STREAMING VIDEO FOR ENHANCED FOREIGN LANGUAGE TRAINING IN SECONDARY AND TERTIARY 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 Learning Experience) aims at the enhancement of foreign language learning by making use of the streaming video technology. The SMILE approach with synchronized slides accompanying a video clip combines language training with a better understanding of technical processes. The main component of the SMILE software is 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 e-learning software have taken into account state of the art technology, didactics and methodology. The program may either be used for secondary or tertiary education in a blended learning environment or as a distance learning device. We will demonstrate its employment as a means of language teaching with the focus on the technical terminology for a selected topic of molecular biology (DNA profile).

KEY WORDS
Streaming Video - Foreign Language Training - Blended Learning - Distance Learning - Technical Terminology

INTRODUCTION

The Austrian SMILE project started in December 2002 and since its very beginning has followed the aim to investigate possible enhancements in Modern Foreign Language Learning [1] by employing Streaming Videos plus additional - more or less traditional – learning materials. The SMILE acronym originally stands for "Streaming Video for Interactive Language Experience" but in the meantime it has become quite clear to the project team, that "Language Experience" could be easily substituted by the term "Learning Experience" since the SMILE approach has proved to be very flexible and well apt for other subjects as well. Generally speaking a SMILE Learning Unit consists of a streaming video clip presented in a video window which is accompanied by a second window of the same size on its right side which shows synchronized content that underlines the speaker's words. Choosing a very popular topic concerning methods of modern forensic investigation techniques, the Digital Fingerprint respectively, it soon became clear that the SMILE approach would also be very well suited to present the basics of molecular biology to students – apart from MFL - in a very efficient way. As a consequence the project will be extended to these fields with support of the Austrian Ministry for Education, Science, and Culture during the first six months of 2005. The clip titled "The Digital Fingerprint" as presented in this paper can be seen as an early bridge leading to a much broader way in implementing streaming technologies for a lot of fairly complicated topics even reaching the level of basics for tertiary education.

THE SMILE PRODUCTION WORKFLOW

Since the traditional SMILE project has already covered the languages English, French, Italian, and Spanish – some single topics are also available in Hungarian, Polish, and Russian – there is the need for a considerable workforce of authors, actors, directors, post production experts and reviewers. As each SMILE learning unit is also accompanied with additional training materials it soon became clear that coordinating the production and filing all the constantly growing amount of diverse materials requires strict organisation and custom made collaboration and storage tools. The demand has finally been met by a specially designed web-based project platform which collects all the material on the one hand and on the other hand documents the work progress for each clip. The platform is based on a MySQL database connected to a PHP driven web interface. The basic structure of the SMILE Working platform is shown below:
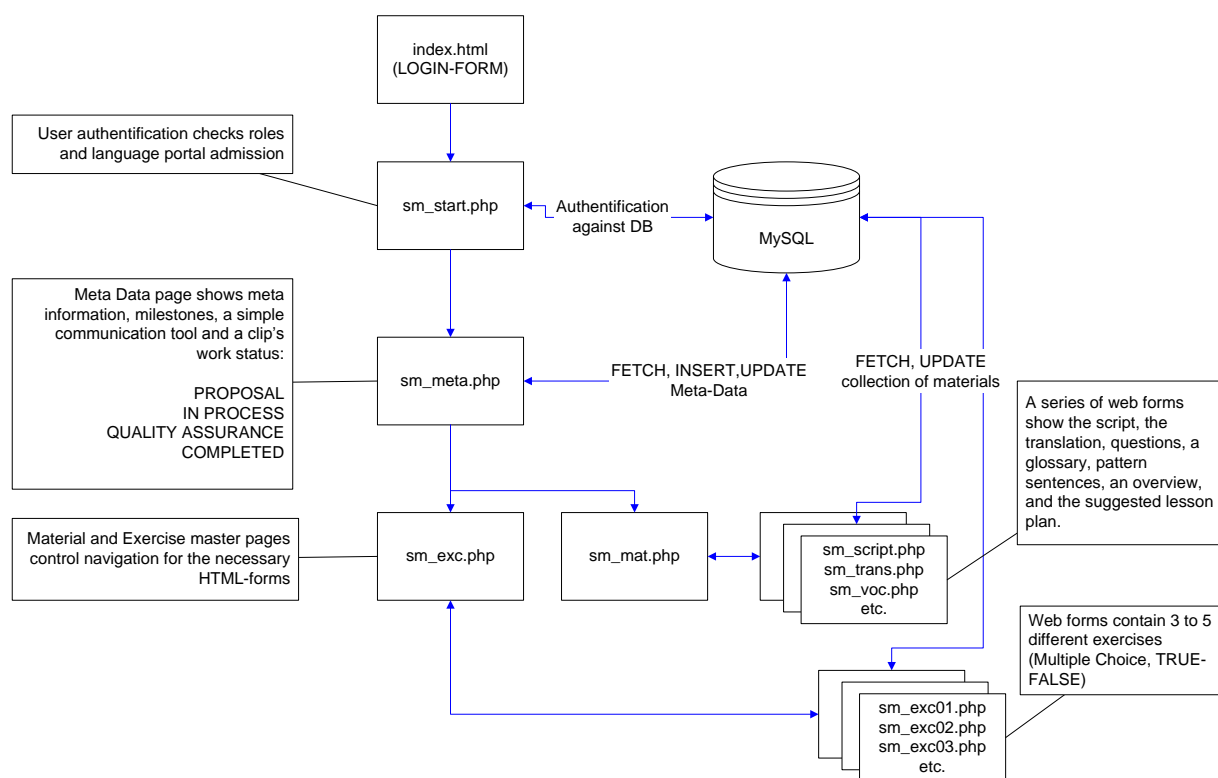

Figure 1. Basic scheme of the SMILE Working platform

The project team is split into authors, reviewers, language team leaders and the members of the production and coordination team. As soon as an author has inserted a proposal for a special topic into the Metadata page an automated e-mail notification is triggered informing the project coordinator and the responsible team leader. If there is no objection the author will start the work progress and the collection of the material can be watched by the project team. As soon as the basic materials are available, the next steps of production can be undertaken. The main production steps for a SMILE standard MFL clip connected with the average time consumption can be split into the following tasks:

Table 1. Main production steps and time consumption

Task	Working Hours
Research, Scripting, Production Planning, Administration	25
Outdoor Shooting	30
Indoor Shooting	3
Post Production	24
Quality Assurance	6
Final assembly	3
Total	**91**

THE TYPICAL SMILE INDOOR SET

As SMILE clips make use of the *Chroma-Key* technology for the speaker's background the indoor set layout has to take into account the presence of a blue screen in the background of the speaker. This means that the lighting has to be adjusted in a way that avoids throwing shadows of the speaker to the blue screen. Experience has shown that a speaker's distance of about 1 metre from the blue screen is essential in this respect. A traditional lighting of three spots as available in a professional video lighting gear is used and provides really acceptable results. Mostly Lavalier radio microphones are used, sometimes, if there are no dialogue scenes required, it is also possible to use a high quality standard condenser microphone with a fairly narrow pickup pattern in order to avoid external noise interferences. There is a set of two three-chip-cameras (JVC-300 GA) each of them connected to a notebook via Firewire (IEEE-1394) which makes it possible to be in constant control of the real framing, since the viewers of the cameras usually do not show the exact format of the scene. Within the framework of producing video clips for educational purposes with a very limited budget it is of course not possible to compete with the equipment of a broadcast corporation. This drawback generally does not play an important role since semiprofessional video equipment delivers really satisfying results. But there is one exception. Professional teleprompters as used in any commercial broadcasting company secure the speaker's eye-contact with the audience, whereas reading from a piece of paper might become an annoying and disturbing feature sooner or later. The SMILE production team has found an acceptable workaround which soon was called *Peephole-Screen-Prompter*. The main camera is put behind a white screen in front of the speaker and the camera's objective is looking through a peephole in the upper part of the screen. A standard data projector is used to project the script to the screen just underneath the peephole. This method has proved to work well with most of the speakers, the speakers' eye movements could have been reduced to a minimum and it seems that the speakers keep a close contact with their audience.

SMILE OUTDOOR SET EXPERIENCE

SMILE clips made for MFL purposes usually start with an outdoor shooting at the original locations connected to the content of a clip. The clip for instance which is especially dealt with in this paper starts with an introductory scene at the Eagle pub in Cambridge. Beside all the problems of getting the necessary filming permissions on such premises there is always the problem of capturing the sound in a sufficient quality. As it is in most cases not possible to install Lavalier micros including the necessary radio receivers plus a sound mixer it is clear that a workaround has to be found. The first approach was to equip speakers with Lavalier-like microphones attached to minidisk recorders and to import the recorded sound later on. It turned out that this method initially worked satisfyingly and as long as the sound remained connected to the AVI file the quality appeared to be acceptable. But as soon as the clips were compressed, the included original sound for still unknown reasons deteriorated in an unacceptable way. As a consequence – wherever it is possible – any further approach will make use of a microphone directly connected to the external camera microphone socket, held by a boom to capture the best audio quality just outside the picture.

FILE FORMATS AND COMPRESSION

SMILE files are captured in the highest possible quality AVI-format, are then edited and finally compressed to three streaming formats which are suitable for three different platforms supporting Microsoft Windows Media 9 series. The platforms in question are a typical 100 Mb LAN, delivery for internet access by means of a streaming server and a broadband connection (typically CABLE or ADSL), and for the MS Media Player on Pocket PCs. The compression data are the following:

Table 2. Compression data for finished SMILE clips

Compression (Platform)	Video size	Frames (sec)	Codec
700 Kbps (LAN)	352x288	25	Windows Media 9
148 Kbps (Web-based)	352x288	15	Windows Media 9
143 Kbps (Pocket PC)	208x160	8	Windows Media 9

As soon as all the post-production work with the AVI-File is completed, all the compression work is done automatically by batch files with the help of the Windows Scripting Host and profile-files that can be designed with the Windows Media Profile Editor. This tool is – at this time – available for free at the Microsoft Windows Media web-site. The definition for a profile to receive an output according to the list above is straight forward. Each compression format of course requires a specially designed profile, but the necessary commands to deliver the output can easily be put into a traditional batch file so that finally the call of one batch file will do all the work. The example below shows the configuration of the Windows Media Profile Editor with an output request for web-based video delivery at a rate of 148Kbps:
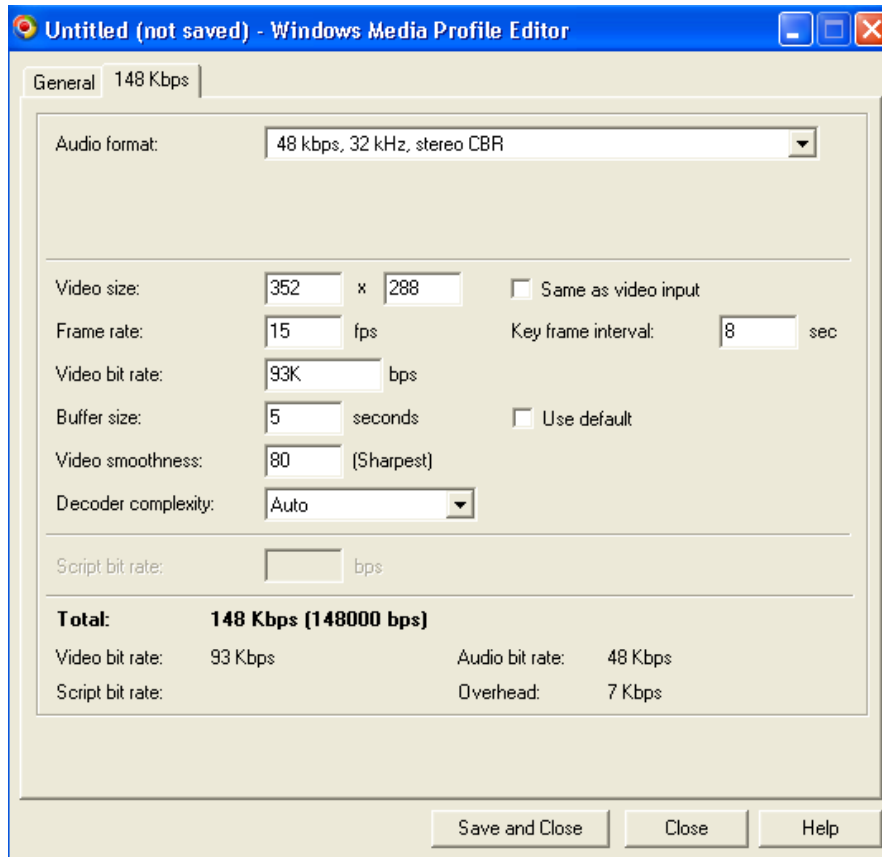

Figure 2. 148Kbps Configuration interface of the Windows Media Profile Editor

The profile data is stored in a binary file with a default extension of *.prx*, which might lead to a file name like *avi_2_148.prx*. The content of a batch file making use of this exemplary profile consists of a call to the WSH, includes a ready made VBS script then names the source folder, then defines an output folder, and finally specifies the appropriate profile file. The content of a batch file, for the matter of simplicity only one target compression is involved here, could look like this:
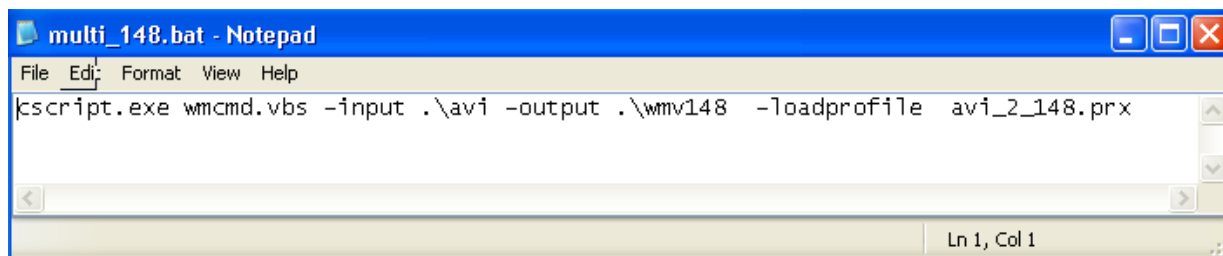

Figure 3. Batch file content for an automated compression process

THE SMILE CLIENT APPLICATION

One of the most convenient ways to integrate SMILE clips into a computer assisted learning framework is to make use of the custom made SMILE client. Of course there are a lot of other possibilities to integrate SMILE clips [2], but a more detailed discussion would go far beyond the scope of this paper. Basically the SMILE Client application provides two different layers for the students' work. A closed interface layer provides two fixed windows (see figure 4) which present the video clip on the left pane and a slide-show window with synchronized additional visualizations on the right pane.
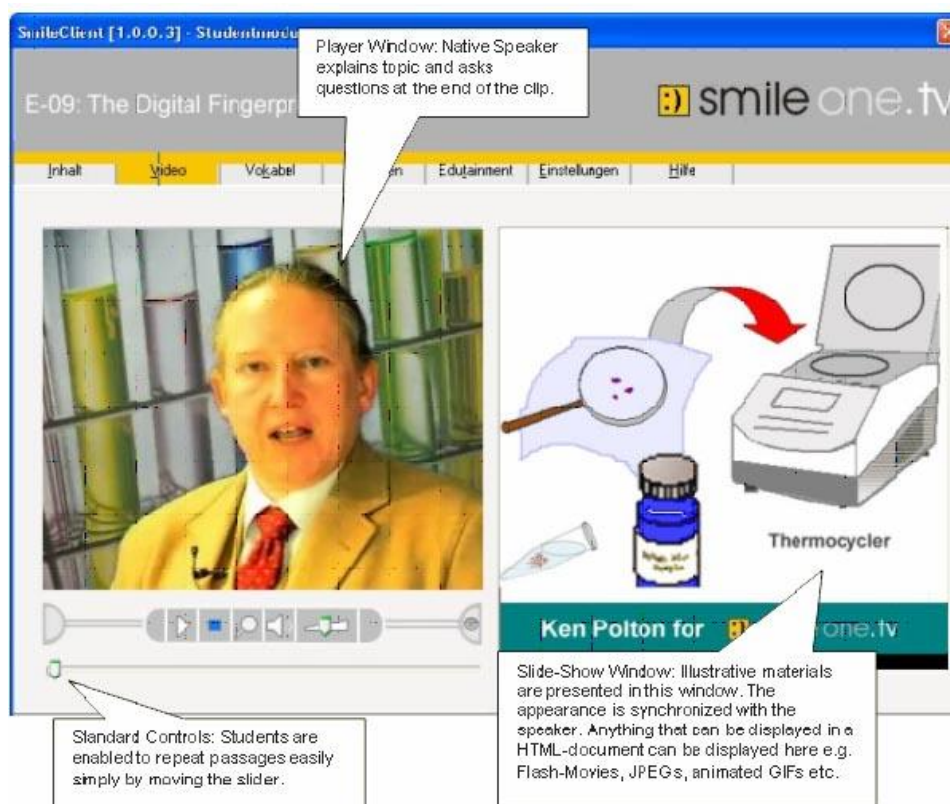

Figure 4. The main interface of the SMILE Client application

A second layer covers additional materials like training units, glossaries, lesson plans etc. The second layer is designed as an open system which means that trainers can easily include their own pool of training units regardless of their file format. The basic methodological approach, however, relies on the idea of combining video clips with illustrating or emphasizing elements in a separate display. The possibility of illustrating the speaker's words with animations facilitates the explanation of complicated matters and offers a lot of methodological advantages as can be seen below.

THE DIGITAL FINGERPRINT – PLANNING AND REALISATION

The objectives of this clip are to deliver the most important English terminology for the process of gaining a person's DNA profile. Since this technique appears again and again in newspaper reports or on television news all over the world, nearly every student is familiar with the term DNA analysis but only a few people know the technological background and even fewer will be able to describe the process in English if it is a foreign language to them. The clip "Digital Fingerprint" aims at providing the most substantial information about the historical background, about its importance in modern forensic investigation and gives a very simplified idea how the laboratory work is done to receive a DNA profile. The latter topic of course is highly complicated in the real world, nevertheless SMILE might make it possible to understand the underlying basics of molecular biology in this connection. The planning of a clip has to take all these aspects into consideration and the following working plan in the form of a simplified storyboard will show how this SMILE clip came into existence.

Table 3. Storyboard for "The Digital Fingerprint"

E09 The Digital Fingerprint			
SMILE Project E09			Movie Length: 00:07:00
Video	**Camera**	**Slide-Window**	**Location**
Introduction: Actor sits in the Eagle, describes the pub and its historic connection to Crick and Watson	OUT 01:30 CAM1	Laboratory (JPG) Eagle outside front (JPG) King's College (JPG) Eagle ceiling (JPG) Calendar Feb 28th, 1953 Double helix (SWF)	The Eagle Pub, Cambridge, UK
Murder case: Actor describes the Narborough murders, introduces David Baker (CID Leicestershire)	OUT 3:00 CAM1 CAM2 (CLOSE)	Map (SWF) Newspaper (JPG) Police station (JPG)	Studio
Mass screening: Actor describes first mass screening for DNA samples, introduces Sir Alec Jeffreys, first time DNA had proved innocence of a person	OUT 4:00 CAM1	Taking saliva samples (SWF) Portrait Jeffreys (JPG) Courtroom (JPG)	Studio
Basic principles of DNA analysis: Actor describes different methods, concentrates on PCR approach	OUT 06:00 CAM1 CAM2 (CLOSE)	Diagram of methods (JPG) STR diagram (JPG) PCR-machine (SWF) DNA zipper (SWF) Laser output diagram (SWF) Laboratory work (WMV)	Studio; Laboratory University of Salzburg (Dept. of Molecular Biology)
Questions 1 - 4	OUT 07:00 CAM1	Text (JPG)	Studio

INCLUDED METADATA AND LESSON PLAN

In order to supply teachers with the necessary information, SMILE provides a file including the metadata and, as a recommendation, a lesson plan for each of the clips. This information file is clearly structured and available in the related foreign language.

We feel it is an absolute requirement for teachers to obtain an overview of each teaching unit in order to decide which clip to choose for their classes, depending on their students' language level, the topic, the time allowance etc.

Much MFL teaching material that is available on the internet is difficult to put into effective use due to the lack of this kind of information.

Table 4. Exemplary file including metadata and lesson plan

Title:
Digital Fingerprint

Author:
Mag. Hans Hebenstreit, Bundeshandelsakademie Zell am See, E-mail: hebehans@sbg.at

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Grades:
Upper secondary level

Language Requirements:
Upper intermediate level; B2

Subjects:
English as a foreign language; Biology; Language Integrated Learning

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Topic:
DNA identification

Overview:
The clip explains the DNA analysis technique that is called "DNA fingerprinting" and supplies the students with the story of a thrilling murder hunt. For the first time in the 1980s, criminal investigators succeeded in detecting a murderer by applying DNA analysis. The clip also shows two main methods of DNA identification and the related laboratory processes.

Time Allowance: 2 or 3 lessons (at school); 1-2 hours (homework)

Objectives:
The students will be introduced a major aspect of molecular biology, which is the DNA analysis technique called "digital fingerprinting". They will learn vocabulary related with molecular biology and forensic science. As for grammar, the students will repeat relative clauses and linking words.

Resources:
SMILE clip Digital Fingerprint; See below for web-hints

Teaching/Learning Activity:
- Class talk: What do the students know about DNA? Reference to occurrences when DNA fingerprinting is/was used or to biology lessons
- Watching the video clip Digital Fingerprint
- Answering the questions in writing
- Interactive training units
- Homework: Watching the clip and doing the interactive training again; learning vocabulary; searching for additional information (see for URLs below)
- Verbal summaries of the clip; answering of teacher's questions
- Students make up short presentations on specific sights in more detail and finish them at home
- Students present their topics to the class

SMILE'S VOCABULARY SECTION

Each SMILE clip aims at the enhancement of vocabulary learning and use, always in relation to a specific topic. The vocabulary section is a listing of the English terms with an English definition and the German word. This is a combination of the more modern approach to language teaching – not using any talk in the students' native tongue – and the dictionary approach for an exact translation.

Table 5. SMILE vocabulary section (abridged)

faculty	department of a university	Fakultät, Fachbereich
helical	adj. in the shape of a spiral	spiralenförmig
molecular	adj. molecule, group of atoms	molekular
DNA deoxyribonucleic acid	acid that carries genetic information	Desoxyribonukleinsäure
genetics	scientific discipline concerning hereditary transmission	Genetik, Vererbungslehre
criminology	scientific study of crime	Kriminologie
to rape	to force somebody to have sex	vergewaltigen
rapist	person who forces somebody to have sex	Vergewaltiger
investigation	careful examination of facts	Untersuchung
forensic	connected with a criminal court of law	forensisch
assailant	a person who attacks	Angreifer
suspect	a person who seems to be guilty	ein Verdächtiger
technique	way of doing something	(Arbeits-)technik, Methode
mass screening	examining a large number of people	Massen Untersuchung
biological traces	very small amounts of biological substances	biologische Spuren
to sentence	to express a certain amount punishment in a court of law	verurteilen
imprisonment	to be put into prison	Haftstrafe
polymerase	any of several enzymes that catalyze the formation of DNA	Polymerase (biol.)
to mimick	to imitate a person or a special process	nachahmen
to purify	to remove substances in order to get a clean product	reinigen
fluorescent	producing bright light	fluoreszierend, leuchtend
label	information attached to something	Etikette
primer	here:a molecule whose presence is required for formation of another molecule	Primer (biol.)

In addition, each English word in the list is available as an audio file for students to learn the accurate pronunciation. As contextual learning has always been an approved method of acquiring and perceiving language, SMILE also provides the students with the word in its context – that is the specific sentence in which it appears in the clip. Thus SMILE facilitates a versatile approach to vocabulary learning strategies.

CONCLUSION

SMILE incorporates various teaching methods as well as learning types and styles in order to simplify the students' acquisition and training of foreign languages. The video clips supply the students with visual and auditory stimuli. Learning is much easier if abstract ideas can be associated with movement, pictures and sound. The DNA structure, for example, can be explained by the presenter of the clip, and it can be visualised as an animation. A mixture of multiple methods will most certainly have a larger impact on the sustainability of knowledge.

Within the learning process, this multiple approach may be implemented as follows: Watching the video clip (comprehension), answering the questions (oral practice) learning the new vocabulary (understanding, use and pronunciation of words), summary in writing (comprehension, structured writing, style), grammar training and comprehension in the exercises section (enhancement of the acquired knowledge, repetition of basic grammar), browsing pre-selected websites (enlargement of knowledge), class discussion and presentations in front of the class (enhancement of topic, rhetoric, presentation techniques), assessment (vocabulary tests, essays, class discussion, class presentations).

SMILE may be used as a tool for distance learning, but for schools it has been designed as a tool in a blended learning setting which we feel is crucial to learning with digital media.

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