

Access to Knowledge: Implications of Universal Design for CALL Environments

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Abstract

The purpose of this conceptual paper is to explore Universal Design, a model from the field of architecture and design that is finding recent applications in education. Called Universal Instructional Design (UID) when applied in education, UID environment conditions are similar in many ways to conditions that effective language teachers design into their instructional environments. This paper addresses how the UID model might profitably be applied in computer-assisted language learning (CALL) classrooms to help all of our students gain access to classroom instruction

Introduction

In the past, it has often been profitable to explore how theories, principles, and models from other disciplines apply to what we know about and do in language classrooms (for a very interesting example, see Larsen-Freeman's 1997 application of Chaos Theory to second language acquisition). By having taken such an approach, we have not only learned more about related fields, but we have also opened the field of language learning to entertaining possibilities that might not otherwise be considered. In many cases, these cross-disciplinary explorations have provided additional support for existing theories about how language classrooms should operate; in others, they have added a new dimension to our investigations of language learning. This type of examination remains valuable as we develop new theories and models of language learning.

The purpose of this paper is to explore Universal Design, a model from the field of architecture and design that is finding recent applications in education. This paper first introduces the Universal Design model and then describes recent discussions of the model in education. The paper next suggests how the model relates to CALL environment conditions and provides examples and discussion of how this model might be implemented in CALL classroom environments.

Universal Design

Universal Design (UD) is widely defined as "the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design" (Bowe, 2001, p.24). Products and environments designed with UD principles in mind:

- are designed to be used by as many people as possible.

- can be used in ways that people choose.
- are easy to understand and use.
- work/are accessible in all kinds of settings.
- accommodate error.
- require minimal physical effort to use and accommodate differences in size or position.

(adapted from Bowe 2000; Burgstahler, 2002; Connell, Jones, Mace, Mueller, Mullick, Ostroff, Sanford, Steinfeld, Story, & Vanderheiden, 1997)

Examples of products and environments designed based on these conditions include power doors on buildings, child-proof but older-adult accessible bottle tops, products that include instructions for assembly in multiple formats (e.g., text, graphic, and video), and homes and offices that are compliant with the U.S. Americans with Disabilities Act (ADA). Although these principles may seem simple and possibly intuitive, it is easy to call to mind examples of products and environments that were not designed based on UD principles. Many language classroom environments, based implicitly on a "one size fits all" model, fall into this category. However, educators of all kinds are adopting UD principles to make education more accessible, as outlined below.

Universal design in instruction

Hatfield and Fox (2001) point out that the inclusion and multicultural education movements in the U.S., along with discoveries about learning styles and other learner differences, have facilitated the relatively recent move of UD into education, where it is commonly called Universal Instructional Design (UID). In part, the impetus for the migration of UD principles to education is the realization that access to education for all students does not mean merely physical access (e.g., utilizing wheelchair ramps and note-takers), but access to information, resources, tools, and opportunities. Burgstahler (2002) notes that

Universal Design principles can apply to lectures, classroom discussions, group work, handouts, Web-based instruction, labs, fieldwork, and other academic activities and materials. They give each student meaningful access to the curriculum by assuring access to the environment as well as multiple means of representation, expression, and engagement (p.1).

Strehorn (2001) and other educators interested in the educational applications of UID tap the broad research base underlying the model to propose that these principles can be used to transform not only the physical environment of the classroom but also instruction, curricular content, and materials. According to UID, rather than providing access on a case-by-case basis, all of these instructional components should be designed a priori to be accessible by the greatest number of learners possible. In other words, UID does not imply that one universal size fits all but more than a diversity of opportunities will work for many different students. Burgstahler (2002) notes that beneficiaries of UID can include students with varying cultures, abilities, backgrounds, and learning needs. These students benefit because, in terms of learning, universal design means the design of instructional materials and activities that makes the learning goals achievable by individuals with wide differences in their abilities to see, hear, speak, move, read, write,

understand English, attend, organize, engage, and remember. Universal design for learning is achieved using flexible curricular materials and activities that provide alternatives for students with differing abilities. These alternatives are built into the instructional design and operating systems of educational materials—they are not added on after-the-fact. (Council for Exceptional Children, 1999, p. 2)

Educators can build in principles of UID by preparing to "present information in multiple ways---offer multiple ways for students to interact with and respond to curricula and materials (give them choices of pace, how to respond, how to get the information)q¼and] provide multiple ways for students to find meaning in the material and thus motivate themselves" (Bowe, 2000, p.4). Izzo (2002) concludes that applying Universal Design in education "is just good teaching" (np).

Burgstahler (2002) and other authors have suggested that meeting UID conditions might provide ESL students with more access to curricula. Strehorn (2001) presents specific applications of UID principles to conditions in higher education ESL classrooms, noting, "ESL and UID are a natural fit" (p.1), and this is particularly true in language learning environments enhanced by computer technologies. A comparison of UID and effective CALL environments shows that they overlap in many ways.

UID and CALL Environment Conditions

In this section, each of the six components of UD environments presented previously is followed by a more detailed description of its instructional application and a summary of its role in CALL environments. The discussion of second language acquisition (SLA) theory and research is adapted from Egbert, Hanson-Smith, & Chao (1999), who have drawn on diverse theories and research studies to develop a set of conditions for optimal CALL environments. These conditions and the foundations upon which they are built provide one way of visualizing the design of effective CALL environments and they allow parallels between the two types of environments to be drawn easily.

- **Equitable use**
- **Useful to and accessible by diverse learners**
- **Appealing/motivating to all learners**
- **Identical OR equivalent instruction**

Equitable use is also important to CALL classrooms. For example, SLA theory proposes that authentic tasks are motivating for language learners; such tasks are by definition useful to and accessible by diverse learners. Both UID and the TESOL standards (TESOL, 1997) require that classrooms will be welcoming to all learners and that materials and instruction will be appropriate for learners' levels and needs. This implies, for example, that text sets, or texts with the same information at different reading levels, will be used if needed. In CALL classrooms, such sets of readings can be found by searching the World Wide Web. The Internet can also be a source of appealing and motivating instruction that learners find to be useful, for example, making connections with native speakers or discovering information that is useful to their lives outside of class.

2. User control

- Various methods of engagement
- Various tools
- Choices in control and pace
- Choices of participation structures

Students need different levels of autonomy according to ability and context. In language classrooms, providing opportunities for learners to choose tools, content, pace, and group composition can also provide for different learning styles, language proficiency levels, and interests. Computers can provide an array of choices and methods of engagement. For example, students can have access to a variety of audiences through the Internet. They can learn grammar in a multitude of ways with a variety of tools, from taking online quizzes to talking with fluent speakers in voice chatrooms to reading and interacting with authentic texts.

3. Simple and intuitive

- Routines, predictability, consistency
- Effective prompting and feedback
- No unnecessary complexity

In language classrooms, facilitations such as scaffolds, consistent structure, models, and “teacher talk” simplify and make instruction more accessible to learners. In CALL materials, simple and consistent software interfaces, content-based immediate feedback, strategy prompts, and other helps provide access to diverse learners

4. Perceptible information/information access in multiple settings

- Various methods of representation
- Redundant methods of representation
- Various methods of expression
- Use of prior knowledge
- Essential information pointed out

Social interaction is a crucial factor in both UID and language learning environments because during the negotiation of meaning learners can tap prior knowledge, focus on pertinent information, and use both linguistic and pragmatic expression. Learners can be engaged in language focusing on discrete forms or engaging in authentic discourse, but perceptible access means that learners have opportunities to understand in ways that they do so well and also to express themselves in different ways. Computer technologies support these conditions in many ways. For example, hot words, hyperlinks, and visuals can help learners to discriminate what is important and to access that information. In many software programs, such as electronic encyclopedias, learners can see redundancies in text and other media that help them to comprehend both language and content. In addition, Web-based activities such as WebQuests can build on learners' prior knowledge to help them to access the language and content of the information presented.

5. Tolerance for error

- Accommodates learner pace and knows where they are
- Overlooks/minimizes unimportant errors
- Supports student intentional cognition
- Easy to navigate
- Minimal chance of problems from accidents during use

Like UID, CALL environment conditions underscore the importance of understanding learners' needs, of focusing on central issues and ideas rather than mistakes, and helping learners to focus on and think carefully about their learning. Computer technologies can help meet this condition in many ways. For example, computer-adaptive testing accommodates learners by presenting test items according to the learners' response patterns, thereby individualizing the testing process. In addition, software such as Brain Cogs (Fablevision, 2002) assists learners in reflecting on and developing their repertoire of metacognitive strategies.

6. Physical access

- Low physical effort
- Appropriate size and position
- Consideration of communication needs
- Maximum attention to learning
- Clear line of sight
- Tools accessible for all learners

In CALL, software that has a simple, consistent interface with both text and visual components means that learners' efforts can focus on content and language rather than the format of the instruction. Although physical access issues are not as prominent in language environments as in, for example, special education classrooms, creating effective physical spaces in computer labs and around other technologies is central to creating optimal classroom learning environments.

This brief comparison shows that following guidelines for UID at all levels of language classrooms and in different language-learning contexts are very similar to adhering to principles for creating effective CALL environments. The strong intersection between UID and CALL points to places where we might concentrate our focus; future research may be able to determine the impact of these conditions on language and content learning. Computer technologies can assist teachers and learners in creating accessible learning environments for language learners. Examples of ways to incorporate UID conditions in CALL classrooms are provided below.

Tools and techniques to support UID in CALL classrooms

Bowe (2000), Burgstahler (2002), the Council for Exceptional Children (1999), Hatfield & Fox (2002), Izzo (2002), Shaw, Scott, & McGuire (2001), and others provide many examples of useful ways to implement UID in classrooms, including effective seating arrangements, participant structures, tools, and techniques. Strehorn (2001) provides specific ideas for integrating UID principles in language classrooms. These include:

- taping classroom lectures and interactions not only for extra listening practice but to provide a review for students who need support for listening
- having a variety of resources, including dictionaries, available to learners
- having the syllabus and other course documents available in many formats, including paper, electronic, and oversized
- using books on tape
- providing students with notes from classes
- reading documents out loud
- supplying time frames and clear rubrics for assignments
- allowing choices for ways in which students respond to assignments

The Council for Exceptional Children (1999), Shaw, et al (2001) and Silver, Bourke, & Strehorn (1998) point out that the use of information and communication technologies can facilitate the integration of UID conditions into the curriculum, as noted in many of the examples above. In language classrooms these technologies, including audio and video recorders and players, computers, and digital cameras, allow teachers to incorporate cueing, organizers, multi-modal instruction, and modeling, as well as to support interaction. Technology can assist with the transfer of text-based information to a visual format (i.e., through graphics or video) or audio format, and vice versa. Oklahoma State University provides links and information for using technology to meet UID principles (see <http://www.okstate.edu/ucs/stdis/web.html>).

There are other tools to help language students with diverse abilities, from gifted students to those with interrupted schooling to those with physical impairments. Bowe (2000) mentions EReader by CAST (<http://www.cast.org>), which allows students to control features of text such as the use of voice, highlighting, and the font size of the text. Software packages that offer study guides, previews, and tutorials also help to support learning by students with diverse abilities. Whichever tools are used, it is important that they not only assist learners in meeting objectives but that they allow all learners to participate as fully as they need or want to in the process.

Figure 1 presents a generic content-based lesson and the UID conditions, tools, and techniques that make it more accessible to all learners in a CALL classroom.

Theme	U.S. Culture
Course	Intermediate ESL (content-based)
Duration and format of activity	Approximately one hour per day, 2-3 weeks
Students	14 young adult students at varying levels of proficiency in the skills areas, five different language and cultural backgrounds, varying lengths of stay in the U.S.

Figure 1: UID conditions in a CALL activity

Sample Language and Content Objectives:

At the end of this activity, students will be able to

- Describe aspects of U.S. culture using appropriate vocabulary and structures
- Create and ask original questions

- Work with teammates appropriately
- Explain a multimedia presentation of their work

TESOL Standards focus: (from TESOL, Inc, 1997)

2.1 Use English to communicate in academic settings

2.2 Use English to obtain, process, construct and provide subject matter information in spoken and/or written form

3.1 Use the appropriate language variety, register, and genre according to audience, purpose, and setting

Presentation: Days 1 and 2, Project preparation

Step 1:

Original Lesson: The teacher starts by presenting an overview of U.S. culture.

UID Lesson: The teacher starts by tapping students' prior knowledge and engaging their attention.

Tools and Techniques: Teacher and students discuss why it is important for them to learn about U.S. culture. Students start by telling what they already know about U.S. culture. Students have had time to prepare by writing, speaking, or drawing. As students discuss, the teacher lists all the "facts" on the board or overhead and also speaks them aloud, recording the list as she goes. She also posts student drawings as appropriate. She gives students time to respond to each other and provides feedback such as asking for more information on the ideas. Students decide which they believe are actual characteristics of U.S. culture, and these are listed on one side of the bulletin board in large text with pictures beside them where possible.

Step 2:

Original Lesson: Students pick out characteristics of U.S. culture from a social studies textbook and the teacher writes them on the board. The teacher tells students whether they are right or wrong. Students copy the completed list.

UID lesson: Students have a variety of readings and resources, including a content-based textbook, video clips, and the Web, from which to find different ideas about U.S. culture.

Tools and Techniques: In some of the readings the teacher has highlighted essential information. She goes through one reading, including reading it aloud, to model how to find information. Students can choose the reading(s) they want to use and whether to work together or alone. The characteristics they find can be copied, spoken out loud, or sketched out for presentation to the class. Students explain what they found using guiding questions from the teacher. The completed list is copied by the students, posted on the bulletin board in the classroom, and recorded on videotape.

Step 3:

Original lesson: Students write a summary, describing what they think are the five most important aspects of U.S. culture. They read their summaries to the class one by one.

UID lesson: The teacher explains that students will have a project to find out more about U.S. culture. Students have choices of how to complete the activity and with whom to

complete it. They use readings and templates from Cultural Reporter (Falk, 1995) and other scaffolds to find out about an aspect of U.S. culture that is relevant to them. Some of the Asian students want to explore home visit customs, the Thai students decide to work on the relationship between their school and the town, some students want to investigate what U.S. students think about non-native English speakers, and the remaining groups choose other topics. Tools and Techniques: Students form small groups around their topic and cooperatively decide on roles and responsibilities for data collection and analysis, including creating survey questions, finding interview subjects, conducting Web-based research, and whatever other procedures they need. Together students decide on a format and tools for presenting their final project.

Step 4:

Original lesson: Students hand in the summary before the end of class.

UID lesson: Students and teachers discuss the process, including roles that each student will play and individual goals for each learner. Students and teachers negotiate the timing and feedback necessary to complete the project and meet the language and content goals. Tools and Techniques: The teacher asks each group to develop a timeline for the project using multimedia/bilingual timeliner software (such as that offered by Tom Snyder Productions at <http://www.tomsnyder.com/Products/product.asp?SKU=TIMV50>) and show/tell her how long they think it will take them to complete. Later she will assign a due date/time based on negotiations with the teams.

During group time over the next two weeks of the project, the teacher can offer or suggest grammar and discrete skills practice and provide feedback as necessary. Although there are many ways to implement UID, the lesson in Figure 1 demonstrates that relatively simple modifications can be made to support environments that incorporate the conditions. By providing students with choices, the instructor can help students work to their strengths, both in content and language. By offering tools and materials that have accessible built-in help features, the teacher creates a climate of challenge while ensuring that the goals are achievable. Language skills are developed not only through drill but through authentic practice. Most important, in UID and effective CALL classrooms, opportunities to use computer tools are ubiquitous but not required, and when used the tools are supportive, goal-oriented, and under the control of the learner.

Barriers to implementing UID in CALL classrooms

There are, however, barriers to implementing UID in CALL classrooms. For example, if the goal of a course or lesson were text-based literacy, then testing with a voice option would not offer an effective assessment. Or, if the objective were oral fluency, it may not be useful for learners to answer questions in other modes. However, many of the UID conditions can still be implemented in such lessons.

Another barrier to implementing UID in CALL classrooms is the time it takes to make sure that all learners have access; whether the time and effort spent on such preparation are feasible is a question that must be answered. Not only must the technology be carefully explored to ensure that it meets the conditions, but so must all other aspects of the instruction. Silver et. al. (1998), however, argue that modifications to the syllabus,

materials, and instructional delivery methods "... would eventually save time once they become routine" (p. 49). Teachers need to decide if the time spent is worth the gains.

A final, but perhaps more significant, the barrier to implementing UID principles in CALL classrooms is the potential conflicting and complex needs of learners from many different cultural backgrounds. The special demands put upon language teachers by learners with widely varying values, learning styles, and backgrounds pose special issues for the implementation of conditions that give everyone accesses to instruction and supportive technologies. As we discover more about how UID and CALL environment conditions work in classrooms, we may be able to more effectively address this barrier.

Conclusion

From this brief discussion, it is evident that UID environment conditions are not that different from the conditions that effective language teachers already create in their instructional environments. This overlap may seem to make the discussion of UID in CALL redundant, but there are several important reasons to continue this discussion. First, defining UID gives us a place to "hang our hats" by providing a way to talk easily about the concept and to develop a common understanding not only within the language field but with others in different areas of education and other fields. Second, discussing the concept and relating it to what we already know leads to the ability to ask more critical questions and conduct research in this area. We can also view on-going research on language classrooms through the dual lens of UID/ CALL environment conditions without taking away from principles of either. Finally, by providing an outside view of what we as teachers know and do, this discussion can help us, as Strehorn (2001) suggests, "... to implement new and useful course design and teaching techniques to allow more access to the information being taught" (p. 3) in CALL classrooms.

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