Learner Personas in CALL*

TRUDE HEIFT
Simon Fraser University, Canada

INTRODUCTION
In examining the titles of this year’s conference presentations, I noticed quite a few papers that focus on learner-specific issues, for instance, papers that address learning styles, learner needs, personality and learning, learner modeling and, more generally, pedagogical issues that deal with individual learner differences in CALL. Over the past few years, my research has frequently returned to the notion of individualized instruction, or adaptive CALL, whether in terms of learner feedback or, more generally, natural language processing (NLP) and learner modeling. For this reason, I would like to focus on adaptive CALL and the concept of learner personas during this talk today. I will first take a very brief look at the historical development of individualized instruction considering its goals and development over time and then illustrate how the concept of learner personas could possibly contribute and eventually result in a more individualized learning experience.

INDIVIDUALIZED INSTRUCTION IN CALL
I would like to start out by posing the following question: Have you ever purchased or been given a piece of software, or a gadget, that you ended up abandoning because it did not work the way you needed? While this probably applies to all of us including the many faces of CALL in our classrooms, what is important here is that whatever the software or the item was, it is most likely not that there was anything wrong with the product; it simply was not right for you. This very same problem of poor fit also applies to CALL software, be it that the course lessons could require longer periods of time than the learner has available in one sitting or that the software could assume a different level of required background knowledge of the subject matter, different task types, navigation patterns, or feedback. No matter what the details are, software should ideally address some of the learner differences that clearly do exist.

Considering a definition of individualized instruction, Wikipedia states that “individualized instruction is a method of instruction in which content, instructional materials, instructional media, and pace of learning are based upon the abilities and interest of each individual learner” (http://www.wikipedia.org). Psychologists have long shown that individuals differ in their abilities, their rates of learning, and often even in their approaches to learning. Specifically, researchers in second language acquisition (SLA) have also noted that individual differences such as cognitive style, learning strategies, and affective variables influence learners’ processes and success (e.g., Skehan, 1998; Dörnyei & Skehan, 2003). Unfortunately, the cost of providing individualized instruction that adapts to these differences is prohibitive if it depends on the use of professional teachers. For this reason, individualized instruction is not the same as a one-to-one student/teacher ratio or one-to-one tutoring, as it may seem, because it is economically difficult—if not impossible—to have a teacher for each student (see also Suppes, 1967a, 1967b; Britt, 1967). As cited by the Educational Research Associates, Oregon

*This article is a revised version of a keynote address given at CALICO 2007, The Many (Inter)Faces of CALL, May 2007, at Texas State University.
(Salser, 2001), for instance, even the most expensive public school system in the United States, which in 2003 was Washington, DC spending approximately $11,000 per student per year, would require at least five students per teacher to pay teacher salaries, without anything left for buildings or nonteaching staff. Given this situation, the computer offers perhaps the most practical hope for a program of individualized instruction under the supervision of a single teacher in a classroom of 25 to 35 students.

A Brief Historical Overview

Considering an early quote of individualized instruction and CALL, Patrick Suppes (1968, p. 731), who also led many of the CALL projects at Stanford at the time, states that “only to a limited extent can we expect teachers to carry the burdens of individualized instruction. The widespread use of computers seems a practical and feasible alternative.” From a pedagogical perspective, the basic ideas of individualized instruction date back to at least as far as John Dewey, that is, the turn of the 20th century, while the first realized systems can be found in the 1960s and 1970s. These were so-called branching programs, such as the PLATO system, that provided branching between language problems. However, contrary to the assumption held by many, individualized instruction does not reflect one particular teaching or pedagogical approach. Individualized instruction has points of contact with the constructivism movement started by Piaget which states that students should build their individualized learning and knowledge. At the same time, individualized instruction shares ideas with programmed instruction which is commonly associated with behaviorist theories of learning.

Fast forwarding through time but taking one stop in between the early days and now, Bork as well as Becker reported in the late 1980s on the progress of our goals of individualized instruction in CALL as follows (see also Hativa & Lesgold, 1991): “The main advantage of the computer as a way of learning is that it allows us to make learning interactive for all students. We can then pay attention to the needs of each student by individualizing the learning experience” (Bork, 1987, p. 201). “However, more than 20 years later after the introduction of computers to individualize school learning, teachers agree that in spite of the earlier expectations, the promise of computers has not yet been fulfilled for systematic individualization of instruction” (Becker, 1987, p. 151). Yet, this does not mean that there were no CALL applications in those years that showed some focus on this pedagogical aspect. For example, just a few years later we find A la Rencontre de Philippe (Furstenberg, 1993), a very popular and sophisticated French program originally designed for laserdisc which clearly showed very innovative branching in the domain of language learning and culture thus also emphasizing that individualized instruction is not tied to vocabulary or grammar instruction, which is a common belief.

Forty years later, we can, at least at a theoretical level, identify four approaches to individualized instruction, and, although they are presented here as distinct approaches, there is certainly a good deal of overlap among them (see Mödritscher, Garcia-Barrios, & Gütt, 2004). First, there is the macroadaptive approach that can be traced back to the 1970s. The macroadaptive approach addresses adaptation of instruction at the macrolevel; for instance, instructional alternatives are selected with respect to learning objectives, general abilities, levels of detail, and achievement levels in the curriculum structure. This type of individualization is commonly found in programmed instruction. Second, the aptitude-treatment interaction approach proposes different types of instruction, or even different types of media, for different students. One aspect of this approach is learners’ control over the learning process according to their abilities. Third, the microadaptive approach emphasizes adaptation at the microlevel by diagnosing students’ specific learning needs during instruction and providing
instructional prescriptions to meet those needs. For that reason, research has attempted to establish instructional models using on-task rather than pretask measures. Such a model then focuses on the temporal nature of learner abilities and characteristics, especially the dynamically changing ones. These models then take not only skill level into account but also many other types of interactions such as the task itself, navigation, or, more generally, the use of the learning tool which is also adapted to the ways learners change over time. Finally, the constructivistic-collaborative approach follows the constructivistic pedagogical approach by focusing on the usage of collaborative technologies. Accordingly, in supporting collaborative learning activities, emphasis here is placed on extending the adaptive environment from individual learners to groups of learners such as a skill coach or a group model.

The four approaches illustrate that nowadays, instead of the simpler, exclusively performance-based models of 40 years ago, there is an increased focus on dynamic adaptation at a very fine-grained level for both the individual as well as collaborative learner models, all with the goal of achieving some form of individualized instruction. However, no matter what type of individualized learning approach we use and thus the kind of model we employ, one of the major and fundamental problems lies in assessing the needs of the individual learner and then constructing a computer-based learning environment in the optimal manner for that individual. Almost needless to say, we cannot design a different computer-based learning environment for each of our learners, nor is this an ideal solution for reasons to be discussed below. Instead, the precise needs of individual learners in a CALL setting need to be defined, and learner types—so-called learner personas—may then provide a step in the right direction. This underscores the notion that the principal obstacles to computer-assisted instruction are not technological, but pedagogical; that is, how to devise ways of individualizing instruction that are suited to a variety of users and, at the same time, addressing the needs of individual users, something Suppes (1966) noted over 40 years ago. Accordingly, what are these learner types, or personas all about?

LEARNER PERSONAS

With the concept of learner personas, we are aiming at capturing and clustering similarities and differences among learners. Once the similarities and differences have been determined, we can model the learning process in areas that are relevant to a given language-learning environment based on the approaches briefly described above. In addition, we then can decide whether this information should be static and hard wired into the learning tool or dynamic in the sense that it changes over time and adjusts to learners as they progress in their understanding of the subject matter. Possibly, this knowledge can also be negotiated with learners and manipulated accordingly.

The usefulness of personas in defining and designing interactive applications is based on ideas by Alan Cooper, the father of Visual Basic, expressed in his book entitled The Inmates are Running the Asylum published in 1999. The concept of persona has been applied in the instructional technology world to both hardware and software design for more than a decade, and some of these ideas are borrowed and applied here to a CALL environment (see also Levy & Stockwell, 2006; Colpaert, 2004 for a discussion of personas in CALL).

According to Head (2003, n. p.), the gist of Cooper’s argument is fairly straightforward:

There will be far greater success designing an interface or a program that meets the goals of one specific person, instead of trying to design for the vari-
ous needs of many. At first blush, though, it may seem downright counterintuitive to design for just one person, whether hypothetical or not. How can designing for a single soul possibly ensure an interface that supports the needs of many users? But as an interface and thus a program becomes more layered and complex and tries to serve an ever-widening audience base, Cooper’s argument holds true.

Head (2003, n. p.) further states that one of the best arguments for using personas comes from some misguided design efforts at Microsoft. When the software giant geared up to redesign its well-known Microsoft Office Suite for a 1997 release, the research team soon discovered that many of the features users wanted already existed. In fact, four out of five of the features users requested for Office 97 came with Office 95. The outcome of Microsoft’s design approach is just what Cooper warns against. In trying to support the diverse tasks of many conceivably different software users, Microsoft cobbled together a product that was bloated with capabilities and ended up satisfying few users.

This illustrates that we are after a cluster of similarities and differences among a small set of typical users rather than covering each and every aspect of each and every individual learner. Accordingly, how can the concept of learner personas help the design of adaptive CALL?

**LEARNERS PERSONAS IN CALL**

Personas are archetypal users of a learning tool that represent the needs of larger groups of users in terms of their goals and personal characteristics. Although personas are fictitious, they are based on knowledge of real users and thus require some form of user research. Accordingly, the research on learner similarities and differences presented at this conference as well as other studies on individual learner differences will provide answers to some of the research questions. Because we need to identify the needs of our learners in order to define personas, a major virtue of establishing personas is understanding how learners most effectively use the learning tools that we construct for them. Some research needs to be conducted before the personas are described to ensure that their descriptions represent real end users rather than the opinion of the person describing the personas. If we do not take this initial step, we can easily end up with a learning tool built for what we think language learners are like and how they use software rather than what they really are like and how they really interact with CALL programs. Alternatively, a learning tool can be designed with predefined personas in mind and then tested and revised to confirm or reject the designer’s assumptions about the personas. In any case, an effective learning environment requires the analysis of ethnographic user data gathered from research into learner assessment, usability testing, student interviews, student surveys, and so on—all of which will help us determine in what ways we need to individualize instruction. For instance, we need to look at what demographic features are important and what design features go with those features. Naturally, the only time the demographic features really matter is when they directly affect learner behaviors. The same applies to general learner preferences. The difference between personas must then be based on deeper issues such as what actions learners undertake (actual or projected) and why they undertake them (goals and motivations) and less so on who the learners are (see also Saffer, 2005; Calabria, 2004; Goodwin, 2001). How many personas do we establish? The number should be reasonably small to keep them distinct.
To illustrate the concept with respect to CALL, I conducted a study a few years ago (Heift, 2002) in which I tracked learner interaction with E-Tutor, an NLP-based language-learning tool for German (see Figure 1). The goal of this particular study was to identify different interaction types with the software, that is, learner personas, for students using an online language-learning system for German.

Figure 1
Chapter 14 of E-Tutor

I tracked learner-system interactions by recording the frequency and kinds of links learners accessed. The learners were then classified according to different criteria, for instance, whether they generally pursued the use of language-learning practice material such as grammar notes or vocabulary tasks or whether they were more inclined to study the cultural notes and/or pictures which were also provided by the system. Moreover, I considered students’ error correction behavior for a variety of tasks ranging from vocabulary and grammar practice to listening and reading comprehension.

By way of example, Figure 2 shows a dictation task for early intermediate learners. This task, in which students listen to a dialogue and then type it out, is found in the last chapter of a third-semester course for German taught at Simon Fraser University. Students can listen to the whole conversation or to one sentence at a time. The dialogue is displayed as they complete the sentences, and by the end of the exercise students see the entire dialogue. Figure 2 displays the first few sentences of the dialogue between two German speakers.
In the area of learner-computer interactions, students have many choices while completing the dictation task, and they were all tracked by the system for this study. In the example provided in Figure 3, the student made a spelling mistake, and the spell checker of the system responded with a list of suggestions to correct the error (see last line in Figure 2). Learners can correct their error by choosing a word from the suggestion list or providing one on their own, or they can ignore the error altogether by clicking on the NEXT button to move on to the next task.

In between these two choices, learners can also correct the error by making use of system help options. For instance, they can click on the SOLVE button to request the correct answer(s) from the system instead of trying to find it by themselves by consulting the correction list (see Figure 3).
Finally, students can access the bilingual dictionary in the system to look up a word. For instance, Figure 4 displays a word that appeared in the previous sentence of the dialogue.

Figure 4

Finally, students can access the bilingual dictionary in the system to look up a word. For instance, Figure 4 displays a word that appeared in the previous sentence of the dialogue.
The goal of the study was to identify different personas, that is, different learner types based on their interactional patterns with the system with respect to help options, feedback, and, more generally, navigation patterns and error correction behavior. In addition, I considered a few learner variables such as proficiency level and gender.

The study identified three learner personas with respect to these behavioral variables: browsers, peekers, and adamants. Results indicated that browsers frequently browsed through the exercises without providing any input or making an attempt to respond to the task. Predominantly, these were beginning-level learners. In contrast, peekers generally attempted to correct their input by making frequent use of system help options; however, they also peeked at the correct answer(s) provided by the system more often than they actually attempted to correct their errors. These were mainly beginning- to intermediate-level learners. Finally, adamants never requested a correct answer from the system but instead worked through the error correction process adamantly; they also made far less use of system help options. These turned out to be advanced learners in the language.

In studying learner behavior and use of CALL programs, the first question which we may want to ask is whether these interactional patterns have indeed an impact on learning and are therefore important to adaptive CALL. In the example above, the answer is YES because if the browsers never get any language practice due to the fact that they predominantly skip exercises, they presumably will not succeed in learning the foreign language by using the software. Accordingly, these interactional patterns prompt suggestions with respect to the design of our CALL programs. For instance, the results indicate that we need to consider proficiency level and what is generally termed learner control, that is, the amount of control the learner can exert in an instructional situation. It seems that a fixed set of exercises may be less hindering for advanced learners than for beginners who seem to prefer to pick exercises from a larger pool, apparently independently of the difficulty of the task.

In addition to these behavioral variables, which I believe have a substantial impact on the design of CALL systems, there may also be demographic variables that affect behavior. In the study reported here, language proficiency revealed significant differences in that the group of adamants consisted predominantly of advanced learners. At the same time, we may identify variables which have no effect on learner behavior and which can be ignored because they do not warrant individualization. For example, gender was not found to be a significant factor, confirming previous studies and suggesting that men and women used the learning tool in similar ways, although intuitively, we may think otherwise. In any case, results of studies of this kind make suggestions with respect to system design, such as help options, task types, and feedback, that tell us what areas warrant an individualized and adaptive CALL environment.

**CHALLENGES AND CONCLUSION**

While I believe that a fair amount of progress with respect to individualized instruction and learner modeling has been made, our learners are still far away from a truly individualized or adaptive CALL experience even though the technology certainly allows us to construct such environments. However, there are many challenges that center around learner personas and, more generally, adaptive CALL that need to be considered. For example, we need to construct reliable assessment tools that have been validated by users. We also need to understand the needs of learners with respect to program design. For instance, what are the adaptive learning paths that will result in an effective individualized learning environment? This question can only be answered by examining the learning outcomes that are based on learners’ use of
and interaction with specific language-learning environments. This then implies the need for studies on learner demographics and behavioral patterns, possibly linked to learning strategies and styles and the ways in which they apply to an individual CALL environment. Given the research that has already been conducted and that still needs to be carried out, what is the reliability of the diagnostic inferences we are drawing? How do the behavioral patterns that reflect goals, motivation, learner autonomy, and other factors translate into design features that contribute to successful language learning? Finally, once we designed our personas, how do we make them dynamic given that learners change in their goals, behavior, and motivation over time?

Last but not least, there are certainly ethical issues around modeling our learners which have to be considered. Clearly, any model of a learner is established through the collection, storage, and analysis of data about that person. While this is a very useful and even necessary concept for developing an understanding of the learner behavior and achieving an adaptive CALL environment, at the same time any model of a learner is also a potentially threatening, demeaning, and perhaps socially dangerous phenomenon—the voodoo behind the software. For this reason, the learner’s consent must be assured for the initial data collection as well as for the ongoing data collection for the adaptation of learning processes. It is important to note that this is generally not done in the commercial world where every time you enter the web all kinds of information about you may be collected without telling you about it. However, in returning to the topics of the talks of this year’s conference, I think that many of you are addressing some of the issues that I have raised and that center around individualized instruction. At this point, I am looking forward to attending your presentations and discussing this topic with you. For now, I would like to conclude with a quote by Suppes (1968, p. 731), who drew an interesting analogy between individualized instruction and the weather.

A discussion of individualizing instruction is like a discussion about predicting the weather. For the main purposes at hand we don’t need a precise definition of what we mean by “weather”. We can simply resort to our intuition, and we all recognize when these intuitions are violated by an example or a statement. We also recognize the difficulties of predicting the weather; the same is true of individualizing instruction.

Thank you very much and enjoy CALICO 2007!

REFERENCES


Cooper, A. (1999). *The inmates are running the asylum: Why high-tech products drive us crazy and how to restore the sanity*. Indianapolis, IN: Sams.


**AUTHOR’S BIODATA**

Dr. Trude Heift is Associate Professor of Linguistics at Simon Fraser University, Vancouver, Canada. Her research focuses on ICALL, particularly, on intelligent tutoring systems, human-computer interaction, and student modeling. She is the author of *E-Tutor*, an NLP-based online language-learning tool for German

**AUTHOR’S ADDRESS**

Dr. Trude Heift  
Linguistics Department  
Simon Fraser University  
Burnaby, BC  
Canada V5A1S6  
Email: heift@sfu.ca