The Combine Effect of Synchronous and Asynchronous E-Learning on Distance Education

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Abstract

The aim of this paper is to highlight the combine effect of synchronous as well as asynchronous in E-learning environment. Both type of learning have importance in different scenario. Not one of them can fulfill whole requirement individually. Synchronous training is done in real-time with a live instructor facilitating the training. Everyone logs in at a set time and can communicate directly with the instructor and with each other. It lasts for a set amount of time - from a single session to several weeks, months or even years. Asynchronous is e-learning in the more traditional sense of the word. It involves self-paced learning, CD-ROM-based, Network-based, Intranet-based or Internet-based. It may include access to instructors through on-line bulletin boards, on-line discussion groups and e-mail.

Keywords: *Asynchronous e-Learning, real-time, self-paced learning, Synchronous e-Learning*

1.   Introduction

Currently majority (over 80 %) of Distance Education Courses are paper based [1][2]. Internet based trainees are typically limited to the hypertext and graphics but not to high quality streaming video due to connection speeds obligation For example WebELS and Smart EDU e-learning   platforms [3][4] supports a special type of contents i.e. slide with synchronized audio and cursor in addition to traditional multimedia contents and conceptually it is a fusion of synchronous and asynchronous e-Learning system. WebELS provides a web-based, multimedia enabled multi-platform tool, by which traditional instructors can archive their learning materials on the web and students can do their personal learning over the Internet. Uploaded contents can be used either in standalone or group learning in real-time with discussion. It supports wide range of multimedia contents including text, images, audio, video and slides with synchronized audio and cursor. Majority of the presentation video can be simulated with audio and cursor synchronized slides except introduction and conclusion parts where cameraman focuses on the face of the presenter. With audio and cursor synchronized slides, it is possible simulate presentation video which drastically reduces data volume and improves contents visualization. Such type system supports both synchronized online presentation as well as asynchronous off-line viewing SMART EDU integrates CBT and WBT functionalities with additional tools as follows:

Synchronous (Trainees and Trainer meet in the same time):
TV quality Live Video and Audio
Recorded Video and Audio
PC Screen Tests
Questions to Trainer
Chat

Asynchronous (Trainees and Trainer does P Discussion Forum not has to be present in the same time):
Knowledge Base Large File transmission

From the psychological point of view advantage of TV like quality video is tremendous for training purposes. It breaks several psychological barriers like isolation in self-learning environment and/or passivity. It is often being understood as a videoconferencing system. SMART EDU differs from videoconference in quality of provided video. Due to the Satellite communication It is able to provide trainees with TV quality video (2 mbps) that videoconference (ISDN or Internet based) is not capable to achieve. It results in lower picture resolution, and speed of move (images per second). On the other hand videoconferencing system assures feedback through video channel. Video feedback is planned to he incorporated in the Meeting mode while Conferencing and Training mode supports text based feedback. SMART EDU on top of

videoconference system provides training tools of WBT, CBT not available by ordinary videoconference systems.

2. Background

2.1 Terminology of e-Learning

A novel world of learning is opening up in the knowledge economy of computer-based learning, online learning, e-learning, and distance learning. In a review of the literature (on terms such as e-learning), technology based learning and Web-based learning are defined and used differently by different organizations and user groups. However, these only form parts of the many modes of learning that will be increasingly essential as education and training becomes part of the lifelong experience of people working in knowledge based projects [5]. With regards to e-learning, Clarke classifies it as the delivery of content via all electronic media, including the Internet, intranets, extranets, satellite broadcast, audio/video tape, interactive TV, and CD-ROM. Moreover it used synonymously with technology based learning.

2.2 Synchronous Training

Synchronous training is done in real-time with a live instructor facilitating the training. Everyone logs in at a set time and can communicate directly with the instructor and with each other. It lasts for a set amount of time - from a single session to several weeks, months or even years. This type of training usually takes place via Internet Web sites, audio- or video-conferencing, Internet telephony, or even two-way live broadcasts to students in a classroom.[6]

2.3 Asynchronous Training

This is e-learning in the more traditional sense of the word. It involves self-paced learning, CD-ROM-based, Network-based, Intranet-based or Internet-based. It may include access to instructors through on-line bulletin boards, on-line discussion groups and e-mail. Or, it may be totally self-contained with links to reference materials in place of a live instructor.[6]

3. Learning Objects

Learning objects are "windows" containing different information and each Learning Object present different media format. These objects can be mixed into various Screen Layouts. Learning objects can be handled in 2 different ways, in a Live Sessions or as Uploaded Educational materials, are:

3.1 "Live session only" learning objects

Supported Learning objects in a Live Session are well explained at a picture below inside the Remote Studio application, where they are used.

Live Video (Streaming Video)
Source of Live Video is a Video Camera. Video is compressed in Video encoder (Lossy compression). Audio is normally part of a Video signal multiplexed and synchronized with video. Microphone from a Video Camera or external equipment must be connected to the sound card of Audio Encoder. Video Audio encoder performs precise time stamping to enable synchronization of video with audio at Trainee Site.

Live Audio
Another Live Audio channel *can* transmitted when needed e.g. in a case of simultaneous translations.

PC Screen
"PC Screen" object enables to transmit images of the Trainer's PC Screen. In *this* way Trainer can show to trainees various objects a**s** Slides, Spreadsheets, Text files etc. with a slow motion requiring clean resolution of characters and numbers. PC screen uses lossless compression what is important to support clear readability of text and numbers at Trainee sites. PC Screen can be accompanied with Audio. Source of this audio can be Trainer's speech but also PC application audio - for example when used in Power Point presentations.

Text
Text is a simple text box allowing putting a text message at the screen or describe other objects

Question
Question object is used to display currently answered (selected) Trainee's question from interactive module. It helps Trainees to see the topic discussed.

Subtitling
Subtitling is a text which is designed to help better understand Trainer's speech. It's goal is to support intelligibility for example of unusual pronunciation (e.g. English speaking French man). Written text provides helpful additional information in case even simple words are not understood clearly. This helps overcome intercultural differences in language understanding.

3.2 Learning objects which can be used in a live session as well as in educational materials:

Prerecorded video or audio
Pre-recorded video or audio files used in a live session or Uploaded via "Educational Material" tool are to be compressed in a supported format. There is a tool for reformatting other format types to SMART EDU supported. SMART EDU uses XVid (MPEG-4) video compression and MP3 audio compression.

Pictures
Pictures are frequently used tool for supporting explanation. All generally accepted picture formats are supported (e.g. *.jpg, *.gif, *bmp etc). It is up to the

Trainer what combination of Learning Objects she/he uses in her/his training. Screen layout can consist from a single Learning Objects such as Live Video with Audio or PC Screen with Audio only up to more objects. At a picture bellow is a sample of Screen Layout using background picture and recorded video.

"*Educational Material" Learning Objects*

Via this tool Trainer can transmit any educational materials to support training process. Educational material can present any file format recognized by Trainee PC. These can be books, slides, sample source
codes, animations, simulators etc.

4.   Uses and Application

The development of the global information society places new demands on the creation and delivery of learning materials and educational services. Education systems must learn to harness ICT to access a wider knowledge base and to help develop a new technology of learning. Yet in this still rapidly-changing sphere, the education world struggles to respond adequately to successive demands [7] The report " Europe and the global information society" (May 1994)**,** produced by the high-level group chaired by Mr. Bangemann, stressed, "that throughout the world, information and telecommunications technologies are bringing about a new industrial revolution which already looks to be as important and radical as those which preceded it, increased use of subcontracting, the development of work in teams, are some of the consequences of information technology. Information technology is contributing to the disappearance of routine and repetitive work which can be codified, programmed and automated. Work content will increasingly be made up of intelligent tasks requiring initiative and the ability to adapt. "It is estimated that every year in the EU at least 20% of the economically active population is engaged in continuing vocational training/ education of various kinds for two weeks on average. According to a survey carried out in 1993 in 12 Member States, some 5% of male employees and 6% of female employees aged over 25 had undergone vocational training in the four weeks prior to the survey." [8] There are detailed tables proving high grow of ICT spending for ICT in Education in OECD countries. It is based on statistics gathered from OECD countries. Most of the ICT spending is represented by Internet Access and PC purchase, but very low/ or no spending are reported for special educational ICT system offering broadband access to high quality video materials in real-time or pre- recorder. Average Internet connection speed in schools if any is very low not allowing to provide acceptable ways of tele-education. Good examples of SMART EDU applications are in life- long and vocational training. In fact SMART EDU can be used effectively in:

- Training teachers for improving ICT skills
- Creating teams of top specialists (e.g. medicine, auditors, accountants, lawyers.)
- Virtual Programming University (e.g. JAVA University)
- Sales agent trainings (e.g. in Insurance Companies)
- Retail chain trainings (e.g. electronic equipment suppliers: cameras, printers, faxes etc.)
- Medicine (theoretical + live sessions from hospitals, from surgery rooms, etc., for all specializations such as Hearth, Tropical diseases, Neurosurgery, Genetics, Cancer, etc.)
- Technical trainings (Telecommunication: ADSL, Satellite communication; Cryptology; OS administration: Windows, Unix, etc.; Databases)
- SW customer support trainings (e.g. for banks introducing new SW)
- Financial products trainings
- Technologies (Installation of civil and industrial plants; Car services: repair from car manufacturer; Electrical; Antitheft   and alarms; Environmental protection in industries; Fire prevention.. .)
- E-Government (e.g. Ministries of Construction, Interior, Environment, Education, Tax offices, Defense & army, Custom at borderlines.)
- Tourism (e.g. Hotel chains staff trainings)
- Professional Associations (Auditors, Notaries, Accountants, etc.)
- Chamber of Commerce
- Non-profit organizations
- International networks
- Development Aid Organizations (UNDP, UNESCO etc.)
- Unemployment offices (e.g. Requalification courses)

5.   Design Concepts and Goal

- E-Learning system designed to meet the requests of postgraduate education. PhD program is the main target of use
- Supporting seamless service of asynchronous and synchronous e-Learning: Asynchronous self-learning and synchronous Internet meeting using same contents
- Multi-OS system: Supports both Windows users and Mac users at same quality
- Powerful authoring features for end-users: One click uploading editor for Power Point, pdf, audio/video contents
- Multi-language interface to support international use: Automatic selection of English (standard),Japanese, Chinese, etc
- "Anywhere, anytime & anybody" system:

6.   Major Objectives

- Provide a general purpose e-Learning environment for distributed and internationalized post-graduate education:

Distance learning, distance meeting, Multilanguage, synchronous/asynchronous

- Provide a variety of distance learning functions such as Internet interview, Internet conference, annotation system, on-line whiteboard.
- Provide a powerful authoring feature to assist the lack of other e-Learning platforms i.e. Integration to such as Moodle, Blackboard, WebCT etc.
- Independent offline viewing system

7. Results

The students were asked to choose an answer between A-F, according to how strongly they agree with the statement of the questions [9]. The answers are shown in Fig. 1. A total of 108 students participated in this survey. Response to survey questions 1 trough 8 5 reveal that students like to utilize the online course material as supplementary material because of the multimedia features, animations, graphics and simulations used. However, there seems to be resistance on part of the students to the idea of replacing the traditional face-to-face classes with learning fully online. A recent news report released by Cnet [10], one of the leading on-line publishing companies, suggested that an Internet-based learning system: "use a wide range of technology to make learning as easy and collaborative as possible. While the level of sophistication varies, standard to most Web courses are communication systems, such as email, real-time chat rooms, and threaded discussion groups that let students interact with instructors and each other online." More specifically, this kind of Internet-based learning system should have the following learning and teaching features:[11]As results shown in Table 1, we had 73 student's models in Fall 07, 113 student's models for Winter 08, 357 student's models for Spring 08 and 173 student's models for Summer 08.[12]

Table 1: Studend's Usage Preferences

	Fall 07	Winter 08	Spring 08	Summer 08
# of Recording	388	47	756	378
# of Students Models	73	113	357	173
# of Viewings (streaming)	3542	1477	7579	2579
# of Downloads	356	356	433	434
# of Podcasts	81	81	136	136
# of Mp3	13	32	40	40
Avg. of reviewing/ student	10	13	10	15

Table 2: The features of online education

| Electronic lecture notes	- Providing with student-customized Materials
Message system	Connecting the course participants so as to achieve communication and collaboration purposes
Discussion	Enabling real –time chat or threaded discussions
Interactive quizzes and self-assessment	Generating on line quizzes which are marked by the server
Course creation	Allowing the instructors to construct or modify their materials
Course management	Having a database management system which helps to organize the course materials
Student management	Having a database management system which helps to organize the students information and to track the individual user so that customized services can be provided.
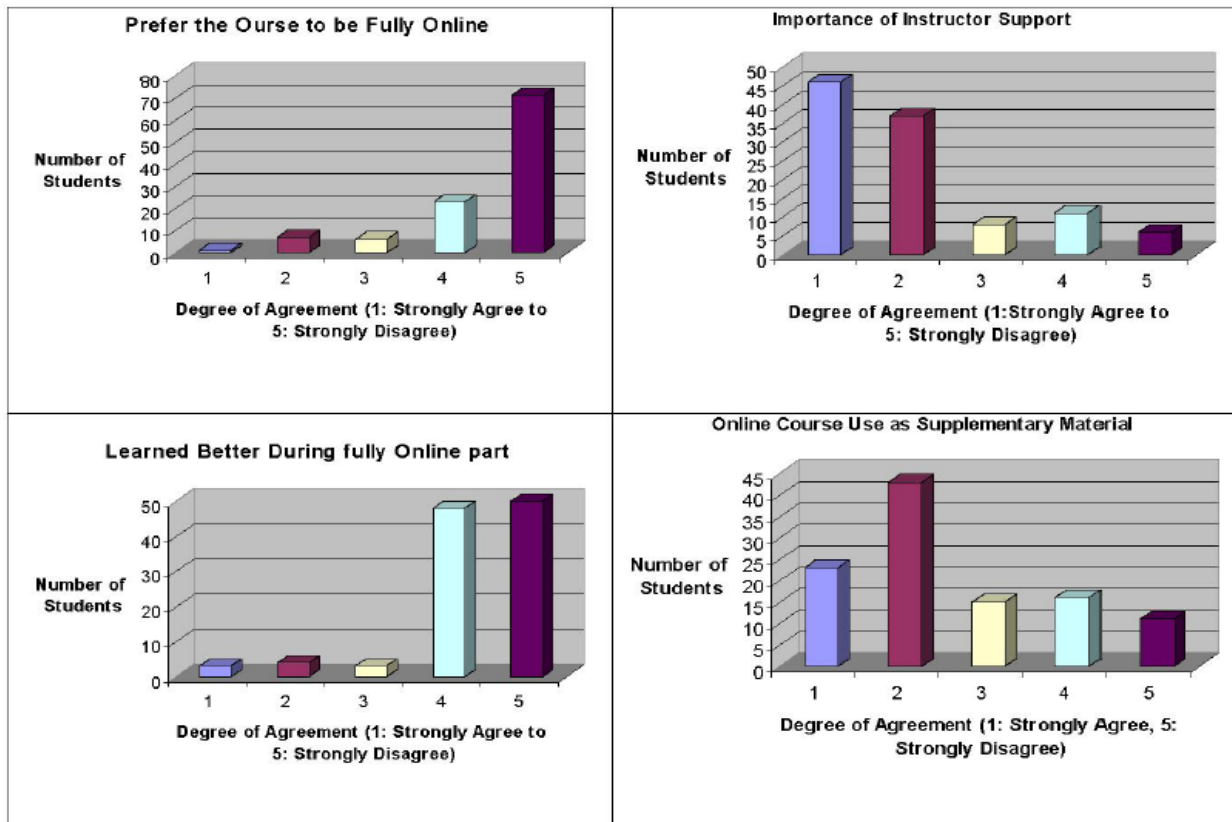
Fig. 1: Survey on 108 students

8. Conclusion

This paper discusses multimedia e-learning environment in education and conceptually it is a fusion of synchronous and asynchronous e-Learning system. It provides a web-based, multimedia enabled multi-platform tool, by which traditional instructors can archive their learning materials on the web and students can do their personal learning over the Internet. Uploaded contents can be used either in standalone or group learning in real-time with discussion. It supports wide range of multimedia contents including text, images, audio and video as well as audio and cursor synchronized slides which can be considered a special type of content and simulate video with drastic reduction in volume.

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