

Low-Threshold Production of Peer-to-Peer Lecture Films

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Abstract: Lecture videos are more and more implemented in higher education to be used widely by students providing an audio and visual stimulus. To attract students and become a fully accepted learning material these videos need to be of a certain standard. An important factor to the success of these videos is to involve students directly into the concept and making-of (peer-to-peer approach). The peer-to-peer approach is an important aspect in terms of project success, quality of the content and lecture video quality because students' needs and their perspective on teaching material are directly included in the videos. To encourage lecturers this paper provides a short guidance to look at basic needs and requirements of the lecture film production and "just get started". Good lecture videos may successfully be produced with low threshold.

Key words: Lecture video, peer-to-peer, making-of, film equipment, KISS, inverted classroom.

1. Introduction

Because there is a difference between audio or video recordings of lectures [1] and short lecture videos of relevant course material analogous to the learning outcome [2], [3], this paper deals with the latter only and has partly been presented at ICRTTEL2019 [4] and HEAD'18 [2]. To keep the threshold low the authors focus on practical aspects rather than didactic methods, which have been described in detail earlier [2]-[5]

Lecture videos provide an audio and visual stimulus covering different learning methodologies [3], [4], [6]. And, despite the common fear, presupposed the video included is analogous to the desired learning outcome of the lecture [7] lecture videos are definitely a reinforcement, rather than a replacement for lectures [8]. Because students consider lecture videos as easy to use and effective learning tools [9] a significant value on the use of videos is placed in higher education [10], [11]. In blended learning course structures the implementation of lecture videos into flipped classroom teaching scenarios [2], [12]-[14] has a positive effect on self-efficacy beliefs and intrinsic motivation [15]. In addition, interpolated questions within online videos may increase the learner's engagement with the material [16] and help to boost actual performance [17].

HTW-Students involved in the making-of of lecture films gained substantial knowledge in both, material science and film techniques. Although both skills are not in the official curriculum they contribute to self-attentiveness and high learning outcome with mastering deep knowledge on one specific topic. [3], [4]

From many questionnaires lecture videos appeal to most students and are encourage self-study and therefore provide excellent requirements when inverting the classroom [3], [4]. Lecture videos may be used at any time provided a working internet connection helping students who have to take care of family or work. Students state that the film format has nearly no influence on the "joy of use" and on their learning

progress. Still most students prefer lecture videos where persons are directly addressing them besides the video lecture reminding them of face-to-face time (Fig. 1). These comfort and provide a virtual environment in which students feel as if they are spoken to directly resulting in better learning outcome. Preparing for tests students prefer lecture videos over books or the face to face lecture by a factor of three.

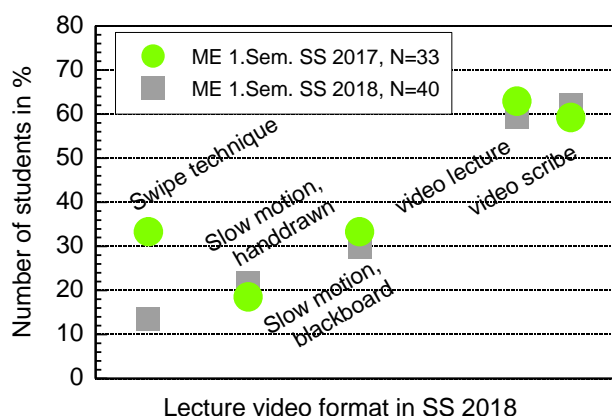


Fig. 1. Evaluation of the lecture film format.

Keymessage: lecture film format is not crucial for learning progress, visualized personal contact is beneficial.

2. Workflow and Content

To our experience the workload is quite high fulfilling the following work packages:

- 1) Writing a script / (Screencast)
- 2) Preparation of assets e.g. illustrations
- 3) Text / Voice-over recording
- 4) Camera setup and shoot
- 5) Editing and post-production
- 6) Finish and delivery

Therefore the production of lecture films is only profitable for content that is not subject to change over at least a medium period. Ideal is basic scientific knowledge that has been established and can be taught for a long time. However, you do not have to have professional skills or professional technical equipment to produce good lecture videos. Most important is that the aim of the lecture video is included into the learning outcome of the course and that the content is clear and well prepared.

Keymessage: suitable for basic scientific knowledge, no professional skills or equipment needed.

3. Equipment — KISS

Concerning all studio and production equipment we promote the KISS “Keep it simple, stupid” principle. Focus on the product not on production. Good content makes a good film, picture quality is secondary. A low-threshold as well as an easily manageable approach and equipment reduces overall costs and efforts. Use equipment everybody is used to and feels comfortable with. Even a smartphone, maybe with a dedicated photo/filming app, is sufficient.

3.1. Camera

Good results are obtained with a Canon EOS 600D, a reasonably priced compact consumer range DSLR. However, any other camera –such as most smartphone camera- is suitable presumed:

- 1) The camera records footage
- 2) Aspect ratio of 16:9
- 3) Picture size at least HD 720p (1280 x 720 pixels).
- 4) Standard formats and containers (mp4), that are transferable to a PC for post-production and editable.
- 5) Framerate of at least 25 frames per second (fps)
- 6) With compression rates not too high. The higher the bitrate, the lower the compression, the better the picture quality. Rule of thumb: youtube: Films with 720p should have 5 Mbps (Megabits per second) and 1080p should have 8 Mbps. The recorded footage shouldn't be of a lower bitrate
- 7) The camera is stabilized (tripod), e.g. realizing a top shot with a camera on a side arm with a standard tripod and basic tools from a hardware shop

Note, do not change the scene setup until the shoot is done. Setup and deconstruction during a production is time consuming and counterproductive.

3.2. Software

The set of features needed for simple cutting, filtering and encoding tasks mainly comprises: e.g.

- 1) Transitions,
- 2) Filtering and basic color correction,
- 3) Text tools,
- 4) Maybe time lapse and slow motion,
- 5) Simple animation of graphical content,
- 6) Audio syncing and editing,
- 7) Export into popular end formats for delivery [4].

Keep the learning curve in using the editing software reasonable and preferably not very steep, e.g.:

- 1) Wondershare filmora,
- 2) Free and open source like OpenShot,
- 3) Screencast software such as Camtasia
- 4) Adobe Premiere (more professional) or Apple Final Cut (easier to use) Both require license fees.
- 5) Black Magics DaVinci Resolve (basic version no charge).

3.3. Lighting

In general, contrasting raises more interest in the viewer and a well illuminated film enables less motion blur because any photography can be done with a faster shutter speed and therefore shorter exposure times [3], [4]. Good results can be obtained following simple rules, e.g.:

- 1) Smart use of daylight,
- 2) Any set of strong lamps as matching in colour; avoid a mix of differently coloured light sources,
- 3) Correctly set the white balance of the camera.

3.4. Recording, Voice-Over

The text and its content are crucial to the films reception, because it sets the frame and the pace of the film. Therefore, you do not need a professional actor, but there are certain boundary conditions to be met:

- 1) Sound exciting (a boring voice spoils the film) and sympathetic (Sympathy gets the audience's attention and its willingness to learn about the content.)
- 2) Readability of the text: Print the text out with font size at least 16 pt. Indicate pauses by blanks and longer pauses by a new passage. There should be some blank space left for voice actors notes e.g. what to emphasize.

- 3) For Recording a semi-professional microphone is absolutely sufficient, e.g. plug & play USB large diaphragm microphones like the Rode NT-USB.
- 4) Room for recording with as little reverb and ambient noise as possible, e.g. a rather small room (< 15 sqm) with carpet and curtains, upholstered furniture and maybe some soft material, like foam material on the wall or simply a clothes rack covered with blankets.

Keymessage: **KISS – “keep it simple, stupid”, Use equipment you are comfortable with, most smartphones do a good job, try open resource programs for editing and post production, Use daylight and do not forget to set the white balance of the camera, guarantee the readability of the text to be recorded, find a sympathetic and exciting voice and record in a self-made “sound-proof” environment.**

4. Involving Students

The peer-to-peer approach is essential to the success of low-threshold lecture films. First, students are very good in minimizing workload at maximum achievement, second their learning experience is of tremendous worth, because lecturers gradually forget how difficult certain contents are due to them being experts in their field. Third, it is always beneficial to offer a great variety of learning materials to address all different learning types and keep a high diversification. Moreover, involving students directly into teaching activities (preparation of lecture videos) engage students in critical thinking [18], [19]; thus, producing deeper learning outcomes [20]. Ware [21] defines “peer-to-peer” literally as “from students for students” this concept was applied for planning and completing lecture videos at HTW Berlin according to the 3I-model including: information, instruction and giving impulse [22].

All work packages are delivered by students supervised by the lecturer with a possible but not mandatory help of a director of documentary film, a professional illustrator or professional speaker. (Voluntary student project 5 ECTS = 180 hours of workload). Group sizes can range from 1 to 10 with a general outcome of approximately 4-5 min lecture film per student which is a very good output.

4.1. Kick-off — The Most Important Meeting

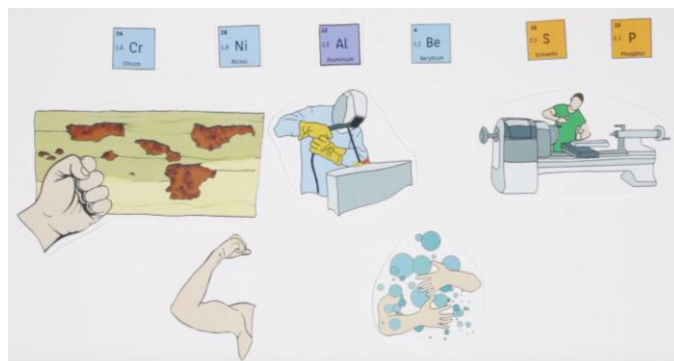


Fig. 2. Illustrative interpretation of the properties of the alloying elements in steel (Cr=corrosion resistance, Ni=strength, Al=weldability, Be=desoxidation, S,P=machinability).

The kick-off meeting at the beginning of the project is the most viral part of the mile stones fixating boundary conditions, such as: deadlines

- 1) Length of films (one set, or sub-chapters)
- 2) Content and type of lecture video (one format or different formats depending on content – on format for one set of films is recommended)
- 3) Who is in charge of which work package (important in terms of a successful team)

- 4) Script (complicated scientific background knowledge has to be explained in a simple – but not trivial – way and at the same time visualized in detail. For example: the properties of the alloying elements in steel are not only spoken but visually attached to a strong illustration (Fig. 2).

4.2. Script — Words before Picture

The scripts needs to be perfect before recording, because first the script is the most important, vulnerable and agile part of a lecture film. Once the text has been recorded, changes that have to be done in the cutting procedure are time consuming, often of minor quality and a hassle throughout the entire workflow, leaving students motivation behind [4]. Think of the script as a podcast with the following requirements:

- 1) As a lecturer only accept perfect scripts (sentence structure, grammar, causality) – each word is important (up to 7 revisions is normal)
- 2) The overall sense of sentences has to be clear and precise enough to be understood without explaining pictures.
- 3) Clear, plain and concise language with rather short than convoluted sentences, easy words
- 4) Extra explanations for technical terms are highly advised.
- 5) Focus on the 5 minute limit and the most important contents.
- 6) Read the text out loud to estimate the time necessary for reading

The script itself contains the content, the setting of the scene, embedded texts and drafts of the illustrations as well as the time of the scene (Fig. 3).

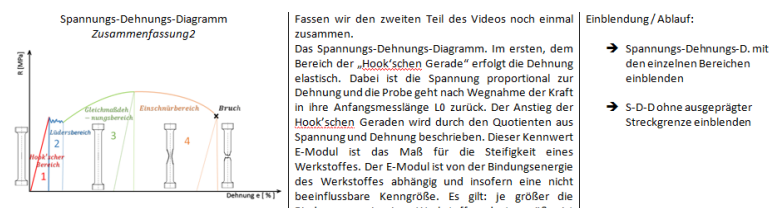


Fig. 3. Typical script: Stress-strain-diagram.

4.3. Production — The Film Shoot

The production itself, shooting the film, takes less than 40 % of the overall time budget But, planning and project management is very important, because anything that hasn't been planned or wasn't paid attention to, was misjudged or forgot in pre-production slows down and delays the production [4]. A basic set of photographic skills can be sufficient (studio personnel is recommended but not necessary). The following ideas help to use this time as efficient as possible:

- 1) At any time avoid a pickup shot (it may even be impossible)
- 2) Stick to the script 100 % and execute it well (double check, whether something is missing in the script)
- 3) Think further, outside the box, what could be added that nobody thought of, what could enhance the film?
- 4) Always do alternate takes, just to have a choice later in post- production.
- 5) If you do not have a dedicated studio it is ok to set up the scene for every film separately on different locations. (A dedicated studio makes production processes smoother).
- 6) Shoot in sprints (rather short time frames). Having to do multiple setups is too elaborate.
- 7) Carefully consider lighting, focus and exposure times should carefully be considered. Auto settings for exposure and focus on cameras are fine.
- 8) Switch the camera to manual mode, to make sure there is no further change in settings.

4.4. Post Production —Editing — Magic

Post production comprises of audio recordings, film recordings, animations etc. compiled into a movie. If something that doesn't sit well, or you can't find it because it was forgotten you can alternate in post-production. Despite many theories and philosophies behind editing styles and techniques in film history the principle of KISS applies:

- 1) Do not focus on becoming a feature film editor, but produce high quality lecture films:
- 2) The basic skills of editing generally can be done in short time.
- 3) As a lecturer support is very important to keep the students motivated.

Keymessage: **peer-to-peer approach - involve students in the making-of, define clear work-packages, focus on the script: words before picture, use clear and precise language, chose short sentences, take time prior to production, do not change a chosen setting, stick to basic editing and motivate students.**

5. Summary

The peer-to-peer approach is a successful route to produce lecture videos as means of self-studying teaching material especially for "inverted classroom" lecture settings. Students are involved in the film making and directly contribute their learning experience. At HTW Berlin students worked in voluntary semester projects (groups of 1-10 students) worth 5 ECTS with a workload of 180 h. Different film formats have been launched on youtube channel such as: power point, comic, swipe-technique or animation. Averagely 5 minutes of high quality video is produced per student. Less than 5.000 (!) Euro are sufficient to set up a well working film studio, using commercial or non-commercial software for post-production. However, professional equipment is not mandatory to produce successful lecture videos as long as the content supports the course learning outcome. Because these videos need to be of a certain standard to gain students' interest and become a fully accepted learning material the following standards have to be met:

- 1) Peer-to-peer approach: lecture video content benefits directly from students learning experience
- 2) Lecture films are best suitable for basic scientific knowledge (repeated usage)
- 3) 5 min length the most
- 4) KISS - "keep it simple, stupid"
- 5) Words before picture. Screencast/treatment is perfect before starting to illustrate, careful proofreading of the lecturer is highly recommended because each word has its weigh and needs to be fully correct. Use clear and precise language, chose short sentences, the overall sense of sentences has to be clear and precise enough to be understood without pictures.
- 6) Always illustrate the meaning of the sentence not the keyword (example: bone has high strength: not the bone, high strength is the meaning).
- 7) You do not need professional equipment or professional skills. Filming can be done with any kind of camera of sufficient quality and most smartphones do a good job.
- 8) Try open resource programs for editing and post production and stay with basic editing (follow the pareto principle for editing)
- 9) Use daylight and do not forget to set the white balance of the camera
- 10) Guarantee the readability of the text to be recorded
- 11) Find a sympathetic and exciting voice and record in a self-made "sound-proof" environment.
- 12) Do not change a chosen setting
- 13) Chose the lecture film format that suits your content and you feel comfortable with, because the lecture film format is not crucial for learning progress.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

Anja Pfennig conducted the research and analyzed the data; director of film Jörg Maier-Rothe is expert for film equipment and techniques (chapter 3, 4.3 and 4.4); both authors had approved the final version.

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Anja Pfennig was born in Büdelsdorf, Germany in 1970, she studied mineralogy at the University Bonn, Germany, where she graduated in 1997. Her Ph.D. in the field of ceramic moulds for liquid metal casting was earned in 2001 from the University of Erlangen, Germany. She then worked for Siemens Energy in charge of ceramic shields and transferred to Berlin in 2008 where she currently teaches material science at the Applied University Berlin, HTW. A. Pfennig's research expertise is corrosion fatigue. Her interest in teaching is new teaching methods and e-learning to enhance learning output and cope in future positions.