E.3   Organizational models in virtual teaching cooperation – documentation and evaluation of organisational didactics in a collaborative higher education project.

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A recent objective of the Saxon E-learning initiative „Bildungsportal Sachsen", a cooperation of all HEIs of the state, is to trigger the development of „virtual teaching cooperation". Currently, a network project labelled "Virtual Teaching Cooperation"[1] is underway which intends to pilot a cross-university teaching networking, considering the didactics of collaborative teaching and learning, ideally in a specialist domain and possibly between different types of universities in Saxony. Main topics of this initiative are a) the creation of solutions regarding the effective cooperation with international partners, b) the qualification of educational personal in order to strengthen their digital competences, c) the support by the creation of preparatory courses and online self-assessments using and creating OER (Open Educational Resources) material (Bildungsportal Sachsen, 2019). While the network consists of five subprojects, with the common aim to promote networking between the respective 2–4 project partners, authors follow an organizational-didactic interpretation of the virtual teaching cooperation in vocational education. This work presents the organizational models of these subprojects with a focus on their internal communication, as well as their type, method and level of the internal cooperation between the project partners. Theoretically, authors apply rather organizational theory than the usually requested media didactic approach of educational heritage. As each sub-project has developed a different blended-learning scenario and different cooperation relationships with its project partners, who might be other institutions, universities, training centres, etc., in national or international level, it is necessary to analyse these different models by documenting the process and the current results of each subproject separately. A matrix-based comparison will be presented to determine how and with which tools these organizational models have been developed and implemented in each respective educational program.

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[1]   https://bildungsportal.sachsen.de/portal/parentpage/projekte/hochschulvorhaben/projekte-2019-2020/virtuelle-lehrkooperationen

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1 Organizational models and domain profiles of the sub-projects

In this chapter the subprojects and their organizational, as well as their cooperation structure will be presented. Based on the project proposals and the assessment report submitted by the Working Committee for E-learning of the Rectors' Conference Saxony for the year 2019, each sub-project has developed a different organizational model, based on the aim and the need for cooperation among its partners. However, the main purpose refers to the promotion of a cross-university cooperation, taking into consideration the didactics of collaborative teaching and learning. It would be interesting to see how the project partners collaborate with each other and on what elements they have structured their communication relationship. The first three sub-projects are domain projects of the initiative „Bildungsportal Sachsen", whereas the last two subprojects can be described as method-oriented projects. The domain projects aim to develop and implement a well-structured concept, whereas the method-oriented projects play an independent supportive role, as their results can be applied as theoretical basis in other projects and cases, too.

1.1 Subproject 1: Initiative to develop a multilingual teaching and learning environment

The aim of the project is to determine in what extent multilingual study materials can help foreign students to develop their language skills, and in what kind of digital work these should be structured and be made available for the students. This would promote self-determined and time-independent learning by non-native speakers. (André & Kirstin, 2019). Project partners are the Department of Textile Technologies at the TU Chemnitz and the Institute for Textile and Leather Technology at the West Saxon University of Applied Sciences in Zwickau. Both partners offer in cooperation the 4-semester master's course „Textile Structures and Technologies". The two project partners have also collaborations with universities in Albania, Romania, Turkey and Bangladesh. Study materials prepared became available by the lecturers from TU Chemnitz and WH Zwickau in two languages, German and English. These have been composed in two main modules of textile. These preparations took place in an interactive learning environment. These materials, and especially the technical terms of them, have been later translated into the languages of the other project partners. The students form every cooperation partner had access to them via the platform OPAL. OPAL plays a fundamental role in this project as it is used as an exchange platform, which enabled the preparation of multilingual teaching material in a form of already created scripts, which have been shared among all cooperation partners.

In the long term, the project aims to expand the existing cooperation with foreign universities in such a way like creating opportunities for internships or part-time courses or student exchange programs.

In the meantime, business trips between the project partners were planned in order to exchange knowledge and experience. There has been also the possibility for the participants and the teachers to take part in certain conferences, themes days and workshops, which would place throughout the year, to expand their networking and exchange their knowledge.

1.2   Subproject 2: Cooperative teaching and learning in the age of digital transformation: Establishment of a cross-site and media-didactic concept for the master's degree course „International Management".

The aim of the subproject is to develop a concept, which promotes an international cooperation between different types of universities in the fields of Economics and International Management (Thorsten, 2019). Since 2013, the University of Dresden and the University of Applied Sciences Zittau/Görlitz are cooperating for the master's degree in „International Management". In 2019, the same course was expanded offering a double degree by a Polish university (Wrocław University of Economics and Business). In the third semester, students will have the opportunity to continue their studies at the partner university. In 2020, the Technical University Liberec will offer the same master's degree as an integrative double master's degree in „International Management" in Czech Republic. In this cooperation, the students are enrolled at both universities from the beginning of their studies and they can choose freely between the courses at the two locations. If the students acquire at least 30 ECTS at the respective partner university, they will receive the corresponding double degree.

The establishment of the cooperation relationships between the project partners required certain work steps. At the beginning of the project, it was necessary to establish a communication structure with the teachers. During the group meetings, it has been discussed which digital tools for designing the teaching-learning scenarios have been tested in the partner universities and in what way they can used now in the project. As far as the solutions and the techniques for cooperative teaching-learning methods that have already been already tried out and tested in the media-didactic community is concerned, the project coordinators should further develop and adjust them for the current situation. The teachers have afterwards considered these. Furthermore, group meetings and workshops about the media-didactic portfolio of the teachers of this degree program have been carried out in order to transfer and achieve the same level of media-didactic knowledge, what has promoted an international exchange of experience and knowledge among different types of universities.

Based on this common knowledge about the content and the didactic requirements of the master's degree program, a collegial development of settings for the different constellations of teaching cooperation occurred. The media-didactic concept was prepared firstly by the project team and then has been coordinated by the teachers of all other project partners, who would later implement the selected cooperative courses in all types of universities. The teachers played an important role in the implementation and evaluation of these teaching-learning scenarios. The results of a first evaluation have been discussed in a teacher conference and the course concept has been finally finalized, introduced and implemented at all four locations of the cooperation.

1.3   Subproject 3: An open, digital learning world for virtual teaching cooperation using Building Information Modelling (BIM)

In this collaborative project, a pilot application for developing a cross-university networking was to be implemented and used, considering the didactics of collaborative teaching and learning in the field of Civil Engineering, in cooperation between the Technical University of Dresden (TU Dresden, diploma degree) and the Leipzig University of Applied Sciences (HTWK Leipzig, bachelor and master courses), as well as Berufsförderungswerk Bau Sachsen e.V. as an external partner (Morgner, 2019). Through the coordinated interaction of three sub-projects, already established learning technologies from the Saxony educational portal (OPAL, BLok) and the DFN (Adobe Connect) were to be expanded into a „Common Data Environment (CDE)". This was intended to create a learning world for the specialist domain „construction".

The role and management concepts, which have been available in OPAL, have been adapted to the BIM area. The content of the „BIM learning world" was expanded based on the „digitalized teaching building" available at the HTWK Leipzig so that students from both universities could work on a joint design project. This created an essential basis for common evaluation criteria. OPAL was used as a mean for intensive quality controls and improvements in the designs not only by the supervisors in Dresden and Leipzig but also with techniques of the „peer-assisted learning" (role of interface manager and task team manager). The teaching room is using the learning technologies as OPAL, Adobe Connect and a CDE Network.

OPAL and BLoK were used for uploading the necessary media and learning content, which would be available for all the students from all cooperation universities. Since the students were in different locations, the courses have taken place online via Adobe Connect and they have been recorded. The Communication among the groups has been conducted with the use of different communication applications and platforms (email, chat, Opal Forum, etc.).

The students of the TU Dresden had the task to develop further the BIM settlement. The teachers of the cooperative courses at „BFW Bau Sachsen" have formulated information requirements. The students at the HTWK Leipzig received the digital models and develop it further. The now well-developed openBIM repository for a component of the „BIM settlement" would be used by the cooperative students of „BFW Bau Sachsen". The instructors at „BFW Bau Sachsen" have then formulated new requirements for changes. Based on them, the students at TU Dresden should develop further the repository, while the HTWK students should develop the customized supplementary documents.

1.4 Subproject 4: Standardization in digitalized cross-university courses (set-up DHS)

This project aims to collect reliable data, which will set the basis for a transferable and scalable standardization of study modules and/or courses offered in a blended learning format. Furthermore, the development of a suitable e-mentor program to support the lecturers should accompany the corresponding conceptual implementation process as a prototype. The hiring and training of student assistants, who will support lecturers in the area of digitized teaching, was also part in the implementation process (Hilmer & Schulz, 2019).

The project has been implemented at the Institute for Knowledge Transfer and Digital Transformation (IWD) at Mittweida University on behalf of Rectorate. As a central scientific institution, the IWD is responsible for the development and support of digitized courses (blended learning) for cross-location teaching cooperation. Scientific exchange with other institutions (e.g. media centres) and at relevant conferences (etc.) is mandatory. At HS Mittweida, the courses are operated in cooperation with academic institutions in Germany and abroad (e.g. Austria or Düsseldorf, Hamburg, Berlin or Munich). With use of the know- how regarding the digital transformation of teaching and learning, the project set the base for advancing the virtualization of courses and modules. The pilot course was designed in blended format. The pilot group concerned the lecturers. All teaching content as well as additional organizational/study-related information have been available in the learning management system OPAL.

1.5 Subproject 5: A case for two universities: Development and testing of a framework for developing a didactic case study for a cross-university group work in virtual environment

In this project, an already tried-and-tested didactic-methodological framework has been further developed in such a way that it will enable teachers from different types of universities to develop resource-efficient teaching material. In form of a case study, the teachers have been asked to create a virtual course, which would promote a cross-university cooperation (Haubold, Baierl, & Schoop, 2019).

Using a modular manual, teachers have been instructed to develop and conduct a case study seminar in virtual space. The technical basis for the development of the manual was the results from a two-round evaluation of a personnel-oriented case study seminar at the TU Dresden (Chair of Information Systems and Information Management) in collaboration with the HTW Dresden (Chair of Human Resource Management and Skill Qualification). Two case studies were developed and implemented (Sachsen, 2019).

The first evaluation refers to an expert interview with two lecturers, one from each university participated in the project. The second evaluation focuses on the format of the virtual case- study seminars of two teaching models on praxis. With use of teaching analysis polls, both lecturers and students have been interviewed. In the case study participated 25 students from each university partner. Thanks to the tried-and-tested structure and the connectivity to digital learning platforms such as OPAL or ELGG, the authoring tool is also brought closer to less digital-savvy teachers.

2   Forms of Virtual Projects in comparison

In this module, a matrix comparison will be conducted with focus on the different organizational models and the cooperation relationships among the project partners of each sub-projects. It is necessary to examine how and in what form and extend the cooperation relationship between the project partners occur and what is its role in the overall establishment of the project. The person-related aspect of virtual cooperation justifies the level and the form of this cooperation and reflects the organizational method on which the whole concept is based.

Every project has different kind of cooperation with its partners, such as among different types and departments of universities, internal or external collaboration with other partners, etc. Therefore, it is important to clarify the complexity of those communication flows and structures. Especially in a virtual environment, aspects like the technology, the digital competences and the flexibility, are valuable element for the establishment of a virtual cooperation within a geographical area of even in an international level. The share of the expertise and the experience are key factors, which can affect positive the cooperation and should be evaluated as instruments to control the quality and the level of communication among the project partners.

The figure shows the different elements of the organizational structure of each sub-project. It is based on the Typology of virtual organizations after Palmer & Speier (Köhler & Schilde, 2003 – cf. Annex 1).

Their common characteristics are their location, their duration, their type of communication and the main research area. Even though every sub-project has developed a different concept, all of them are based on the main idea of using the didactics of collaborative teaching and learning in a virtual teaching environment in the region Saxony in Germany and they could be described as virtual, temporary projects. The duration and the establishment of these projects regards the years 2019 until 2020. All of them aim to support the initiative „Bildungsportal Sachsen" and trigger the development of a „virtual teaching cooperation".[2] The sub-projects are divided into two main categories, based on their purpose and concept, such as domain and method-specific projects. The difference between them is that the method-specific projects play a supportive role, because their concept is oriented to a method used for promoting a virtual cooperation, which can be applicable in other projects, too. In the domain project on the other hand, a specific concept has been created with systematic actions and collaboration development. For that reason, the comparison will be based on these two main project categories.

3 Conclusion

Higher education development is strongly linked to virtual collaboration. Still such is now much explored and focused publications are rare (cf. Köhler et al., 2010). Indeed the oorganisation des Online-education is triggered by the research network investigated both theoretically and as well in its structure by focused sub-projects. Interestingly all approaches promote a different aspect of the development of a „virtual teaching cooperation" between different types of universities. As a result, the internal communication must be structured in such a way that enables the collaboration in the virtual environment, considering the needs, the conditions and the requirements of the main concept. However, communication is not always seen as an important part of the whole process. Most of the time, the focus is on the how and in what means and tools one should proceed. Some other times it is taken for granted as it is of fundamental importance in order to proceed, however it is not always clear what kind of communication one should use and in what form and structure this should be, in order to succeed.

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[2]   Project 1: Initiative to develop a multilingual teaching and learning environment
      Project 2: Cooperative teaching and learning in the age of digital transformation: Establishment of a cross-site and media-didactic concept for the master's degree course "International Management"
      Project 3: An open, digital learning world for virtual teaching cooperation using a Building Information Modeling (BIM)
      Project 4: Standardization in digitalized cross-university courses (set-up DHS)
      Project 5: A case for two universities: Development and testing of a framework for developing a didactic case study for a cross-university group work in virtual environment

Altogether, it would be very interesting to see how exactly the collaboration within the method-specific projects has been established. This would give us a better image regarding the on-praxis implementation of the concept and aspects like collegial cooperation and adaptivity could be determined.

3.1 Comparison of domain-type projects

The concept of all the domain virtual projects takes place in different types of universities. The first two projects are international oriented, and they are established in a shared/similar degree program, whereas the third one is regional oriented, applicable in a very specific scientific area and different academic degrees, which offer the same or similar module, though. Furthermore, an external partner plays a specific role in the overall procedure. The organizational structure of each project has been designed taking into account its needs and requirements. One may find a different process in every single project. The systematic implementation of the concept varies among the domain sub-projects.

In the first project, a systematic methodology has been created and every step must be completed in order to continue with the next one. Every project partner has specific tasks and project development can be described as process from inside (regional) to outside (international) communication. In other words, the process starts from the teachers in a German university. As long as they have created all the relevant study material, the teachers share them to their students and their project partners abroad, which afterward continue with the next step, which is to adjust this study material in a multilingual environment.

The second project depends on the structure of a master's degree program. The volume of the cooperation is based on the study semester. In this project, teachers have the responsibility to provide to their students all the relevant material, which will be available for every cooperated university. However, the students are those who decide in which semester or which course and when they want to participate. At this point, it would be good to consider, that the factors mobility of students and selection of course, could be important indicators for the overall evaluation of the concept.

The third project differs a lot in comparison with the others, because it is divided into three sub-projects, in which a shared digital infrastructure will be used from a team from all locations and departments. The teachers in this concept are responsible for supporting, giving feedback and evaluating the students' performance and provide them with the relevant material. For this project the teamwork and the good communication between the teachers and the students from every university is required in order to achieve a high level of collaboration effectiveness.

Regarding the networking among the members of each virtual project, this occurs in different forms. In the first two projects, the communication could be described as „closed", because the communication of the teachers and the colleagues occurs only between them and for specific topics and issues, which are mainly discussed in planned business meetings or conference and other similar activities. In the third virtual project, the communication between all the participants could be described as complex and open. There are different and, in many directions, communication flows, such as between the teachers of each module, between the students from different degrees and locations or between the teachers and the colleagues from the external partner. For an effective share of information and knowledge, all the virtual projects use the learning platform OPAL in order to stay connected and updated.

3.2   Comparison of method-type projects

The role and the structure of the last two sub-projects are different to some extent in comparison with the domain projects. Both have similar characteristics, such us limited duration, virtual form and local-concentrated. However, these projects have been designed to give a more in-depth answer in topics regarding the methods used in virtual classrooms by the teachers. Based on the available literature, the communication structure within them has not been explained in detail. The focus has been on the further development of blended-learning formats.

The fourth project aims to advance the virtualization of the courses and the modules. Furthermore, the development of an e-mentoring program to support the lecturers is being promoted. The interesting part is that the research will take place in an institution of a specific university, which cooperates with other universities, but it is not said if a research conduction will occur in those cooperation partners or not.

On the other hand, the fifth project is focused on how the teachers use this manual with the aim to create virtual case study seminars for a personnel-oriented module. The research method has to do with a two-round evaluation of these virtual case study seminars. However, there is no reference regarding the communication structure between the project partners, as the main emphasis has been given on the method and the evaluation process.

Finally, both projects use a learning platform for creating and sharing information, material and knowledge. The fourth project uses the common platform OPAL, whereas the firth project the platform ELGG.

Literature

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Annex 1:

Virtual teaching environments in education					
	Project 1	**Project 2**	**Project 3**	**Project 4**	**Project 5**
Type of cooperation	virtual project	virtual project	virtual project	virtual project	virtual project
Length of project	temporary	temporary	temporary	temporary	temporary
Type of Project	domain	domain	domain	method-specific	method-specific
Mission	creation of a multilingual teaching and learning environment	development of a double master's degree in "International Management"	Use of a Building Information Modeling for civil engineering courses	standardization of study modules, development of e-mentor program for the lecturers	Development of a virtual personal-oriented case study seminar based on a manual
range of involvement	across different types of universities	across different types of universities	across different types of universities and degrees in Saxony	in a specific institut of a university	between two different departments and types of universities
Methodology	in steps, share of study material	exchange semester	splitted in three sub-projects, teamwork	setting the base for creating an e-mentor program	evaluation of virtual case study seminars
Membership	international	international	local	local	local, mixed
Network configuration	closed	closed	open, external	open	open
Networking	business trips, workshops, theme days, conferences, exchange programs	business trips, workshops	meetings, trainings	*reference about international cooperations	* no reference
Use of IT	connectivity, knowledge share (OPAL)	connectivity, knowledge share (OPAL)	connectivity, sharing embedded knowledge (OPAL, BLoK) / shared infrastructure (BIM)	knowledge share/exchange (OPAL)	connectivity, knowledge share (ELGG)

Figure: Comparison of organizational models of the sub-projects
(Köhler & Schilde, 2003)