized development, which will, we believe, lead to a very much enhanced version to be used in many settings. We describe the enhancements and currently planned applications in the next section.

### **Continuing Evolution of OpenRCT: A Prioritized Process**

Recent use of OpenRCT, both actual experimental and by demonstrations to several planning groups, has led to a new cycle of revisions. Beginning in January 2002, a group supported by the UC Office of the President agreed to incorporate OpenRCT in an Advanced Placement Spanish program to be developed during the current academic year and offered to high school students beginning Fall, 2003. Directed by faculty at UC Santa Cruz with technical assistance from the Mediaworks group at UC Davis, this project has examined the current status of OpenRCT and made a number of valuable suggestions for changes and new features. At the same time, suggestions from the School of Education faculty have influenced the prioritizing of the list of changes to be made as well as the process by which those changes will be introduced.

The first guideline that has been agreed to is to protect students using the current version in a somewhat experimental mode from unsettling changes in the version they use. A number of animated tutorials accompanied by sound clips have been placed on the web site <http://www.openrct.org>. We have also developed a CD-ROM that contains all platform versions of the current client. Providing these to the students eliminates the major difficulties associated with downloading from the Web and at the same time tends to stabilize distribution to a version that will not change for several weeks. It has been agreed that the current version, whatever it may be, will be left undisturbed for an academic term, during which developments will be carried out in the background, but not made available to students until a natural transition time, such as the end of the term or the end of the summer break.

Meetings with several groups have led to prioritizing the list of features to be included for the “next” release. For instance, the version to be made available for the start of Spring Quarter will include the following:

- Addition of a time-stamp on all archived material
- Differentiating owner’s chat messages from those sent by others
- Permit ongoing update and editing of Textpad files without having to cut and paste
- Show incoming new chat messages at all times

and several other features that require more explanation than warranted in this paper. Interestingly, almost all of these features have already been implemented and tested, but in keeping with the desire not to confuse current users, all of the features will be released with version 1.4 at the end of the current term.

Among the most important short term subsequent additions agreed upon by developers and a growing group of potential users will be addition of Threaded Discussions, and reintroduction of an enhanced whiteboarding feature. The Graphical User Interface (GUI) will also be modified to be more user friendly than the current OpenRCT client. While many new features are on the long-range list, we are not prepared at this time to speculate when such elements as live sound (Voice over IP), video, and application sharing will be addressed.

### **Projected Applications of OpenRCT in the Short Term Future**

With the increased stability and functionality of OpenRCT, its visibility has increased dramatically. The new Web site has generated a great deal of interest and encouraged us to improve that site with a large number of added features such as simplified download, tutorials, status pages and extensive screenshots. Live demonstrations of the tool are in increasing demand. Word of mouth from satisfied current users has led to inquiries from an ever-expanding list of potential users. While many of these are pending as this paper is written, we wish to focus on just a few that are relevant to L2 instruction, and reference others in the context of perhaps accelerating development and addition of new features.

At UC Santa Barbara, OpenRCT will be an integral part of an ongoing project in second-year German classes. The *InterCultural Exchange (ICE)* project is a collaborative effort between the University of California, Santa Barbara and partner classes at the University of Kassel in Germany. The constructivist model and the sociocultural perspective of general learning provide support for incorporating interactive language and culture projects into the L2 curriculum. Students at the partner universities first fill out on-line questionnaires in their L1 about a variety of cultural issues. After reading the responses from both sides, they discuss the responses in asynchronous, on-line threaded discussions or “forums.” In the *ICE* project, the third phase involves further, more personalized and deeper discussions in paired e-mail exchanges.<sup>1</sup> In the final phase, real-time synchronous discussions using OpenRCT will be conducted, and during these sessions, students will take advantage of the URL-sharing feature so that they may refer back to the forum entries of both groups. The ability to archive the chat sessions is an invaluable tool for both research and pedagogy. On the research side, the data from all of the students’ questionnaire responses, forum postings, sound files, other files transferred, Textpads, e-mail exchanges and synchronous chat sessions will be triangulated to show how the learners actively create cultural meaning by making

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<sup>1</sup> These components of the project were designed based on the work of Abrams (2002), Finkbeiner & Koplín (2002), Furstenberg et al. (2001), and Wright (2000), and, in general, on the work of Kramsch (1998), who argues that cultural meaning is created through the actions and interactions of speakers –in this case writers– in social contexts, and that language and culture are inseparable.

associations, connections and linkages between existing and new knowledge, views, and attitudes. On the pedagogical side, instructors will be able to use the transcripts of the chats to analyze the linguistic production of the learners and to identify areas that need to be addressed or reviewed, as well as to assess the cultural learning that has taken place during the various modes of exchange.

Uses of OpenRCT in the AP Spanish courses under design at UC Santa Cruz and UC Davis are still in the design phase, but it is clear that the package will play a central role in these programs.

Several other L2 projects are envisaged. A plan to use OpenRCT to teach Arabic throughout the US is under development. Previous users of the package at the Community College of San Francisco and other community colleges will likely use it again during Fall Semester, 2003. Uses in the School of Education, while currently focused on science and math, will likely extend to L2 instruction by the start of the next academic year. A number of other state and local agencies are seriously considering adopting OpenRCT for use as communication tools. The significance of these negotiations relates to the additional support that they may generate, leading to accelerated incorporation of new features in the package.

### **Conclusions**

We have described, and we will demonstrate, a package that has enjoyed considerable success in its early adoption. The package offers exciting ways to enhance L2 instruction with new learning strategies and opportunities. The potential seems open-ended and very broad indeed, not only in L2 materials design, delivery and research, but also in countless other learning and research domains. However, it is also clear that using this tool is not without a price. Extensive time is required to redesign courses to take full advantage of OpenRCT's multiple features. Students must become trained in its use and familiar with L2 and other input methodologies on a computer. New paradigms in human communication, made possible through OpenRCT use, will require reflection, research and evolution to take full advantage of this type of communication. While we have confidence that these changes will be positive, we recognize that they will require extended testing and evaluation, since they will materially affect the learning process.

We are excited, if a bit awed, by the opportunities opened up by this approach to L2 acquisition, and we encourage others to join us in investigating ways in which it can become more useful in the learning process.

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