

Marine Spatial Planning and Integrated Coastal Management as drivers for a more international, interdisciplinary and interactive approach to higher education

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Abstract

Environment and sustainability issues are becoming increasingly important world-wide. They also determine future career options of students. This change demands a modified portfolio of competences students should develop during their higher education studies. Within a multidimensional field between interdisciplinarity, internationalisation and interactivity various pathways can be taken to realise according adjustment of higher education settings. In this paper, we will present an example for successful innovation and adaptation to emerging needs. We refer to the case of an interdisciplinary module tailored to a international student group by creating interactivity in an online learning environment. The module has its topical drivers in Marine Spatial Planning and Integrated Coastal Zone Management. Both societal challenges provide multiple options to connect plus innovate existing (disciplinary) study programmes in an institutional framework.

Keywords: *Internationalisation, interdisciplinarity, interactive methods, higher education, sustainability.*

1. Introduction

Global environmental and sustainability concerns are becoming increasingly important and are also shaping future career options of students. This change demands a modified portfolio of competences students should develop during their higher education studies (i.e., futures-thinking competency, values-thinking competency, strategic-thinking competency, interpersonal competency, integrated problem-solving competency, (see Brundiers et al., 2021)). This set of competencies requires a broader and more holistic perspective in terms of disciplines, but also in the context of different geographical challenges as well as country-specific perspectives and approaches. It becomes crucial to integrate interdisciplinary and international cooperation in higher education into study programmes at all level (courses, modules, programme, university profile, research of lecturers). This means an international and interdisciplinary learning environment needs to be actively created through cooperation between different disciplines and international partner universities. To gain the mentioned competencies, learning and teaching approaches have to be adopted accordingly, fostering interactivity and cooperation between the students in such a learning environment. Strengthening of cooperation and interactivity within a heterogeneous student group requires (and fosters) interdisciplinary knowledge, skills and approaches of both, lecturers and students (Fig. 1).

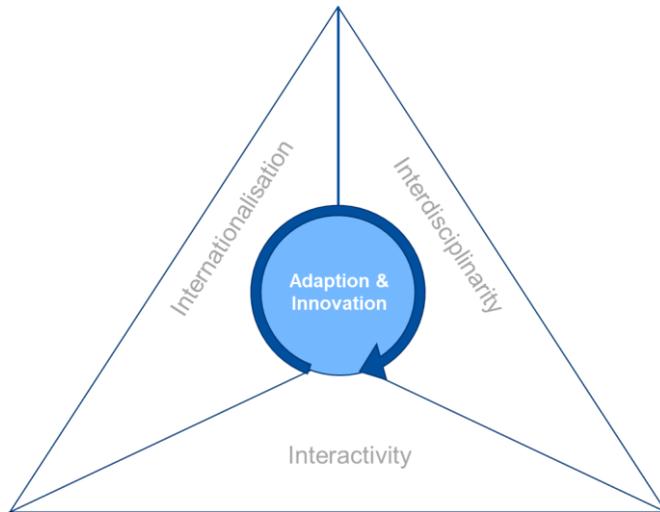


Figure 1. Adaption and innovation needs in higher education concerning content, competencies and structure to more interdisciplinary, internationalization and interactivity.

In addition to the mentioned competences to be achieved in degree programmes, professional competences such as topical and disciplinary skills need to be developed by the students complementarily. The complexity and disciplinary diversity in degree programmes is high,

covering e.g. environmental sciences and management, as well as sustainable development. Furthermore, grand topics such as environmental and sustainability concerns have to be discussed with local and global perspectives and diverse solutions. International cooperation and exchange becomes crucial accordingly providing students international and intercultural experiences. Therefore, higher education in the context of social-ecological systems and sustainability has to include the didactical and methodological preparation of important and complex topics for a broad audience from various disciplines (Lozano et al., 2017).

Within this multidimensional field between interdisciplinarity, internationalisation and interactivity various pathways can be taken to realise long-term improvements. Any design of meaningful pathways needs to amalgamate two different levels at the same time: 1) The level of conceptualisation: creating an international and interdisciplinary learning environment by increasing cooperation between disciplines and international partner universities and permeability of different study programmes. 2) The level of implementation: applying innovative, interactive learning and teaching methods, e.g. digital teaching and learning settings to gain international and intercultural experiences in a digital and flexible environment without exclusion of specific disciplines.

This paper will present an example for successful innovation and adaptation to emerging needs. The authors will refer to the case of an interdisciplinary module tailored to a international student group by creating interactivity in an online learning environment. The module has its topical drivers in Marine Spatial Planning and Integrated Coastal Zone Management. Both societal challenges provide multiple options to connect and also innovate existing (disciplinary) study programmes in an institutional framework.

2. Conceptualisation and Implementation

2.1. Institutional framework

A structural framework for international and interdisciplinary higher education at the University of Oldenburg (Germany) has been proposed in the context of environmental and sustainability research. The framework refers the university's strategic development plan which simultaneously aim at further internationalisation and activities under the priority theme environment and sustainability. It aims for an increased interdisciplinary cooperation and higher permeability of study programmes at the University of Oldenburg. With different activities, the opportunities for students to gain international and interdisciplinary knowledge and skills are increased. This is realised by cross-linking different studying programmes from different disciplines (incl. international study programmes) on different levels of higher education. Additionally, international and interdisciplinary courses (seminars, summer schools) and study programmes are cooperatively developed and offered with international

partner universities. The overall aim is to increase the visibility and attractiveness of the university for (international) students.

Within an environment of five degree programmes in the field of environment and sustainability science, different projects and activities are constituted to increase internationalisation, interdisciplinarity and interactivity and to create innovations in this three dimensions (Fig. 2).

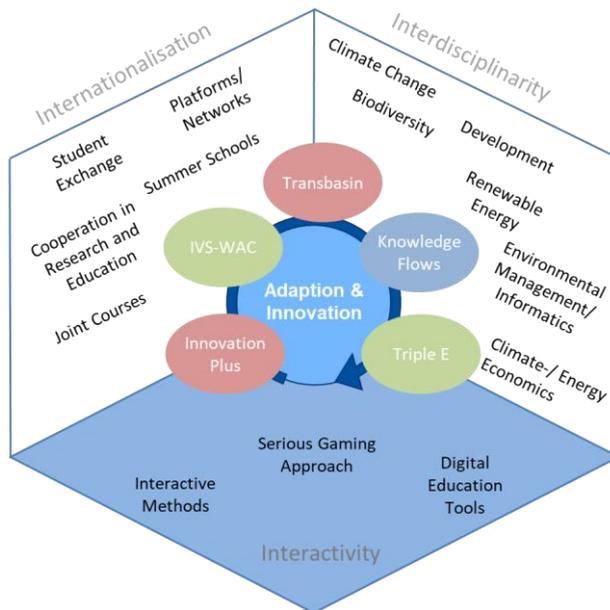


Figure 2. Projects within the multidimensional field between interdisciplinarity, internationalisation and interactivity: Various international activities and interactive tools are considered to implement adaptations and innovations concerning different interdisciplinary topics.

By enhancing international cooperation and building an exchange platform for researchers and lecturers international joint activities such as student exchanges and summer schools are fostered (EU ERASMUS + Strategic Partnerships “ Marine Spatial Planning” and “Knowledge Flows in Maritime Spatial Planning”). With cooperated/joint course an international interdisciplinary environment for teaching and learning can be created (DAAD (German Academic Exchange Service) “IVS-WAC / International Virtual Seminar Water and Climate”). Additionally a structured interdisciplinary exchange programme for international students can improve the predictability and the recognition of an international exchange and therefore barriers can be reduced (university’s strategic project “Triple E”).

With these projects it becomes possible to establish heterogeneous student groups concerning disciplines and culture in which the students can learn interactively and cooperatively. Such

mixed groups form the prerequisite to create the essential broad perspective and therefore develop necessary competencies for environmental and sustainability issues students will face in their future career. Integration of appropriate teaching methods, such as Serious Game and WordPress Blog, foster the development of the specific set of competencies and will be presented and evaluated in the following.

2.2. Implementation Example

The setting of the project “Gamification of higher education on MSP and ICM” under the German Lower Saxonian State Ministry’s funding programme “Innovation plus” is a specific scheme in interactive teaching and learning in the context of Marine Spatial Planning and Integrated Coastal Zone Management: An established higher education module “Planning and Management of Coastal Zones and Sea Basins” was enhanced with a combined approach of Serious Gaming, Lectures and a WordPress-Blog for a heterogeneous group in an interdisciplinary environment.

The module covers the complex interrelations between the natural marine and coastal space and human activities. Coastal and marine areas in Europe, especially the North Sea and Baltic Sea are of enormous social and economic importance and pressure. Its shared resources represent a crucial asset but also a mutual territorial challenge to European countries. Marine Spatial Planning (MSP) and Integrated Coastal Management (ICM) are much needed approaches to manage and organize the use of the sea and coastal areas to prevent uncoordinated planning and management and protect the unique environment with valuable habitats and high biodiversity. Both, MSP and ICM are complex and interdisciplinary fields of study and significantly important topics in marine and environmental sciences in higher education. This implies the dynamic interactions of the considered ecosystems with complex feedback mechanisms and low predictability on the one hand. On the other hand, it includes the social, legal and economic implications and interactions. The two lectures are generally separated lecture series (separated into ICM and MSP) with a significant overlap in the intended skills.

Within the module, a heterogeneous group of about 20 students - from all over the world with an interdisciplinary background - learns together. Additionally, to the variety of previous knowledge and experiences the current studies of the students vary as well: the module is electable within certain master programs focusing on natural science to economics or management. It is considered that the students can profit from the different backgrounds and learn interactively and collaboratively. The collaborative learning process is fostered by the innovative gaming approach and associated group work tasks. As an innovative approach of the module, overarching gaming days were included. After giving an overview on the topics in the first lectures and clarifying important terms the lecturers and students meet for playing

the serious game “MSP Challenge”. Parallel to lectures and gaming events the students use the WordPress blog to present, reflect and discuss their findings.

„Serious Games” offers novel opportunities for problem-based interdisciplinary education for mutual understanding, exchange of ideas, development of new approaches and understanding the complexity of different activities. They are of particular value in teaching because the direct interaction of students and teachers with the subject matter is carried out through trial and error, practically and interactively. As such playing a Serious Game is a form of collaborative discovery learning. Since 2011, under the name ‚MSP Challenge’ different Serious Games (Board Game and Simulation Platform) in support of MSP have been developed and applied, i.e., for education, social learning, stakeholder engagement and decision-support (Abspoel et al., 2019;). The MSP Challenge Simulation Platform is an interactive and collaborative tool for informed decision making to experience the complexity of possible actions of marine planning and coastal management based on real data (Mayer et al., 2014).. It combines role-play, game-technology, geodata and simulation models to create planning-oriented learning tools for MSP and a communicative environment that makes players think, talk and interact (Abspoel et al., 2019). The players shall develop the Exclusive Economic Zone of one country around the North Sea. The interaction and effects between human activities, geosystem and ecosystem are simulated (incl. feedback loops) and visualized in terms of pressures and indicators. Due to the COVID-19 pandemic situation the structure was adjusted to a completely online setting: Students work alone at home planning the marine space synchronously. Exchange between students, as well as time-out discussions and final reflection with the whole group were realized via video conference.

The students built the connection between the theoretical input, gaming experience and final assignment by creating blog pages along guiding questions (voluntary group work which prepares to the individual final report). At the beginning of the course groups were formed. Every group manages an own area in WordPress, work on tasks (i.e. using H5P tool) or where they create small information pages along guiding questions. Ideas, approaches and findings during the gaming experience are presented and discussed with their colleagues within a WordPress evaluation session.

The module was evaluated in three steps: pre-evaluation, mid-term evaluation and post-evaluation to (1) assess the characteristics of the group concerning nationality, background knowledge, interests and expectations, (2) the learning progress during studying depending on the different learning activity and (3) the overall satisfaction of the students with the module.

3. Experiences and conclusions

The presented setting illustrates one promising pathway to provide students with a modified portfolio of competences for their future career by aligning higher education with additional needs concerning environmental and sustainability issues. MSP and ICZM proved to be suitable cases due to their complex, interdisciplinary nature as well as their high relevance in science, education and policy.

Within the module international students from various study programmes within the university were successfully brought together. The combined approach of lectures, online Serious Gaming and WordPress Blog foster the interactive learning process of an international and interdisciplinary group of students. To assess the acquirement of certain competences the students were asked to rate their knowledge and skills concerning different categories within the pre- and mid-term evaluation. According to their statements, improvements can be observed for all evaluated competences, e.g. “Knowledge about MSP/ICZM”, “Design a strategy for a project you are participating in” and “Coordinate in teams”. Additionally, the students specified which of the applied methods helped them most to develop a specific competence. It is noticeable that no method is perceived to be helpful for all competences, but are relevant for certain sets of diverse competences. An appropriate mixture of methods is required to address all the different skills, i.e., the MSP Challenge and the WordPress Blog helped the students with their professional development, also classical lectures were perceived as helpful. The MSP Challenge gaming approach supports the understanding of complex topics and the development of problem-solving skills while additionally fostering soft skills (i.e., team skills, digital skills) (Abspoel et al., 2019 and Behrendt et al., 2021). Within the blog the individual perspectives and knowledge can be shared and discussed among the student group (Torio et al., 2016)). The students receive group feedback from their colleagues on their individual exploration (Heidkamp & Kergel, 2014).

The identified main observations can be summarized as:

- An interdisciplinary and international group of students can successfully be formed through connecting contents and participants of various study programmes offered by an university.
- A combined teaching approach supports to enable students to learn interactively with a high motivation and satisfaction of the students and lecturers.
- The students proved to receive a better understanding of complex topic, and developed various soft skills.
- The approach is flexible and adaptive to either face-to-face, hybrid or virtual/digital learning settings (can also be included in international, cooperative learning settings)

- Organisational (e.g. incl. sessions in different study schedules), technical (requirements for available devices) and didactical (balancing workload: between a (reduced) theoretical input and gaming events) challenges were observed

The experiences made have significant potential to be transferred to other major societal topics related to environmental science and sustainable development such as energy and climate. At the same time they stimulate to strengthen further international and interdisciplinary cooperation in higher education – also by integrating professional practice. Students and universities can profit from such broader topics and study options as well as further intercultural exchange.

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