

Streaming Video for Enhanced Foreign Language Training in Vocational Education

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ABSTRACT: *Streaming video is increasingly recognized as a most effective tool within the field of contemporary and future education. The Austrian SMILE project (SMILE = Streaming Media for Interactive Language Experience) aims at the enhancement of foreign language learning by making use of the streaming video technology. The main component of the SMILE software are video clips, each of which comes along with a series of interactive training units, lesson plan and vocabulary. The authenticity of pronunciation and intonation is guaranteed by well-trained native speakers. The learners will benefit from the opportunity to work according to their individual capacity.*

The makers of this software have taken into account state of the art technology, didactics and methodology. The program may either be used for regular school education in a blended learning environment or as a distance learning device. We will demonstrate its employment as a means of language teaching in the field of engineering and technical terminology. SMILE is in the process of being evaluated this year with the intermediate results being presented in the paper.

1 INTRODUCTION

The SMILE acronym stands for "Streaming Media for Interactive Language Experience" and indicates a strong emphasis on engaging streaming technology for the purpose of enhanced computer assisted language training. During the last three or four years there has been a notable movement towards software tools enabling a synchronous presentation of videos accompanied by slide shows or flash movies or perhaps a combination of both.[1,2] At the same time such techniques have found their way into various educational institutions.[2,3] The video typically shows a trainer in the role of a narrator, whereas the slide show merely illustrates or explains complex background facts. This works especially well, not only in a distance learning environment but also in a blended learning situation. As far as foreign language training is concerned, it is obvious that a blended learning approach is more effective. At the Bundeshandelsakademie in Zell am See, Austria, which is a college for business administration and in a lot of subjects, there is a strong relationship with ICT topics. During the last year we have been experimenting with streaming media clips in order to provide modern software tools for language teachers especially to those who enjoy the benefit of teaching students who are equipped with notebooks and have a DSL quality internet connection. The SMILE Project [2] provides foreign language video clips with native speakers as narrators in a length of 3 to 4 minutes for each clip, the speaker's presentation is accompanied by a synchronized slide show. The project proved to be very successful, acceptance by teachers and students as well exceeded our expectations.

2 A STREAMING FILE FORMAT VERSUS UNCOMPRESSED FILES

At first sight there is no obvious necessity why video files should be brought into a streaming file format. Video clips for a VCR player have a long tradition in the classroom, captured into AVI-Container Files they would represent - depending on the source material of course – a high quality experience and a minimal effort to change the media from the traditional cassette into a VOB package on a DVD or any other suitable media, which mainly depends on the file size and the media capacity. As far as the consumption of resources on the client machine is concerned, there is, rather surprisingly not much difference compared to the same file encoded to a streaming file with a file size reduced to approximately 2 percent of the original size. Tested on a PC with an Intel PIII chip, running at a clock speed of nearly 1GHz with 512 MB of RAM both files produced a processor workload not exceeding 40 percent, disk access and RAM consumption remained - apart from some loading peaks - for the most part below 5 percent of the available capacities. Why streaming files at all? In all tests carried out - we concentrated on the Microsoft Media Series 9 world - the encoded streaming file for a size of 384x288 and a bit rate of 256 kbps proved to be of satisfying quality. Since the SMILE files were mainly expected to be delivered by local machines directly or perhaps via a LAN it was of course no problem to encode for 700kbps for the benefit of higher quality with still an exceptionally small file size as Table 1 shows.

Table 1. Comparison of file size (same source)

FILE	Compression (bit-rate)	Frames	File Size
TEST.AVI	uncompressed	25 fps	633.340 KB
TEST700.WMV	700 kbps	25 fps	11.019 KB
TEST256.WMV	256 kbps	25 fps	4.706 KB

If the streaming file is delivered via a web connection a streaming format should make use of a special protocol. In the case of .wmv or .asf - files (see the Microsoft web documentation on Windows Media Series 9 for further details this will be done by the MMS-Protocol provided by a Windows 2000 or Windows 2003 server. In case the files are encoded for a multiple bit-rate, which can easily be achieved by engaging the MS Encoder tool, there is a good chance, students will see their teacher in an acceptable quality.

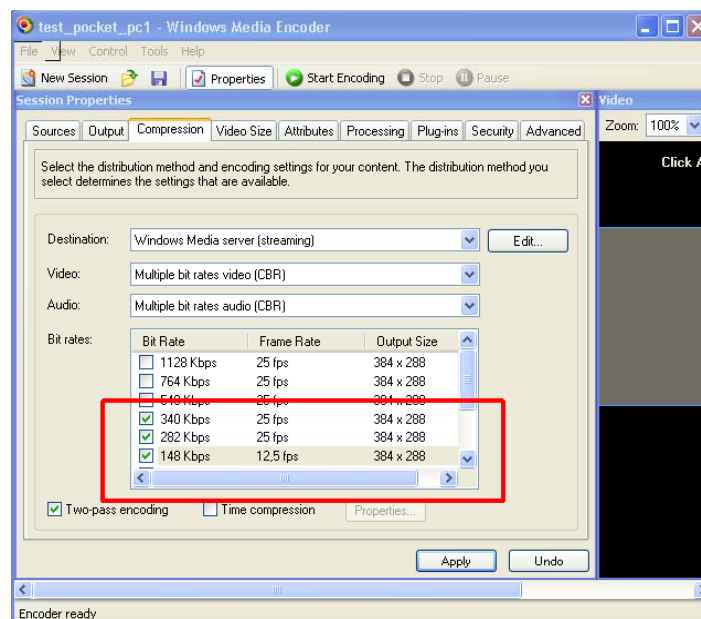


Figure 1 – MS Encoder Multiple Bit Rates

Since the main goal of the SMILE Project was to give assistance to the foreign language teacher in a classroom with notebook machines or with – at least temporarily - access to desktop computers, it was seen as sufficient to provide clips and accompanying materials via the local file system or via the school's LAN as mentioned above. The small file size is of course always helpful, either in consideration of the possibility storing complete training units on a CD or if you want to avoid unnecessary network traffic. A streaming format therefore turned out to be the clear choice.

3 EMBEDDING SMILE FILES INTO A CUSTOM MADE CLIENT

As the foreign language teacher does not necessarily have programming skills we had to engage the project group's IT staff for developing a software platform which should embed the Media Player on the left pane of the user interface, the Slide-Show Window on the right side and in the background some framework for integrating vocabulary items and exercises as well. The goal was achieved with the Borland Delphi 7 Development tool and the main window of the final application looks like this:



Figure 2 – The Main User Interface of the SMILE Client application.

The concept of this software tool provided two different layers for its real life implementation. A closed interface layer provides a fixed surface as seen here, including all the necessary controls and navigation elements which of course apply to all embedded content. The second layer, seen as content – layer, represents an open system which makes it very easy to integrate further training units including video-clips, exercises and so on. All files reside on the server or perhaps on an isolated workstation in their original format, files which are responsible for the synchronisation of videos and slides are integrated in an open

ASCII-format. The only thing any extension has to be aware of is to maintain the correct folder structure. The benefit of this approach can be seen in the possibility to offer a constant delivery of additional clips via web download based on some sort of subscription system. There is no need to recompile the program, it just works with a simple add-on technique. This might be especially appreciated for use in a vocational education environment. Topics covering new engineering developments, new production processes or new technologies in a general sense can easily be added as soon as the production workflow (scripting, video shooting, video processing, multimedia integration, quality assurance) has spawned a final product.

4 ALTERNATIVE METHODS FOR EMBEDDING STREAMING FILES

As shown above, embedding streaming files and accompanying materials into the SMILE client is very straight forward, there are of course alternatives for achieving a similar goal. First of all Microsoft Producer should be mentioned, a program offered for free download by Microsoft. There is one substantial drawback as this software requires PowerPoint installed on the developer's machine for the process of production. MS Producer provides a lot of ready made templates and thus facilitates synchronization with PowerPoint slides enormously. The final product resides on an automatically generated folder structure, hosting the whole product in HMTL-, XML-, CSS- files plus the image and video files. If additional material should be added, the whole project has to be re-generated which might be seen as some disadvantage. However, the product can be brought to the students via the web – provided there is an acceptable broadband connection – or via any other traditional approach.

For educational institutions with basic programming resources of their own, it is also possible to develop custom made applications for synchronized streaming training units by simply embedding a Media Player into HTML, the synchronization work and the display of slides can be done by a scripting language like JavaScript or JScript respectively. For comparative studies we have done so by embedding the MediaPlayer into a simple HTML table cell, the necessary slides have been put as JPG-files into a JavaScript Image-object, visually represented as an Image-Tag in the neighbouring table cell. As soon as there is a possibility to know the current position of the video it is very easy to change the source of the Image-Tag by a series of IF-Clauses. As the Media Player 9 Series Software Development Kit provides a lot of methods for controlling the video, all the necessary navigation can be done by HTML button controls and associated functions.

Since such techniques are very common, we do not consider it necessary to go into further details here. The core of such an application – as pointed out above - is a routine which delivers the accurate position of the video throughout the playing cycle.

The Media Player 9 Series SDK provides a method with the straight forward syntax: *player.controls.currentPosition()*. The method returns a double number, it can be read and set as well. The following JavaScript Code example for a function named *getPosition()* delivers the wanted position and enables easy synchronization:

```

function getPosition(action_flag)
{
  /* parameter action_flag indicates whether
  the video has been started or stopped.
  If stopped the timer will be cleared. */

  var timer_handle;
  if (action_flag == 1)
  {
    timer handle = setTimeout("getPosition(1)",1);
    video pos = Player1.controls.currentPosition;
    /* insert any rounding operation here,
    e.g. for receiving the position
    in milliseconds.*/
  }
  else
  {
    window.clearTimeout(timer_handle);
    /* video has been stopped,
    let us clear the timer. */
  }
}

```

Figure 3 – JS Code Example Video Position

5 EXAMPLE FOR A TOPIC IN VOCATIONAL EDUCATION

In vocational education it is considered very important that the proper terminology for a special field of engineering techniques will also be adopted for a foreign language by the students. English, as the modern *lingua franca* for scientific and technological communication plays the most important role in this case undoubtedly. The SMILE approach in this example concentrates on the technological background knowledge acquired in subjects as *Chemistry* or *Physics* in the students' mother tongue and now aims at repeating the basic facts in the foreign language, and at the same time providing training tools for a sufficient mastery of the terminology. A topic which might serve well as an example is the high-tech production of plastics for body components in the automotive industry. We assume the students have a basic knowledge of raw materials, their molecular structure, typical physical properties, generally used processing techniques and so on.

A SMILE language training clip named SMART PLASTICS based on such a groundwork might follow the (simplified) storyboard as shown in figure 4 below. There are outdoor sets as well as indoor sets, the overall production of a clip with a length of approximately 4 minutes requires a total of 88 hours production time, roughly split into the following tasks the time consumption runs as follows:

Table 2. Production Time Overview

Task	Working Hours
Research, Scripting, Production Planning, Administration	25
Outdoor Shooting	30
Indoor Shooting	3
Post Production	24
Quality Assurance	6
Total	88


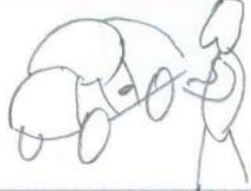



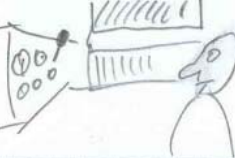

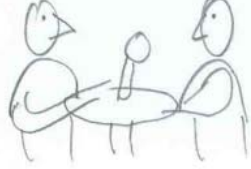
Smart Plastics		
MediaLink Zell am See		Movie Length: 0:04:30
1	Video 0:00:40	
	Introduction SMART car driving into scene. Actor gets out, knocks on the roof of the car. Comments qualities of car, presents a bag of plastic granulate. Well, my car is made of	 outdoor set
2	Video 0:00:40	
	Basic Knowledge STUDIO: Actor explains which parts are made of plastics, explains raw materials, molculare structure, processing techniques	 get blue-screen bg-image
3	Video 0:01:00	
	Thermo forming process FACTORY: Actor explains the thermo forming process, camera shoots the forming process until output of the part.	 2 camera ↑
4	Video 0:02:10	
	Summary STUDIO: Short interview with production manager, especially repetition of terminology. Actor sums up, asks 4 questions concerning the content of the clip.	 get blue-screen bg-image

Figure 4 – Simplified Story Board for “SMART PLASTICS”

As it can easily be seen, producers for this type of learning materials have to face a considerable workload for just a single clip, therefore it is very tempting to investigate the pedagogical value of the concept and the added value for an E-Learning environment.

6 E-LEARNING METHODOLOGY AND DIDACTICS: BASIC PRINCIPLES

All those involved in school education and ICT have been confronted with a drastic shift in educational paradigms and roles. Teachers are no longer the omniscient authorities of former times, and students are increasingly learning on demand – with little willingness to burden themselves with general knowledge they may not be able to apply.

- Generations of educators have incorporated the behaviouristic, cognitive and constructivist approaches to learning and teaching.
- There has been a strong tendency towards the aspects of left and right brain learning in order to enhance the acquisition of knowledge.
- Obtaining information – training – applying – assessment have been applied as the classic steps in teaching.

- Various learning types and styles have been considered in teaching: Visual, auditory and tactile learners; concrete and abstract learners; active and reflective learners; individual and group learning; learning by presenting.

So far, all these attitudes have proven helpful in many ways, but it is only now that educators are given the tools to put them into use effectively. SMILE is such a tool.

7 FACILITATION OF FOREIGN LANGUAGE LEARNING

The makers of SMILE have taken into account the various teaching methods as well as learning types and styles in order to make it easy for the students to acquire and train foreign languages. The video clips supply the students with visual and auditory stimuli. Learning is much easier if abstract ideas can be associated with pictures and sound. Technical experiments, for example, can be demonstrated in a video scene or flash animation in addition to the explanation in words. A mixture of multiple methods has a larger impact on the sustainability of knowledge.

This is a listing of SMILE's proposed learning steps:

- The students acquire information by watching the video clip and listening to the speaker. At this stage, students will benefit from the native speakers' intonation.
- They learn about the new words in the vocabulary section with audio files rendering the correct pronunciation.
- They summarize the clip's content by answering the questions asked at the end of every clip.
- They train the acquired knowledge in the exercises section.
- They multiply their knowledge by browsing pre-selected websites.
- They apply their knowledge in text writing, class discussion or presentation in front of the class.
- Students will be assessed by their contribution to class discussion, essay writing and class presentation.

SMILE may be used as a tool for distance learning, but for schools it has been designed for use in a blended learning setting which we feel is most essential to learning. The integrated lesson plans suggest that the video clip should be embedded in a face-to-face teaching environment. So what we are aiming at is team-orientation and co-operation in the course of a SMILE learning unit that may cover several hours of work.

8 THE VALUE AS SEEN FROM THE TEACHER'S PERSPECTIVE

When teachers start work with SMILE in their MFL lessons, they may want to have a look at the integrated lesson plans first. These have been made and tested in classes by language teachers adept at e-learning.

As soon as the students have started work, teachers will benefit from the individualized approach inherent to SMILE: Students who are advancing fast will not need their teacher's attention to a great extent. As a consequence, the teacher gains more time to help and concentrate on students who are working at a slower pace. At this point, let us explain in more detail the role changes when teaching with SMILE: Teachers who may be used to working as lecturers will soon find out that there is some relief. They will find themselves as tutors or coaches, guiding and assisting their students rather than advising them.

Teachers may also want to adopt from the lesson plans the idea of multiple approach to the content as mentioned above.

Another benefit for the teacher is the easy organization of such learning units. Information material can be easily distributed, and there is easy access to the content as it is possible to upload or delete training units according to the particular stage within the learning process.

9. CONCLUSION AND INTERMEDIATE EVALUATION OF SMILE

In the course of this school year, SMILE units have been tested by several teachers and classes for the English, Italian and French languages. Generally speaking, students and teachers have enjoyed these learning/teaching units to a great extent. The program is officially launched on April 5th, 2004. In the course of scheduling the official evaluation questionnaire will be handed out as soon as the students and teachers have had sufficient opportunity to work with SMILE. The results will be part of our presentation at the iCEER in June and will also be published on the <http://w3.hakzell.at/smile/eval/> web-site which will be open starting with June 15th, 2004.

An informal intermediate evaluation, carried out at the Bundeshandelsakademie Zell am See, brought the following results:

- Both teachers for Italian as a foreign language were immediately ready to make use of the SMILE clips.
- Three out of five teachers for the French language promised to make use of the SMILE clips.
- Only two teachers out of seven for the English language are ready to integrate SMILE clips into their training units.
- Three teachers for different foreign languages immediately engaged in writing scripts and exercises.
- Nine percent of schools have placed SMILE orders in advance after having seen a presentation for the first time.
- School twinning with a College for Business Administration could be established in order to produce clips for the Spanish language.
- Roughly 80 percent of students declare that they like the SMILE approach and enjoy working with the clips.
- Roughly 20 percent of students think that the clips are too long.

All in all – even the considerable amount of working hours necessary in view – it can be said, that the SMILE approach seems to produce promising results. A reliable evaluation, soon to come as mentioned above, however, will require broader implementation and an elaborated set of investigating tools.

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