

# EduMedia - enabling the use of audiovisual content within higher education in Denmark

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## Keywords

Audiovisual content, protected media, distribution infrastructure, streaming service, video

## 1. EXECUTIVE SUMMARY

Video and other audiovisual content can be utilized in a multitude of ways: As research objects, as a way to document and visualize processes, create engaging teaching situations and facilitate learning, as an instructional or promotional tool etc. Next, media production and distribution is more affordable and quickly accessible than ever. Never the less audiovisual content is far from used at its full potential within higher education and research in Denmark.

At the heart of this apparent paradox is the need for a focused point of access to a critical mass of relevant content, a systematic approach to the managing and presentation of such content, managing of copyrights, and ensuring restricted access to content when needed.

EduMedia seeks to overcome these issues. EduMedia (currently beta version - final release September this year) is a web-based service that will provide Danish higher education with an easy and secure way of accessing and distributing protected audiovisual content, primarily video, via the Internet.

EduMedia is a service under the Danish Research Network and developed in joint collaboration with the Danish Broadcasting Corporation (DR) and the State Library (SB). The aim is to give access to large quantities of audiovisual content from cultural and library archives and to supply the primary infrastructure for institutions/users, who wish to utilize audiovisual media for educational purposes, as well as promote research findings.

## 2. INTRODUCTION

The EduMedia project is all about advancing the use of audiovisual content within Danish higher education. The outcome of the project is a web-based application, EduMedia, which enables those affiliated with a Danish HE institution to find and share audiovisual media relevant to research, teaching and communication.

EduMedia gives registered users access to protected audiovisual media. They can publish their own content, and apply access restrictions and other publication settings. The general public can search and retrieve metadata on *all* published content, but access to/play back of actual media depends on the publication settings for the content in question. Play back requires Flash Player 9 plug-in or newer.

EduMedia is currently available in a beta version (figure 1) - final release September this year.

EduMedia is a service under the Danish Research Network (DRN), which provides high speed Internet to Danish universities and research institutions. The Danish Research Network has approximately 100.000 users.

EduMedia is developed in joint collaboration with the Danish Broadcasting Corporation (DR) - Denmark's oldest and largest electronic media enterprise and public service organisation - and the State Library (SB). Both institutions committed to collecting, preserving and making Danish audio-visual cultural heritage accessible.

The project is partly funded by Denmark's Electronic Research Library (DEFF) - an organisational and technological partnership between Danish research libraries dedicated to the utilisation of digital information resources.

In the following you will be given

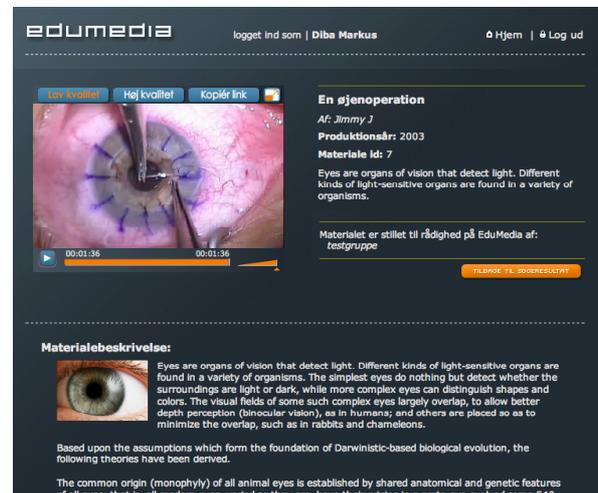
- a brief introduction to the EduMedia project - background, objective, vision etc.
- a feature tour of the application to be
- a catalogue of ideas of how and when to use EduMedia
- a glimpse in to the future of EduMedia

## 3. THE PROJECT IN BRIEF

### 3.1. Background

Audiovisual media for educational and research purposes in the form of video, audio, animations, simulations etc. is not commonly used by students, teachers and researchers within Danish HE. Apart from the fact that production of such media requires time (a scarce resource!) and skills, two possible explanations are:

1. The demands hosting and distribution of media makes on both technical know-how (especially video), managing of intellectual rights/copyright and securing content that cannot be distributed freely due to e.g. personal data.
2. The lack of a focused point of access to a critical mass of relevant content - content that can be searched and retrieved always and everywhere as well as utilized in an unproblematic way in regards to copyright, payment etc.



**Figure 1** Screen dump showing how a video asset is presented in preview mode (current user interface design). View options include high/low resolution and full screen.

Many free easy-to-use advertisement-financed distribution services like YouTube, Flickr etc. exists. A common trait is that legal conditions related to access and distribution are not maintained, just as content is not quality ensured in any way and strategies for media preservation are non existing. In other words, services that are not durable in a university context in the long run, although they undeniably have much going for them in terms of usability and volume.

Thus, to properly advance the use of audiovisual content within HE, the practical, technical and juridical issues related to distribution and utilization of media must be addressed together in an effective way. That is the idea behind EduMedia.

### **3.2. Goal**

The objective of the EduMedia project is to establish a web based infrastructure based on international standards that - via the utilization of a generally accepted authentication and authorization mechanism - will enable the users of the Danish Research Network to access, manage and distribute protected audiovisual content in an secure way via streaming technology.

In other words, the goal is to provide an easily accessible media access/distribution tool that supports single sign on.

### **3.3. Target Groups**

The primary target group for EduMedia include researchers, teachers, students, staff and others affiliated with HE institutions in the university sector. These are the primary customers/users of the Danish Research Network. However, the college sector constitutes a secondary target group for whom EduMedia may be a relevant infrastructure for distribution and a means to include research-based materials in curriculum.

As for the "consumption" of audiovisual content the general public is a tertiary target group as the Danish HE institutions are committed to promote research findings and knowledge sharing - this of course only to the extend that the content in question can be published.

### **3.4. Objective**

The objective of the project is at a practical and technical level to support the users in

- Distributing and utilizing audiovisual content in relation to their research, teaching and communication needs
- Gaining access to far more audiovisual content (e.g. cultural heritage) than previously possible due to technical, economical and copyright related barriers

In a broader perspective the objective is to contribute to the dissemination and sharing of knowledge at an individual and institutional level.

### **3.5. Vision**

For the Danish HE institutions EduMedia will be the

- Common frame of reference for researchers, teachers and students in relation to historical and present audiovisual content from Danish cultural and library archives
- Primary infrastructure for institutions/users that wish to utilize their own productions for educational purposes or to communicate research and other activities both in-house and to the general public

In a further perspective, the vision is that audiovisual content will one day be just as readily accessed and used as text based resources are in today's education and research.

## **4. EDUMEDIA FEATURE TOUR**

In September EduMedia will be launched, and a full set of features implemented. Some of the features are implemented differently at present.

A bit of terminology: Users have different roles in relation to EduMedia depending on how they use it, and accordingly also different levels of privileges. In this context *users* refer to those that view media content (“consumers”). Users are either

- *Anonymous* users, who can search and retrieve metadata on everything published on EduMedia, and also view/play back the associated media content depending on the publication setting (access restriction), or they are
- *Registered* users, which have an account on EduMedia and authenticate themselves whereby they get access to all features of the system, and (at present) also the ability to view all published content

All registered users - teachers, students etc. alike - are allowed to distribute content via EduMedia and thus become “*publishers*” (may be individuals and/or groups). Publishers are content owners, i.e. only they can make changes to their published material.

#### 4.1. User profiles

A *user profile* is automatically created as part of the registration/account creation process.

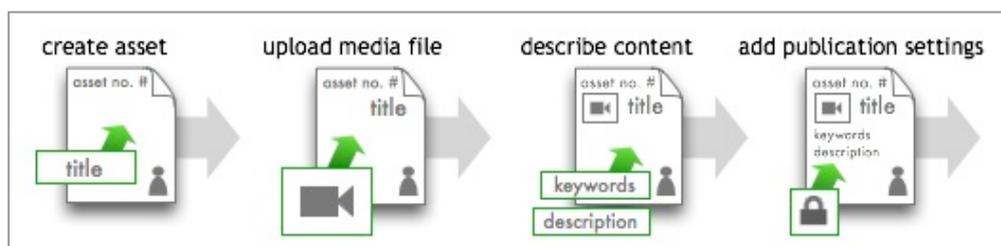
The profile is a prerequisite for distributing content and gives users who retrieve content valuable background information about publishers including: Name, affiliation, institution and description (optional). Two or more registered users may decide to “join forces” and distribute content under a common name, i.e. form a publishing group, in which case a group profile must be created as well. This information is exposed in direct relation to the content description, and users may thus perceive it as yet another important indicator of the relevance of the content.

Once equipped with a user profile, you are ready to add content and become a member of the “EduMedia sharing community”.

#### 4.2. Publish content

Publishing content is simple, quick and does not require knowledge about formats or distribution of e.g. video via the Internet. The only thing you really need to know is what content category your media belongs to: Video, audio, pictures, interactive media and ‘other media’ (unspecified media).

Publishing content is a process in four steps as illustrated in Figure 2:



**Figure 2.** The four steps involved in distributing content via EduMedia.

These steps do not necessarily have to be executed in a continuous sequence, i.e. publishers are not forced to do all the things within the same session or in that exact order as seen in e.g. step-by-step guides/wizards.

In Figure 2 content is referred to as an **asset**, a sort of “container” which in turn - when completed - consists of references to the

- *Publisher(s)*, i.e. a user/group profile
- *Media file* (video, audio, picture etc.)
- *Description* of the content i.e. metadata (DCMI subset + thumbnail)
- *Publication status* i.e. a specification of how/when the content may be accessed/used

Thus, publishing content is a process where publishers create a new asset, i.e. the empty container that will later “hold” the actual media content, and subsequently add the rest of the data when it is

convenient. In this way, these steps are actually separate activities and the information separate entities. The practical implication of this is, that it is up to the publisher in what order content is uploaded or described, and that the media file and associated description etc. can be replaced/changed at any point in time after the asset is created. Assets and user/group profiles are managed as part of the user account.

The asset-as-a-container concept might seem a bit abstract, but has huge advantages in terms of information re-use and the way workflows can be designed.

Media can - depending on category - be uploaded in a multitude of formats and is handled by the system in different ways:

- Video and audio are transcoded and presented in uniform formats, i.e. streamed (Flash) in H.264 and Mp3 respectively
- Pictures are converted to PNG and presented in a Flash viewer
- Interactive content (.swf-files) opens up in a new window
- Other media are provided as download only, since EduMedia does not process these media files in any way as they can be any kind of data

EduMedia stores the original media files along with the transcoded/converted files used for presentation ("preview versions"). This is done partly as a service to the content-owner(s) and partly with future re-transcoding/re-conversion in mind as new standards emerges. This way media is preserved and future access insured.

### 4.3. Control access to your content

Content is either published or unpublished (publication status). Users can view content as long as it is published, while not yet published or de-published content is accessible only to the publisher/publishing group. To use an analogy, content is switched "on" or "off".

By default content is available to everyone on the Internet the second it is published. Access may be restricted to registred users only and an "available-from-date" and/or "available-until-date" can be specified.

In regards to publication EduMedia makes a distinction between metadata and the media file itself: Metadata on published content can be searched and retrieved at any point in time by everyone on the Internet, whereas access restriction applies only to the media file.

Besides access restriction EduMedia also implements the Creative Commons License framework (CC). This means EduMedia supports publication ranging from "all rights reserved", i.e. access is restricted to EduMedia users only, through "some rights reserved" (CC) to "no rights reserved" (public domain). Last but not least publishers can share their ideas with the world without using a license, which means "all rights reserved" still applies.

Default media content is viewed in *preview mode*, which in this context means that nothing is saved on the hard drive (except for content uploaded to the 'other media' category which is distributed as download only). However, the practical implication of applying a creative commons license on media content is of course, that it is available for download too.

Apart from this, the download option is also applicable to "all rights reserved content" (with or without access restriction) although EduMedia does not implement any kind of DRM to ensure that content distributed in this way, is used as intended. In other words, publishers have to carefully consider the possible implications if they apply "EduMedia users only access" *and* provide a download option for their media.

On the other hand, providing media content as downloads can be a real service to users, who wish to access it in places where access to Internet is not guaranteed, limited or even impossible. This "off-line option" provides others with a sense of certainty that things will work regardless of Internet connection e.g. when they give a presentation.

Within these limitations of the EduMedia distribution framework, it is entirely up to publishers to decide, how and when their media content may be accessed/used. Figure 3 shows the ways in which media content can be accessed via EduMedia depending on publication settings.

	Registered users only	Unregistered users		
	Restricted access "all rights reserved"	No license "all rights reserved"	Creative Commons License "some rights reserved"	Public Domain "no rights reserved"
Video				
Audio	preview +/-	preview +/-	preview +	preview +
Pictures	download	download	download	download
Interactive media				
Other media	download	download	download	download

Figure 3. Access options in EduMedia.

#### 4.4. Collaborate

EduMedia supports collaboration in relation to content distribution.

In technical terms this means publishers can create an asset in EduMedia (1st step in publishing content) and at any point in time hereafter assign it to a group for completion or editing.

This feature comes in handy where two or more work together on producing media content, or it can be used as a simple means to share the workload involved in the distribution process e.g. your assistant uploads a video and you add a description (metadata). In this way publishers can have both personal and shared media libraries on EduMedia.

#### 4.5. Embed audio and video

If you want the video you found/published on EduMedia to appear on a webpage of your own, you can get the html code from the EduMedia player with just one click. By using the resulting code snippet you embed the media and it's accompanying Flash player into the page. According to the latest Adobe figures, approximately 99 % of all Internet users have a Flash-plugin in their browser, so most likely all visitors at your page will be able to play back/see the media content.

When access restrictions apply to the media content in question, you can still embed it, but whenever anyone visiting your page wishes to see/play it, a log-on prompt will ask them to authenticate, i.e. to use their EduMedia credentials.

If you are a publisher and your role in content production is to supply the expert knowledge, the upload-and-embed concept means that you can focus on just that. In this view EduMedia is a hosting service where you do not have to know anything about the technicalities involved in media distribution/streaming.

#### 4.6. Add a link

If users find some interesting on EduMedia, they can get a link to the media content in question, and put that in e.g. a presentation. For audio and video it is also possible to link to a defined part of the media stream if an in- and out mark is added first. In EduMedia terminology making a selection by adding an in- and out mark is called making a "clip" although technically it is just a reference to a particular time-span in the stream. Providing a link to the exact part you find interesting, directs attention and saves time, as you - or those you send the link to - do not have to enter in- and out points manually.

Once the link is activated, users are directed to an EduMedia page that presents the media content and the associated description etc. in the exact same way as if it was retrieved via the EduMedia search interface.

Out of courtesy to the publisher the context of the clip is preserved, in the sense that the full timeline of the original audio/video is visible at all times, except that the parts before and after the clip are greyed out.

## 4.7. Save clips and search results

A quick list helps users keep track of selected search results and clips they might have generated.

This quick list works like the online shopping carts found on e-shops that keeps track of collected items, except that in EduMedia there is no “checkout”. For anonymous users this quick list holds selected assets and clips only temporarily i.e. until they navigate away from EduMedia.dk, whereas authenticated users get to keep their list for as long as they like (the list persists between sessions).

## 4.8. Get a feed

Users can subscribe to RSS feeds from selected publishers/publishing groups. Feeds contain a summary of published content, i.e. titles and links to the media and its associated descriptions. Providing RSS feeds has an advantage that works two ways: Users are automatically informed when publishers or publishing groups, they take an interest in, publish new materials, and publishers, e.g. teachers, can reach their “audience” in an effective and effortless way.

# 5. APPLICATIONS FOR EDUMEDIA

## 5.1. Research

Within research audiovisual media as e.g. research objects (cultural sciences), as documentation of experiments/processes and as testing ground for the development of analytical tools like algorithms for pattern recognition (engineering/natural sciences).

Common to many applications of audiovisual content is the need for high quality (resolution) and an infrastructure for handling of such objects. In this context EduMedia can act both as a repository, and - due to its structured approach to authentication, authorization and metadata exchange - as an interface to external repositories.

Apart for these applications, EduMedia can be used strategically as a means to promote research areas and communicate research findings through the use of audiovisual methods. In this context EduMedia can be used as either the place to convey the messages, or perhaps more likely as a simple hosting service that enables the institutions to utilize them in a defined context.

## 5.2. Teaching

As university teaching is research-based, the distinction between the ways in which audiovisual communication is applied within teaching and research, is at some points artificial. However, the pedagogical gains make this particular application for EduMedia worth mentioning.

In this context EduMedia is useful as a means to e.g.:

- Provide flexible access to lectures, learning resources etc. whether in support of on campus teaching or e-learning
- Facilitate new learning modes and provide support for visually oriented students
- Visualize processes and exemplify concepts that are otherwise hard to grasp
- Create varied and engaging teaching situations for a body of students that is increasingly accustomed to media consumption
- Provide practical language training in the form of e.g. recordings either of native speakers from around the world or of the students themselves
- Create re-usable instructions for e.g. particular laboratory procedures that can be used in preparation of real-world excises

The examples mentioned above focus on EduMedia as a tool primarily in support of teachers and their use of audiovisual communication. However, other pedagogical scenarios are possible, e.g. assignments where the resulting products are students individually recorded presentations or documentation etc.

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## **6. WHAT THE FUTURE WILL BRING**

The roadmap for the project post-release is only partially laid out, however, some anchor points stand out.

### **6.1. True identity management**

The basic infrastructure needed for federated identity management between the Danish HE institutions (DK-AAI) has just recently been established, eventually enabling service providers like EduMedia to rely on a users home organization/institution for authentication and for the provision of information about the users.

Seen from a service provider perspective this set up has two advantages: User management is done where it is done best - at the institutions. This relieves EduMedia almost entirely of the job of maintaining a user database and keeping it up to date. Furthermore accurate information on users affiliations, study level etc. makes for personalised services and more advanced features e.g. fine-grained access restriction based on field of study and study level etc.

EduMedia starts to implement DK-AAI this coming fall.

### **6.2. More content**

For the foreseeable future much work has to be done to identify the many existing media collections that are presently managed by individuals or university departments as well as to promote the exposure and utilization of them through EduMedia.

In parallel to this, arrangements/collaboration with establish audiovisual archives are a high priority. As a means to this end EduMedia provides an API (Application Programming Interface) and adheres to metadata standards.

In regards to media production, The Danish Research Network has established other initiatives (e.g. [www.univid.dk](http://www.univid.dk) that provides inspiration and guidelines for video production) which will hopefully contribute to the generation of content.

### **6.3. Sand box development**

It is important that EduMedia continuously evolves and provides its users with relevant tools for e.g. searching, retrieving, presenting and working with audiovisual content.

These topics are themselves subject to research at the HE institutions. Thus, it is our hope that the users contribute on an experimental level to the continuing development of EduMedia by using designated parts of EduMedia for beta-testing of e.g. new methods for analyzing and handling of audiovisual media.

## **7. Conclusions**

As a common infrastructure for the HE institutions, EduMedia is expected to improve access to audiovisual content, and thereby advance the dissemination, exchange and utilisation of such valuable resources. In that respect EduMedia is expected to have a greater impact than scattered initiatives among the HE institutions.

Enjoy! ☺