Universität Hamburg
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UNIVERSITÄTSKOLLEG

Erfahrungsbericht zum Lehrlabor-Projekt:

Brücken in die organisch-chemischen Praktika

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GEFÖRDERT VOM
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ABSTRACT

The main aim of this project was to equalise the knowledge of practical organic chemistry between differently educated first year chemistry students. As there are students who have had more prior exposure to practical organic chemistry techniques, either as a result of experience gained in their high schools or at home with 'home chemistry kits'. We proposed to overcome these differences in practical knowledge, by producing a video library of fundamental organic chemistry techniques. These videos are to supplement the practical organic chemistry courses at the Universität Hamburg and will be available to students before these courses begin and throughout the remainder of their studies. We hope that this video library will reduce the hurdles and fear of the practical courses and even lower the dropout rate. We envisage that this video library will allow students to work at their own pace, based on their practical experience, to also not hinder those students with more practical knowledge.

KONZEPT UND ZIELE

We planned to produce a video library of the following fundamental organic chemistry techniques, which the students encounter in their organic chemistry practical courses at the Universität Hamburg:

- Heat under reflux (Erhitzen zum Rückfluss)
- Washing and extraction (Waschen und Extrahieren)
- Recrystallisation (Umkristallisation)
- Rotary evaporator (Rotationsverdampfer)

We planned to produce the video library in different languages, other than German, to make the content more inclusive and accessible to students from various backgrounds, such as for those whose mother tongue is not German.

The concept for the project arose from observations that students in the foundation organic chemistry practical course had varying levels of practical knowledge and experience, due to their different prior education. This resulted in an unfair advantage for students with more prior practical experience. Whereas the students with less prior practical experience were left feeling overwhelmed by the practical course. However, if the level of the practical course was lowered to ensure that all students had the same fundamental practical knowledge, this could potentially disadvantage the students with more practical knowledge as then the course may not be challenging or stimulating enough. Therefore, we envisaged that the video library could serve as a key resource to cover the fundamental techniques of the practical course, which students could access and use at a pace that suits them, as well as serving as a revision tool for the students with more prior practical experience.

UMSETZUNG

The video project was carried out from October 2019 until September 2020, in the following stages:

1. Refined the aim of the project: “To demonstrate fundamental organic chemistry techniques with voice-overs, and possibly subtitles, in different languages to make the content more inclusive and accessible to students from various backgrounds”.
2. Evaluated organic chemistry technique videos, to compile guidelines for the areas: set-up, content, post-production and general. This evaluation was carried out on videos available online and from an earlier, related project carried out by a former group member ("Bridges to Science" Joachim Herz Foundation 2011-2014)
3. Produced a questionnaire, based on the findings from this evaluation, to accompany the earlier video from the former lab group member. This questionnaire covered the following aspects:

    - Evaluation of earlier video assessing areas: set-up, content, post-production and general
    - Techniques that would be useful to demonstrate to the students entering the foundation organic chemistry practical course
    - Feedback on our concept, with respect to voice-overs and subtitles in different languages and the accessibility and platform of the videos
    - Languages that it would be useful to have the videos available in

    This questionnaire was sent to fellow lab group members, as they have experience of both partaking and supervising in the organic chemistry practical courses. In addition to this, the questionnaire and accompanying video were sent to all chemistry undergraduates for student feedback.

4. Evaluated the responses from the questionnaire, to further tailor our concept to the students‘ needs
5. Produced a prototype video, based on the feedback received from the questionnaire
6. Discussed the logistics of the filming and post-production with Christian Kreitschmann (Lehrlabor) and Michael Heinecke (DL.MIN) to develop the concept of using two cameras for filming, with one camera for close-up scenes and the other to capture the full scene, and recording the voice-overs separately, to avoid background noise whilst filming in the laboratories
7. Booked the filming and post-production equipment for hire from the DL.MIN
8. Produced in-detail scripts and storyboards for the four videos (Figure 1, top), we used the storyboards to plan the order of scenes to be filmed (Figure 1, bottom), as the scenes were filmed with the ease of filming in mind, for example which scenes could be filmed with the same camera angle, rather than in chronological order
9. Prepared a job advertisement for the student assistants for:
    - Post-production
    - Translation of the scripts from English into German and to record the voice-overs

10. Interviewed and appointed the student assistants
11. Filmed the four videos over four days in the laboratories of the Stark Group, with the assistance of Christian Kreitschmann and Stefan Koch (DL.MIN)
12. Uploaded the video files to the DL.MIN Cloud, where all members involved with the project were able to access them
13. Translated the scripts from English into German, performed by student assistant Jelena Berl (AK Stark)
14. Recorded the voice-overs in the sound booth at the DL.MIN office, recorded by Jelena Berl
15. Commenced with post-production of the videos, using Adobe Premiere Pro software, by Leve Kühl (post-production student assistant) and Christian Kreitschmann
    - Arranged the video and audio clips according to the story boards and added effects and transitions to produce draft versions of the videos
    - Discussed the draft versions of the videos between Charlotte, Leve and Christian and made further amendments to the draft videos, until the videos were finalised
    - Produced the common intro and outro scenes for the videos, performed by Christian Kreitschmann
16. Completed videos were uploaded to Universität Hamburg Lecture2Go and podcampus.de

Titel: Rotationsverdampfer

Autoren: Charlotte O'Donnell, Jelena Berl

Thema/Beschreibung: wie man einen Rotationsverdampfer verwendet

Zielgruppe: Studierende in Organisch-Chemischen Grundpraktika

*ideally shots are done close up, but if filming is too technically challenging can be performed with full set up shown

†ideally picture/videos shots are used, but if this is too technically challenging text slides can be used

Nr.	Bild oder Titel	Was ist zu sehen?	Was wird getan?	Was wird gesagt?	Kommentar bzw. ergänzende Info
1	Intro slide	Obertitel: „Brücken in die Organisch-Chemischen Grundpraktika“ Titel: „Rotationsverdampfer“			
2a		Picture of full roti setup	Static image and spoken sentence	*Rotationsverdampfer (roti) is a piece of equipment used to remove solvent at lower temperatures under reduced pressure* *Der Rotationsverdampfer ist ein Gerät das dem Entfernen von Lösungsmittel bei geringer Temperatur unter vermindertem Druck dient*	
				This is an example of the roti model used in the grundkurs praktika. Although there are many different models of rotis, they all have the same components: *Dies ist ein Beispiel des Roti-Models, das im OCP genutzt wird. Obgleich es viele verschiedene Roti-Modelle gibt, bestehen alle aus denselben Komponenten*	
2b		Labelled picture of full roti setup	Static image with vacuum pump label introduced	*Vacuum pump: to reduce the pressure in the roti system, as solvents boils at lower temperature under reduced pressure* *Vakuum-Pumpe: zum Absenken des Drucks im Roti-System, da das Lösungsmittel bei geringerem Druck schon bei einer tieferen Temperatur siedet*	

Figure 1 Excerpt from storyboard for Rotationsverdampfer video (top), excerpt from order of scenes to be filmed for Rotationsverdampfer video (p. 4 top).

Scene No.	Bild	Was ist zu sehen?	Was wird getan?	Was wird gesagt?	Order of scenes filmed
2a-m, 4a		Picture of full roti setup, with post-production labels	Static image with post-production labels added and spoken sentences	-	1
4d		Video of pump being switched on	Video with spoken sentence	*Once the water bath has warmed up, you can then turn on the vacuum pump by pressing the switch at the side.*	2
4q		Video of flask being lowered into water bath	Video with spoken sentence	*Lower the flask into the water bath by lowering the lever*	3
5b		Video of flask being lifted from water bath	Video with spoken sentence	*Using the lever, raise the flask from the water bath*	4
5c		Video of vacuum being turned off	Video with spoken sentence	*Turn the vacuum off, by pressing the start/stop button on the monitor*	4

Although we had planned to produce the video library in multiple languages in addition to German, we were unable to translate the video content into different languages within the timescale of the project. However, as the chemistry Bachelor programme at the Universität Hamburg is in German, the video library only being available in German is suitable for our primary target audience of students in the foundation organic chemistry practical course.

ERGEBNISSE

A video library of fundamental organic chemistry practical techniques, which students encounter in their organic chemistry practical courses at the Universität Hamburg, has been produced. These videos are available on Universität Hamburg Lecture2Go (https://lecture2go.uni-hamburg.de/l2go/-/get/v/38295) and podcampus.de (http://podcampus.de/nodes/RzXzA) online platforms (Figure 2) and can be accessed by students prior to the start of the foundation organic chemistry practical course, to serve as an introduction, and throughout the remainder of their studies, as a revision tool for later organic chemistry practical courses.

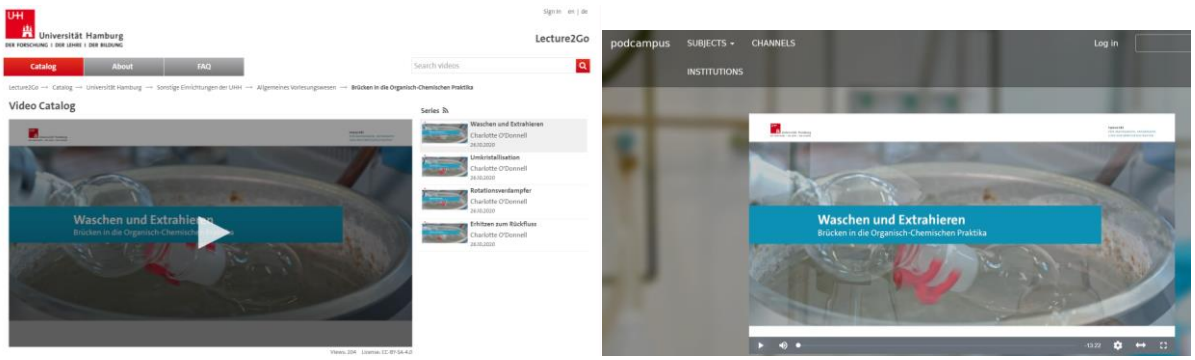

Figure 2 Screenshot of Brücken in die Organisch-Chemischen Praktika video library on Lecture2Go (left) and podcampus.de (right) online platforms.

Although the video library is already available for students on the Lecture2Go and podcampus.de online platforms, the students need to be made aware of this. This could either be through a course email to all students taking organic chemistry practical courses or by a tutorial to the students prior to the foundation organic chemistry practical course. The introduction of the video library to the students can be supported by Prof. Dr. Christian Stark in agreement with Dr. Brita Werner, who is the responsible for overseeing the foundation organic chemistry practical course.

In the current format, the video library is a stand-alone, non-compulsory learning resource for the students to use at their own will. Whilst this has the advantage of allowing the students to access the material on their own time; the videos could also be integrated into the curriculum as a more active learning resource. For example as a compulsory pre-laboratory online course, in which the students would be required to obtain a certain score before they are able to begin in the foundation organic chemistry practical course. This more active, compulsory format for the video library would have several advantages. Firstly, as all the students would have watched the videos prior to the beginning of the foundation practical course, they would all have the same introduction to the practical course. This would also be beneficial for the assistants in the practical course, as they would have more time to assist with the more challenging tasks and aspects, rather than the more basic tasks and aspects that can be addressed from watching the videos. Additionally, the more active format of the video library would be more engaging for the students and would cause them to interact more deeply with the learning resource.

As previously mentioned, we had initially planned to produce the video library in a selection of languages other than German. Although the videos only being available in German should not present an issue for the primary target audience, if we were to publish the videos on a 'more open' online platform, such as YouTube, having the videos available in English could vastly broaden the audience of the videos, which would be advantageous in showcasing the collaborative project of the Lehrlabor.

RÜCK- UND AUSBLICK

The video library has been successfully produced to the desired high standard. The next goal is the increase the awareness of the video library amongst students, either by introducing the students in the foundation organic chemistry practical course to the video library or by integrating the video library within the curriculum, for example as an online pre-laboratory course. Student feedback on the video library and its integration would be beneficial for future related projects. There remains the possibility to translate the video content into other languages, as originally planned, to increase the inclusivity and accessibility of the video library. Additionally, publishing the video library on a 'more open' platform such as YouTube would significantly broaden the audience and would showcase the collaborative project from the Lehrlabor.