Computer Assisted Learning Applications for Teaching Language Technology
– A view on the pedagogical aspect

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Abstract

This paper consists of a discussion about the pedagogical aspect of developing a Computer Assisted Learning application for the discipline Language Technology. It discusses the influence of cognitive and behavioral learning theories on the development.

The Pedagogical Aspect

According to the results of research in the effectiveness of CAL compared to traditionally taught classes, it is difficult to prove which is more or less effective. Some empirical studies show that CAL is as effective as traditional education, but especially many earlier studies claim that CAL is not nearly as effective. One reason for this can be the fact mentioned by Brahler and Johnson [1], who state that many computer assisted instructional materials are developed by technical professionals who have the technical skills necessary for successful implementation but lack knowledge of educational principles. I would like to add that it is also very likely that the technical professionals lack thorough knowledge of the discipline that the CAL application covers.

The Discipline “Language Technology”

Language Technology (LT) is a subject that consists of both technological and linguistic aspects. During a course in language technology, the students learn how to work with language for special purposes (LSP) for improved understanding and translation. They learn to create concept diagrams and ontologies for difficult areas in professional communication and how to search for information when definitions and translations for concepts cannot be found in dictionaries. In order to save the results of their work, they learn to use and develop terminology databases such as MultiTerm 95+ from Trados and DANTERMCBS, an Access database application developed at the Copenhagen Business School.

The Pedagogical Aspect of CAL for LT

It is important to clarify the educational goals of the computer assisted learning program, and then use the learning theories to reach these goals through the development of the program. Choosing between the learning theories during the development does not have to be a matter of total commitment to one learning theory or the other. When developing a computer assisted learning program the developing team can choose between implementing the use of the different learning theories for the different partial educational goals of the program. When it comes to the computer’s role in CAL there exists a basic difference between cognitive and behavioral learning. In behavioral learning the computer is seen as an instrument for instructing the students, whereas in cognitive learning the computer is seen as a tool that the students can actively use for retrieving and building knowledge. Introductions to the two educational theories are available in several textbooks e.g. those mentioned in the references.

Use of Cognitive Learning

The main purpose of cognitive learning is to make the student reflect on the subject of the CAL application. One way to obtain this is to reduce the role of the instruction as much as possible in the learning situation. This forces the student to think for him-/herself. In cognitive learning the student is supposed to be an active participant in his/her own learning. This can be done by providing a learning situation where the student learns by means of unrestricted exploration of the instructional material in the CAL application. The CAL application should also include questions that lead to cognitive conflicts for the student so the student realizes that a disequilibrium exists (something he/she did not understand or misunderstood). This way, the student accommodates the relevant cognitive schemes into the existing cognitive schemes that contain the knowledge that he/she already has. When posing a question, it is also important not to give the student the right answer up front, this will encourage the students to think actively [2]. Cognitive learning is suitable for learning topics that the students later have to reflect on in order to use the learned language technology theory on their own.

Use of Behavioral Learning

Behaviorism is often associated with trial and error exercises. The classical example of an operant behavioral learning application is the self-instructing and self-rewarding learning programs where the student is learning a subject through varying exposures to learning material and controlling questions. Typically the application is
divided into sections. Each section represents a level of learning and the levels increase from one level to the next. The function of the controlling questions is to determine whether the student is ready for the next level or not.

In CAL, the main purpose of behavioral learning is to equip the student with rote competencies within a subject. According to Hermansen [3], the most suitable topics for behavioral learning are technical, conceptual and definitory topics. Language Technology includes all three topics and they should become rote competencies for the student. Therefore, there is also justification to include behavioral learning in the CAL application for the discipline.

**Content of the CAL application**

At this early stage, I intend to implement an application that combines the two basic educational theories mentioned above. The educational goals of the application are to give the students rote competencies and teach them to work with the language technology tools and to give them the capability to work with the theory of language technology in an independent and creative manner. The content of the application is going be:

- Introduction
- Theory sections
- Exercises
- Self-tests
- Examples
- Help

The application is not going to demand that the students follow a specific path through the material. This means that the student can explore the instructional material unrestrictedly. In this way each student controls the progression of the learning situation at any given point in the application. This is a cognitive aspect and it is chosen because the student then has to consider and be aware of what he/she needs to learn. Because there is no given path through the material, the design has to be very comprehensible in order for the students to grasp the perspective of the application.

The exercises will also be developed with consideration to cognitive learning. The exercises are meant for triggering accommodation of the assimilated knowledge accumulated when going through the theory sections. An exercise could for example be to construct a simple concept system with ten concepts related to the concept “bicycle”. To use the theory on a well-known object will presumably create a realization of how to actually implement the theory.

The self-tests will be developed according to the behavioral educational theory. The self-tests will be a set of multiple choice questions for each section of the theory. When the student has answered the questions connected to one section, he/she will receive a reply from the application that indicates which answers are correct and which are wrong together with the right answers for the section. Furthermore, the student will receive positive reinforcement for the correct answers and be encouraged to continue with a section of the theory that reflects the level of correctly answered questions. It is however, very important to consider the reinforcement carefully. The Danish mentality does not take kindly to praise, unless it is of very moderated character. Therefore, too much reinforcement will have the exact opposite effect on a Danish student than anticipated by the behavioral educational theory. It is also important to consider what will function as reinforcement for the target group. As the target group for this application is students at university level, it must be assumed that the students, as a minimum, have an interest in learning the skills required by the study board in order to pass an exam. Therefore, this will be used as reinforcement in the CAL application.

The introduction contains a motivational aspect. This is intended to motivate the students to become interested in learning the theory of language technology. The motivational aspect can for example be video clips of experts telling how they use language technology.

To help the students cope with both academic and technological problems, a number of opportunities will be available. In the program there will be a Help function to help the students overcome minor technical problems that might occur. For major technical problems, the students can contact the local IT Support. For academic problems, the students can ask each other for help or contact the teacher in charge of the course e.g. by email.

**Concluding Remarks**

In this paper I have pointed out that many of the problems that seem to be connected with CAL are a consequence of the lack of a pedagogical foundation. However, until the CAL application for language technology has been developed and empirical studies have been conducted on a group of students, it is not possible to evaluate the actual effect of involving the pedagogical aspect into a CAL application.

I have justified the use of both the cognitive learning theory and the behavioral learning theory in the development of a CAL application and furthermore, that they can be used for specific partial educational goals in the development. Cognitive learning can be used for knowledge that the student is required to reflect on, while behavioral learning can be used for obtaining rote competencies within the subject.

**References**

