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**Development of Video in Higher Education
- From Past to Present to Future**

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Development of Video in Higher Education - From Past to Present to Future

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Abstract

In this paper we will trace the development of educational video in a timeline approach. The main focus is put on applications in tertiary education. Each development stage is discussed with respect to audio visual technologies applied and their respective educational usage. The analysis presents a broader view and historical perspective that will help to understand the chances and risks in forecasting future development of the medium. This is of considerable importance for the actually quite enthusiastic debate about educational video that seems to neglect some still existing important caveats that may limit the option of giving video a central role in future online education.

Keywords: Distance Education, Video, Digitization, Timeline, History, MOOCs, Flipped Classroom

Historical Flash Back On Technical Audio Visual Media Development

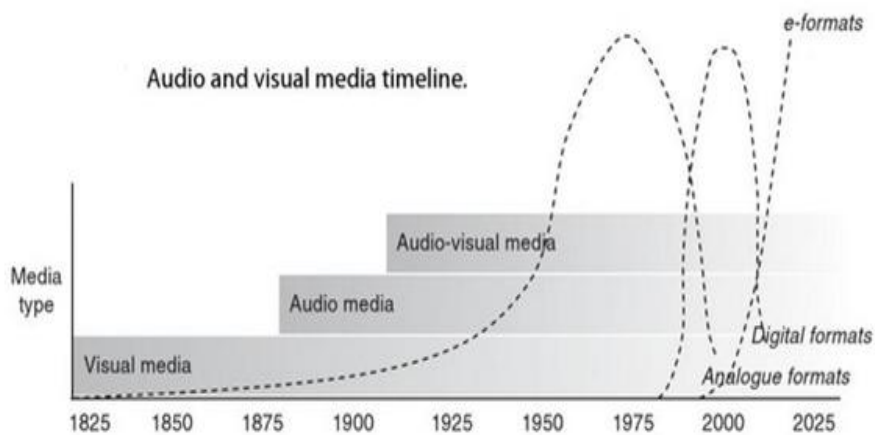
The relevant audio and video predecessors of today's digital video started almost at the ending of the 18th century. At that time the technical basis of radio and TV has been already established by a number of researchers such as Nipkow and Hertz.

In 1900 "television" has been presented for the first time at the 1900 World Fair in Paris (Softschools 2016). Radio became a mass media during 1920 and 1930. The breakthrough of private household's use of TV sets then started after World War Two. Imagine that until 1948 only about 2% of American households had a TV set (Encyclopaedia Britannica 2016). In the US television became a mass media almost in the 60ties, though still in the analogue mode.

Audiocassettes have been introduced in 1963/1964 by Phillips and in 1971 the first video recorders were offered by Sony. The use of digital media then started around the midst 70's of the last century. So far we could observe a quite permanent and fast technical development.

The graph below (Figure 1) illustrates these developments and shows at the same time, that we can interpret media development also as innovation cycles with up- and downswings of different formats.

Figure 1. *Audio and Visual Media Timeline*



Source: Henderson 2009

What about the Development of Educational Videos? The Early Years

Up to the End of World War Two, textbooks and lecture notes in addition to face to face lectures were the dominant media used in higher education.

Educational use of audio visuals in Higher Education was stimulated by the upcoming distance education programs in the 1960s and 1970s by dual mode institutions or by institutions, specialized in teaching remote learners with minimum on campus meetings, the so called "Autonomous Distance Education Universities". The following table gives an idea about the fast growing enrolment of distance teaching universities.

Figure 2. Selected Distance Teaching Universities

Institution	App. Enrolment at present	Foundation Date
<i>Anadolu University, Turkey</i>	1.900.000	1958
<i>Indira Gandhi Open University, India</i>	3.500.000	1985
<i>Universitas Terbuka, Indonesia</i>	646.467	1984
<i>Open University Britain</i>	253.057	1969
<i>UNED, Spain</i>	260.000	1972
<i>UNISA, South Africa</i>	300.221	1946
<i>FernUniversität in Hagen, Germany</i>	70.000	1975
<i>The Open University of China</i>	2.700.000	1979

Source: Fernuniversität Hagen 2014/15, <http://bit.ly/29l8f6b>; Open University of China <http://bit.ly/29dCo8H>, Wikipedia <http://bit.ly/29epUdo>.

Distance Education Institutions became the forerunners in educational media applications because their modality forced them to use technical media to reach out to their students at home or workplace.

Distance education universities in their first development stages were heavily based on print as a core medium, the role of audio visual media was restricted to fulfill a complementary role.

In Britain the famous British Open University used in its first development stage mainly BBC supported TV and radio transmissions in addition to the printed modules. The outcome was audio visual learning material, produced at gigantic TV studios with attractive applications and expensive formats. The distribution or transmission costs were low and large audiences could be reached, but production cost was high. The learner was bound to the fixed time slots, when the programs were transmitted. Because of its costly and “open to everybody” format the design had also to attract those viewers, who were not enrolled and therefore usually did not dispose of the respective pre-knowledge, necessary to understand the scientific content. Furthermore, the expectation of high technical quality and attractive presentation formats was raised as the programs were compared with other entertainment or documentary style programs on TV.

For these reasons the audio visuals remained only a drop in the ocean of printed instruction and not closely related to the course material. Furthermore, universities were technically bound to the quality standards of Radio and TV.

In contrast the German Distance Teaching University of Hagen started immediately with audiocassettes and videos distributed in form of videocassettes. The didactic advantage was that the productions could be better integrated with print material. The print material was complemented by icons that indicated when the student should listen or view the audio or video. Also additional exercises were integrated into video or audio productions to break the passive viewing attitudes. Especially the

audiocassettes were relatively cheap and easier to produce than videos (Laaser 1986). However, opposed to student's very positive ratings, the lecturers were not used to record audios and found it not attractive to go to an audio or TV studio for professional recording. Homemade recordings usually were of low sound quality and thus another reason for low acceptance. Nevertheless, audio and videocassettes contributed step by step to substitute educational radio and TV because they allowed a higher degree of "just in time" learning.

From Analogue to Digital Media

With the upcoming use of personal computers in the mid 1970s audio visual media have been transformed from analogue signals to a digital format, which means into a machine readable code. The transmission speed increased and storage, distribution and editing became much easier. An important advantage was that now the former separated media such as text, sound, still images and video could be combined and stored on a single data carrier.

An example of the didactic structure of a multimedia production on DVD is the following one (Figure 3).

Figure 3. DVD *Looking for Charisma*



Source: Weibler & Laaser 2004.

The listing of the content shows, how authentic management practises can be added to and discussed in the light of textbook readings. In the following years a considerable number of nice and media rich productions have been created, exploiting the potential of audio visual media and combining it with simulations, exercises, animations, interviews, role plays or authentic pieces of source material from audio visual libraries (Laaser & Sieg 2004). However, such production type needs a lot of important prerequisites such as specialized staff (audio visual engineer, editor, script

writer, actors, animation and graphics designer, programmer, camera specialists and finally the content specialist). On top of that a complete video studio had to be available and an appropriate financial budget. Therefore, it is not surprising that the relatively sophisticated multimedia productions had been developed with long project duration, sometimes covering even several years, which posed limitations for large scale development.

Video as Part of Learning Management Systems (LMS)

During the first phase of web development, officially introduced as web 1.0 in year 2000 transmission speed was still too low to transmit high resolution digital video images. Therefore, we could observe a draw back in the use of educational video and a dominance of text based web courses in pdf format. As result a great number of media centres at universities have been closed down at that time.

Figure 4. *Steps of Media Development at FernUniversität Hagen (Germany)*

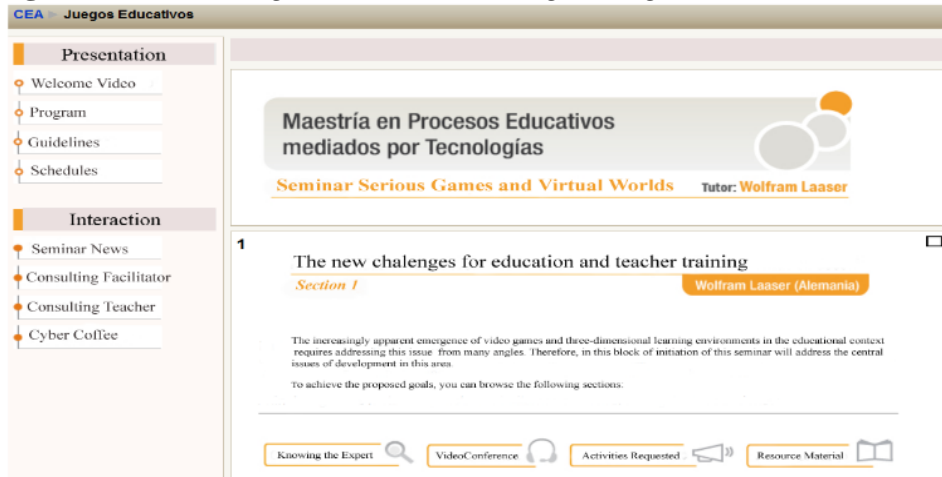
<ul style="list-style-type: none"> • 1975 Printed Self-Sufficient Course Units • 1976 Audiocassettes as Complementary Teaching Aids • 1978 Supplementary Videocassettes • 1983 Cooperation with Public TV Channel <p>(Analogue Production)</p>	<ul style="list-style-type: none"> • 1988 Development of Interactive Courseware for Personal Computers (exercises, simulations, experiments) • 1990 Computer Conferencing • 1991 Video Conferencing (multi-point) • 1993 Multimedia Teachware on CD-ROM • 1997 Online lectures and tutoring • 2000 Web courses and LMS • 2004 Podcasting • 2008 Mobile applications • 2014 MOOCs <p>(Digital Production)</p>
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Source: Data based on the authors work experience at FernUniversität Hagen, Germany

Nevertheless, the ongoing development of audio visual digital learning material stepwise extended and enriched the spectre of educational media over time and is exemplified by Figure 4 with approximate starting dates at FernUniversität in Hagen, Germany.

To ease incorporation of videos into the regular course material, digitized videos have been embedded to html pages and offered through course development platforms, also called learning management systems (LMS). Prominent ones were Moodle, Blackboard or WebCt. So, now videos could be placed exactly where they are needed, be it as an introduction to an online course, as interview with an expert, tutorial support or as instructional video of documentary style. Furthermore, videoconferences or conference recordings could be added as is shown in the screenshot below.

Figure 5. *Videos Integrated into a Learning Management Environment*



Source: Laaser & Brito 2011.

The screenshot (Figure 5) is taken from an international online seminar that the author run from Germany with participants located in Argentina. Video was used in this case to introduce to the profile of the teacher and as documentation of different online games. To bring international experts to the seminar, a series of videoconferences was offered to be followed at home or workplace. The recordings could be downloaded by the students after the conference.

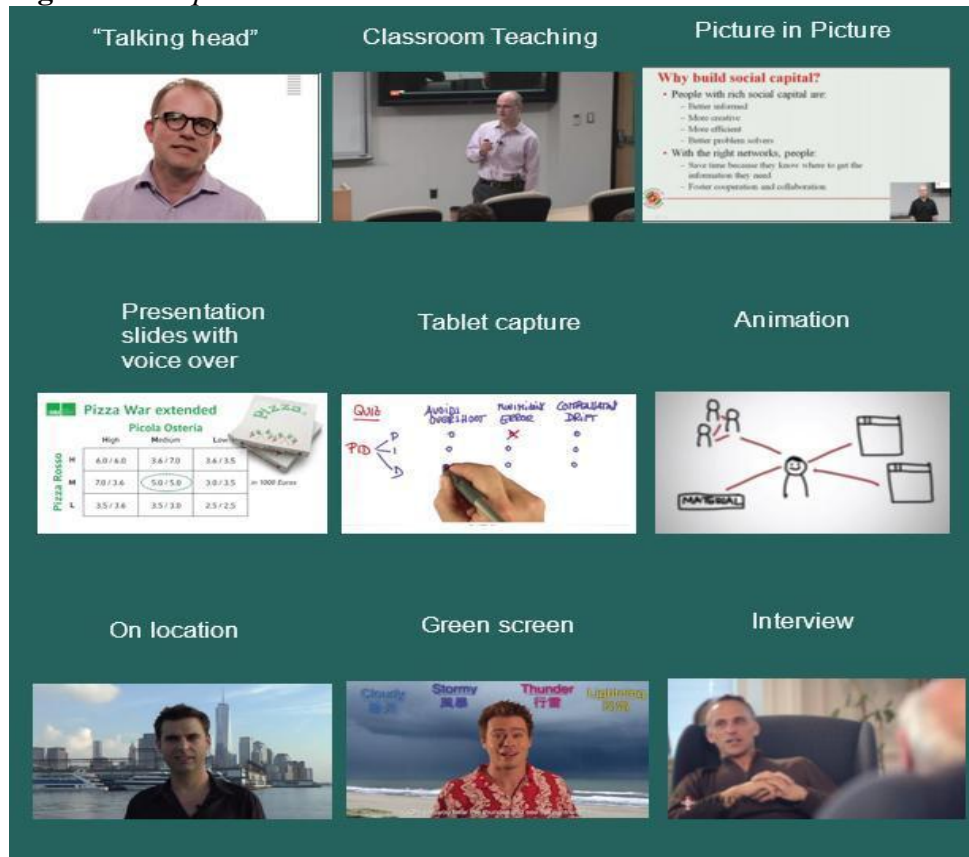
So video started to become an integrated and regular component, though not the leading part of the course content. Also it extended its usage, when imbedded into other presentation formats like PowerPoint lectures or streamed online presentations.

The Use of Video in Actual MOOC Presentations

With the change from Web 1.0 to Web 2.0 the role of video changed once again. Stimulated by the creation of video channels on the web like YouTube, and the concepts of opening up access to courses (Massive Open Online Courses) some new patterns became visible. In addition, student's and teacher's personal use of video has changed. Smartphones are used to exchange video messages or short clips, unprofessionally recorded, edited with freely available web tools and eventually uploaded to YouTube or similar portals. All these influences led to a presentation format that can be characterized as predominantly short, simple and stand alone.

The focus of the MOOCs, offered by many prestigious US universities now is on lecture capturing in different types of presentation styles (Figure 6).

Figure 6. Frequent Presentation Formats in MOOCs



Source: modified from Hansch et al. 2015.

Some of the productions that mainly consist of recording a lecturer talking (talking heads), reminds on the often criticized Radio and TV Programs used in China to teach massive student populations in the 1980s (Laaser 1993). Physical or real world background images are eventually keyed in by green screen technology. The duration of the videos is usually short to keep up engagement of the viewers (Guo et al. 2014). The technical setting is made for “quick and dirty” production. Nevertheless, the video component in MOOCs still represents the most important cost driver in professionally recorded lectures.

The attractiveness is not based on the presentation format but on the promoted “prestige” of the lecturers.

The simple recording of lectures is justified and pushed by new concepts like “flipped or inverted classroom”. A flipped classroom claims that face to face lectures are replaced by recording a live lecture and then distribute it via download to the students. The more interactive discussion and tutoring will be freed thus for face to face interaction and collaborative learning:

As Bogust comments critically (Bogust, A. 2013)

“Perhaps surprisingly, a flipped classroom doesn’t fundamentally alter the nature of the experience in the way that McLuhan and Davidson propose. Both MOOCs and flipped classrooms still rely on the lecture as their principal building block. In a typical classroom

students listen to lectures. In a flipped classroom, students still listen to lectures — they just do so as homework, edited down into pleurably digestible chunks. The lecture is alive and well, it's just been turned into a sitcom."

For another critical view of the flipped classroom concept see Baggaley (2015). However, the possibility for students to listen independent of time and space to lectures is rated very positive by them. For the first time immediate benefits in form of time savings for teachers and students became visible. Though, from a design perspective the actual MOOC videos are rather a step back with respect to learning achievements. This may explain the relatively low usage of MOOC videos (Seaton et al. 2004).

Today students increasingly create their own learning environment to exchange messages or edit and upload own videos. As a consequence, they will demand more quality in the future.

The Potential of Video in Online Learning

It is obvious that the potential of audio visual media is actually only exploited to a minor degree compared to the period of multimedia production on CD and DVD.

A.W. Bates (2015) lists a series of characteristics that describe potential applications of educational video

- demonstration of experiments and phenomena
- illustrate principles involving dynamic change or movement
- illustrate abstract principles through the use of specially constructed physical models;
- demonstrate changes over time through the use of animation, slow-motion, or speeded-up video
- substitute for a field visit,
- bring students primary resource or case-study material, i.e. recording of naturally occurring events which, through editing and selection, demonstrate or illustrate principles covered elsewhere in a course;
- synthesise a wide range of variables into a single recorded event, e.g. to suggest how real world problems can be resolved;
- demonstrate decision-making processes or decisions 'in action'(e.g. triage in an emergency situation)
- demonstrate methods or techniques of performance (e.g. mechanical skills)
- record and archive events that are crucial to topics in a course
- show practical activities to be carried out by students, on their own.

How such possibilities can be used and structured in a more professional and didactic way, compared to what can be observed so far in present MOOC-lecturing, is presented by a framework taken from Koumi (2015).

Figure 7. Dramaturgical Elements of Educational Video

<p>1. Hook (a. capture attention, b. sustain interest)</p> <p>a Shock, surprise, appetise, delight</p> <p>b Create suspense, entertain, fascinate/captivate</p>	<p>5. Sensitise</p> <p>a Consistent style</p> <p>b Personalise the teacher</p>
<p>2. Signpost</p> <p>a Distant Signpost: what's coming later</p> <p>b Chapter Heading: what's next?</p> <p>c Focus: what to look out for next</p> <p>d Educational Rationale: why are we doing it?</p>	<p>6. Elucidate</p> <p>a Vary tempo to indicate syntax</p> <p>b Restrain image-word density</p> <p>c. Alleviate Cognitive Complexity</p> <p>d. Enhance Legibility / Audibility</p>
<p>3. Facilitate Cognitive engagement*</p> <p>a Pose questions</p> <p>b Encourage prediction</p> <p>c Establish relevance to personal life</p>	<p>7. Reinforce</p> <p>a Repetition (with a different angle)</p> <p>b Re-exemplify</p> <p>c Compare / Contrast</p> <p>d Synergy between words and images</p>
<p>4. Enable Construction of knowledge*</p> <p>a Words <i>not duplicating</i> images</p> <p>b Pause commentary for contemplation</p> <p>c Invent visual metaphors</p>	<p>8. Conclude / CONSOLIDATE</p> <p>a Chapter Ending</p> <p>b Summarise key features</p> <p>c Integrate complementary materials</p>

Source: J. Koumi, 2015

It can also be stated, that earlier insights and developments e.g. from the Theory of “the Gestalt” or from “Psychology of Perception” seem to be not more relevant or are simply disrespected (Laaser 1984). We can summarize, that in the lecture capture model only few characteristics of video are exploited and especially not those, that are representing the characteristics and methods that are supposed to use video at its best.

This contrasts somehow with recent statements from MOOC platform developers like Kaltura (2015), who claim that

- video will be a standard part of education
- videos role will grow beyond delivering content to students, serving purposes of communication, feedback, student’s assignments and portfolios.
- video will continue to enable flipped learning and distance learning.
- video will enable innovative types of learning and teaching.
- video will replace most of the textbooks.

This looks more like an instrumental view rather than a pedagogical concept. The trend of integrating user created content is not on the radar. Instead work is spent on integration of quizzes, exercises to make MOOC videos more attractive (Kaura & Getting 2014; Woll et al. 2014). However, this is far from being a new role of video.

Although, some important limitations of video had been removed in the past, such as

- time independence,
- cheap and easy to use tools for production,
- fast and hardware independent distribution,
- low production cost,
- better integration with other media,

There are still some factors that pose obstacles to a use of educational video to a larger extent. It is the lack of expertise and experience both on side of the students as well as on side of the teachers, which creates insecurity and reluctance. These obstacles can only be overcome by better training of teachers and students to handle recording and editing themselves. The tools are already there and many can be used free of charge. What is still missing are didactic concepts to motivate users to create video content and to understand the language of audio visual messages. For teachers, job promotion and exhibits of best practise, would be helpful. For students audio visual production should be embedded as a basic element into academic curricula. Only if students and teachers accept, or in a sociological sense “appropriate the medium for themselves”, the future development of video will extend its share and contribution to improve higher education. The ease of technical handling, inclusion of exercises or search routines is not enough to give video a lead role (Schwartz & Hartmann 2007; Baumann & Jahn 2015).

Conclusions

We can see from our prior treatment of the topic, that there are ups and downs in the development of educational video, in part due to the waves and directions of technological development and in part dependent on the value added for students, teachers and the university as an institution. So we might summarize that implicitly two media theoretical approaches are reflected in the development of educational video, Marshall McLuhan’s point of view, that “the media is the message”, which means that the technology driven form is more relevant and influential than the content himself and the opposing viewpoint of Berthold Brecht, who stressed in his “radio theory”, that the content has to be relevant for the target population and therefore has to allow for user participation. Both reflections can be traced in the developmental stages of educational video and will be driving the future development as well.

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