WERKSTATTBERICHTE

“DRESDNER STADTGESCHICHTE 3D”

CHALLENGES AND CHANCES OF CROSS-DISCIPLINARY PROBLEM-BASED LEARNING

JULIA CHOJNA
julia.chojna@tu-dresden.de
NATALIE WOLTMANN
natalie.woltmann1@mailbox.tu-dresden.de
DR. SANDER MÜNSTER
sander.muenster@tu-dresden.de
DR. KRISTINA FRIEDRICHS
kristina.friedrichs@tu-dresden.de
DR. DANILO SCHNEIDER
danilo.schneider@tu-dresden.de
PROF. DR. MARKUS WACKER
wacker@informatik.htw-dresden.de
RAINER UHLEMANN
uhlemann@htw-dresden.de

ABSTRACT

The increasing awareness of the opportunities and possibilities of digitization in research and industry brings increased demands on graduates. The fact that digital resources are now cumulatively playing a role in the humanities and social sciences also necessitates the networking of various specialist disciplines. Cross-disciplinary project work, however, has its own challenges due to different subject cultures, perspectives and working methods. In order to adequately prepare students for these hurdles, the TU Dresden and the HTW Dresden (University of Applied Sciences) carried out a joint teaching project called "Dresdner Stadtgeschichte 3D". Potentials and challenges were collected and analysed in a mixed method procedure in order to subsequently formulate didactic-conceptual implications.

Keywords: cross-disciplinarity, architectural history, visual media design

1. "DRESDNER STADTGESCHICHTE 3D" – IDEA AND DESIGN

Remembrance facilities are a genuinely cross-disciplinary field of work, which is growing even further in the breadth of its requirements due to digitization. For example, museums are not just places where historical artefacts are collected and exhibited. They are also places of learning, encounter, inclusion and communication. Students who want to be able to cope with the changes in digitization in their professional future need an understanding of the intrinsic logic of digital communication through their own discipline. Media IT specialists do not create visualizations solely on their own but consult with experts from other departments about the function and target group of their graphics. Museum educators no longer design the place of learning in an analogous way, but instead design mediation services that respond to the heterogeneity of the visitors. The course "Dresdner Stadtgeschichte 3D" therefore offers

(1.) the development of cross-disciplinary project competence as well as the deepening and application of scientific knowledge in the participating disciplines,
(2.) the qualification of prospective teachers in the implementation of project-based teaching and
(3.) consolidation and continuation within the qualification projects of the junior research group „HistStadt4D - Multimodal Approaches to Historical Image Repositories" (www.visual-humanities.org).

Practical and reusable result of this project is a publicly accessible, interactive "Residenzschloss" (castle) guide on the internet with texts, 3D-models and designs which were worked out by the student's project groups (http://schloss-dd.mz.test.tu-dresden.de). Although this guide is the final product for the lecturer's team it subordinates in the hierarchy of goals. The main objective is the exchange and cooperation of the students. At the same time, achieving this goal is the biggest challenge for the teaching format. "There is a common sense case for suggesting that the best education that can be provided to students is a sound discipline-based education, with opportunities for interdisciplinary discussion when it is warranted." (Davies/ Devlin 2007, p.4) Central challenges of cross- or interdisciplinary cooperation are the differing mental models as well as the different vocabulary of the individual disciplines (cf. ibid.). The extent to which the students manage to deal with these challenges should be observed and described in the seminar according to the principle of research teaching.

Each group is asked to work on a different part of the castle: based on art historical knowledge of the castle the students of Media Informatics work on 3D models. Students of educational sciences, who deepen their master's degree in the field of educational technology, should, above all, take over the task of didactic preparation of the material elaborated by the art historians. In addition, they have to organize the group's working process. Students of geoscience accompany the cooperation with half of the semester credit hours. The smaller extent

arises from the fact that measurements required for the project already took place in the previous summer semester. In particular for the use of the measurement data for the location of the 3D visualizations of the castle in the surrounding model, the students have an advisory function. All participants meet at an appointment of 90 minutes per week. In addition to these sessions, expert seminars are held once a week. The aim is to provide subject-specific input that enables students to fulfil their task in cross-disciplinary collaboration.

"One promising approach to enhance cooperation quality may be the adoption of established and standardized methods like SCRUM for cross-disciplinary project management." (Münster et. al. 2015: 2338) Following this assessment, the TU Dresden and the University of Leipzig conducted a joint teaching project in the field of visual media design, which applied this organizational structure coming from the project management in the context of teaching. In the testing of SCRUM as an agile framework for the organization of complex work processes it became clear that in general it is very well suited for the context of problem-based learning, but in some cases it would have to be reduced in scope (cf. Hermann et. al. 2017). Such a shortened form of SCRUM should therefore also be used in our seminar.

Since the cooperation to this extent was carried out for the first time by all participants[1], the event was formatively evaluated during the semester. For this purpose, a weekly 15-minute conversation was held in the specialist seminars and a Teaching Analysis Poll (TAP) was conducted by an external person. In addition to these methods, short feedback was written by the students of educational science, who were to take on the leadership role in the project groups. A report was submitted in the sense of the formative evaluation during the semester, a total reflection as a summative seminar reflection was submitted after the last session. The results of these surveys allow conclusions about the success of the seminar and future tasks.

2. INSIGHTS AND REACTIONS

With the evaluation of the course the various challenges of cross-disciplinary problem-based learning became evident. The hurdles which we expected in advance turned out to be partly solvable and sometimes difficult to handle with the methods we chose. Overall, it became clear that architectural history is well suited as a topic to encourage cross-disciplinary collaboration. However, a suitable problem alone is not enough. Since the majority of the evaluative surveys took place during the semester and thus with a formative character, we could look for immediate solutions to emerging problems. Not all of the considerations that preceded the structure of the seminar and the content proved suitable for the specific teaching-learning situation. The heterogeneous prerequisites of the students made it necessary to adjust the support offers.

The seminars were rated very well by the students. Likewise, they value the knowledge gained through the course as comprehensive and useful. It was positively highlighted that insights into the other discipline were possible.

The students mainly criticized that there was no clear task for a very long time. The students of art history and educational science had overlapping tasks, as both disciplines should make content decisions for the guide. Their different perspectives were not sufficiently defined. In addition, the students of media informatics in particular complained that they were first learning how to create 3D visualizations and therefore could not adequately assess their own competence at the beginning of the semester.

As a consequence, the tasks of the art historians and the educational scientists were more clearly distinguished from each other. While the writing of the texts was the sole task of the art historians, the educational scientists considered the didactically meaningful design of the page, also with regard to pictures and videos and their relation to the text. In addition, the teaching staff at the University of Applied Sciences offered additional practical courses to better support the students of media infor-

1 One similar project, which served as a model for our seminar, dealt with the architecture of the Freiberg Cathedral (http://www.freiberger-dom-app.de). The TU Dresden and the TU Chemnitz developed a virtual travel guide through the cathedral. Since architectural history has proved to be a very fruitful framework for cross-disciplinary work (cf. Kröber et. al. 2016), our seminar was also located in this thematic field, but unites more than two disciplines in larger student groups.

matics. Weekly office hours, which the students could visit when needed, supplemented the specialist support.

The exchange about the project work during the expert seminars was also difficult due to the widely varying group size. This inequality arose from a very large number of students of Media Informatics, which were divided into different groups depending on the size of the castle section to be modelled. Larger groups complained about communication difficulties, whereas the smaller groups felt partially overwhelmed by the workload. In some cases, however, the opposite was the case, where individual students did not feel sufficiently occupied and their own role in the project work as too insignificant. This shows that a clear naming of tasks for each individual student, including a time frame in which these are to be done, would have been necessary. SCRUM would enable such planning while being agile and iterative. However, the students resisted the use of SCRUM at the beginning of the semester. On the one hand, they did not feel able to use this unfamiliar framework, on the other hand, the given introduction did not succeed in teaching them its benefits for designing the virtual travel guide.

Due to the students‘ rejection of SCRUM, this type of project organisation was excluded from the outset. After it has become evident that the brief introduction to project organisation methods was not enough for the educational scientists to structure the cooperation, weekly work progressions were demanded by the teachers. But since this measure was not implemented until the semester, unfortunately, the students did not feel obligated to comply. In the seminar of educational scientists, introductions into communication and organisation of groups were given. Certainly, the possibility of supervision also helped the students to jointly think about how they could handle the communication difficulties in their respective groups. However, as this problem was partially complained about until the end of the semester, the communication aspect should be discussed in all the expert seminars.

In the ideal presentation of this cooperation, the student of art history specifies which iconographic or architectural peculiarities the visualization in particular should emphasize. The student of geoscience and the student of media informatics make statements about the extent to which such visualization is feasible. In addition, the student of educational science formulates requirements for the castle guide as a learning medium and always keeps the users and their heterogeneity in view. In a constant exchange, a product could emerge that visualizes art-historical learning content and thus provides added value for conveying the history of the city. Such cooperation requires students to be aware of their own expertise and, above all, to identify points of contact with the other disciplines themselves. Only a few groups achieved this goal.

Since the biggest obstacles of the seminar were the lack of clarity about one‘s own tasks and lack of knowledge to deal with emerging problems (in many cases the students could not transfer the available knowledge to their concrete problem), we suggest that expert knowledge should be conveyed in a first working period only. That means that the students work within their specialist disciplines for several weeks. This should help them to see themselves as experts in their task and enable them to work independently in the small groups (weekly project work). They would then start well-prepared in the second working period.

In addition, all students should be aware of the added value of frameworks such as SCRUM even before the start of the group sessions. This would make it easier for students of educational sciences to lead the groups.

3. IMPLICATIONS FOR FUTURE DIDACTIC INSTRUCTION

The evaluation of the course showed some challenges, which are resulting in structural re-organisation necessities. The feedback from the students as well as the assessments of the teachers are central clues for the future design of an improved learning setting. The suggestions made, which are briefly summarized below, should be interpreted as interim results, which must be re-tested in similar courses.

(1.) Cross-disciplinary cooperation between the students can only take place as soon as there is absolute **clarity of tasks** within the own subject area. The students of the differ-

ent disciplines can only perceive each other as experts for their respective subjects if they see themselves as such.

(2.) It makes sense to specify a **project structure** from the beginning; otherwise there is a risk that the students' self- organisation will turn into arbitrariness. Support formats that are used later to respond to current needs are less meaningful.

In summary, we conclude that cross-disciplinary teaching very quickly involves the danger of becoming solely multidisciplinary. A networking of disciplines does not take place only by working on a joint project. The added value of the exchange must first be made clear to the students. An intensive development of our own expertise and above all the awareness of which specific added value each discipline can bring to the project, therefore, seems to us to be central to the planning of future cross-disciplinary teaching projects.

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