WERKSTATTBERICHT > PRACTICE REPORT

Linking learning by research and scientific communication in the Master‘s degree programme Sport and Movement Gerontology: A new teaching-learning approach

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Keywords: Learning by research; science communication; teaching-learning concept; sport and movement gerontology; sport science

Abstract

Within the new teaching-learning concept, ‘learning by research’ and ‘science communication’ via social media are combined. In our concept, we link science communication with an active transfer between research, teaching and practice in the Master‘s degree programme in Sport and Movement Gerontology (M.Sc. SMG) at the German Sport University Cologne (GSU). In teaching modules over three semesters, students are enabled to learn about, implement and evaluate innovative digital applications and social media networks for an effective communication with different target groups. Complementary to the subject-specific content of the modules, lecturers will focus on different aspects of science communication (e.g., in module SMG7 - Intervention with posts on project progress on twitter and instagram or in module SMG12.2 - Clinical exercise science in geriatric health care with twitter threads on journal club studies including a graphical abstract).

The aim of the teaching-learning concept is, to achieve the following science communication specific learning objectives: Students should be able to communicate findings from their experiences, research and their learning progress to others. Furthermore, students should be capable of considering specific characteristics of media communication and to use different communication tools effectively. They should be able to compare different social media networks in terms of their suitability for specific objectives and target groups.

Enhancing these important core competencies prepares students for an entry into careers in health science research and the health professions.

Zusammenfassung

In dem neuen Lehr-Lern-Konzept werden das „Forschende Lernen“ (FoL) und die „Wissenschaftskommunikation“ (über soziale Medien) miteinander verbunden. Dafür erfolgt ein aktiver Transfer zwischen Forschung, Lehre und Praxis im Masterstudiengang “Sport- und Bewegungsgerontologie” (M.Sc. SBG) an der Deutschen Sporthochschule Köln (DSHS). In Lehrmodulen über drei Fachsemester hinweg werden die Studierenden dazu befähigt, innovative digitale Anwendungen und soziale Netzwerke für eine effektive Kommunikation mit unterschiedlichen Zielgruppen kennenzulernen, umzusetzen und zu evaluieren. Ergänzend zu den fachspezifischen Inhalten der Module setzen die Dozierenden unterschiedliche Schwerpunkte in der Wissenschaftskommunikation (z.B. im Modul SBG7 – Intervention: Posts zum Projektfortschritt auf Twitter und Instagram als Teamwettkampf oder im Modul SBG12.2 - Forschung in der klinischen Gesundheitsversorgung Älterer: Twitter-Threads zu Journal-Club-Studien inklusive grafischem Abstract).

Das Lehr-Lern-Konzept zielt darauf ab, die folgenden Lernziele bezogen auf die Wissenschaftskommunikation zu erreichen: Die Studierenden sollen in der Lage sein, Erkenntnisse aus ihren Erfahrungen, ihrer Forschung und ihre Lernfortschritte an andere zu kommunizieren. Darüber hinaus sollen die Studierenden befähigt werden, spezifische Merkmale der Medienkommunikation zu berücksichtigen und verschiedene Kommunikationsmittel effektiv einzusetzen. Sie werden dafür sensibilisiert, verschiedene soziale Netzwerke im Hinblick auf ihre Eignung für bestimmte Ziele und Zielgruppen zu vergleichen.
Die Förderung dieser wichtigen Kernkompetenzen bereitet die Studierenden auf einen Berufseinstieg in der gesundheitswissenschaftlichen Forschung und in den Gesundheitsberufen vor.

Schlüsselwörter: Forschendes Lernen; Wissenschaftskommunikation; Lehr-Lern-Konzept; Sport- und Bewegungsgerontologie; Sportwissenschaft

1. Introduction

Good university teaching should aspire a unity of research and teaching (Healy & Jenkins, 2008; Huber, 2009) so that students are well and broadly qualified for potential professional fields (Rectorate of the German Sport University Cologne, 2021). This opens several opportunities for innovative teaching and learning approaches, particularly for ‘learning by research’ (in German: ‘Forschendes Lernen, FoL’). By following the ‘learning by research’ approach, students should understand and experience the process of a research project, which aims to gain knowledge insights that are of interest to third parties. Therefore, the students (co)design, experience and reflect the essential phases as a learning cycle in the format of the research cycle (Huber et

al., 2009). Learning by research can increase students' interest in research and enhance students' self-efficacy (Deicke et al., 2014). Not all students should be trained as researchers, however, with the approach of learning by research, the development of important competences for every student can be achieved (Huber et al., 2009).

The Master's degree programme 'Sport and Movement Gerontology' (Master of Science; M.Sc. SMG) at the German Sport University Cologne (GSU) involves different priorities within research led learning. The teaching-learning concepts in the M.Sc. SMG cover both, parts of the research cycle and the complete cycle (Haeussermann & Fleiner, 2020; Morat, 2020; Morat & Fleiner, 2021).

The knowledge gained through learning by research not only benefits the students, but also feeds into the 'scientific community' and interested third parties. Thus, learning by research is the beginning participation in scientific working and science communication (Riewerts et al., 2018). According to science didactics, communication is a key factor in addition to an enquiring mindset, critical reflection and creativity. A scientific activity should always be accompanied by the communication and acquisition of scientific knowledge and a corresponding attitude. It becomes clear that science is not possible without communicative giving and taking (Salden, 2020).

In the course of linking learning by research and science communication, the creation of scientific knowledge, the communication between scientists and reflecting the progress of the project and one's own learning are important (Bihrer et al., 2010; Hofhues et al., 2014).

An essential aspect that has received insufficient attention in teaching-learning concepts of learning by research in our opinion is science communication (#scicomm). According to the Federal Ministry of Education and Research Germany this involves communicating and transferring research and scientific content to target groups outside of science in a generally understandable, dialogue-oriented manner (Federal Ministry for Education and Research [Bundesministerium fuer Bildung und Forschung - BMBF], 2019). Within the field of science communication, we see the following five aspects as key components and definitions: The topic, which is sharply defined and appropriately presented to the event and the audience; the target group, which is defined as precisely as possible and whose interests and expectations are taken into account; a clear communication objective for oneself and one's institution as well as for the target group; the medium or format that fits the objectives and the target group; the style with which content is presented in accordance with the other four dimensions of communication (Brandt-Bohne, 2021; National Institute for Science Communication, 2021).

Science communication is already and should become an important part of funding calls to further emphasise its importance (Federal Ministry for Education and Research [Bundesministerium fuer Bildung und Forschung - BMBF], 2019; Science Council [Wissenschaftsrat], 2021; Social Democratic Party of Germany [SPD] et al., 2021). In the 'Frankfurter Allgemeine Zeitung' (German Newspaper), Weisskopf & Ziegler (2021) state that it is not a question of whether researchers communicate, but how (Weisskopf & Ziegler, 2021).

Based on our literature search, previous publications deal with science communication and its importance for researchers (e.g., Barton & Merolli, 2019; Chan & Leung, 2018; Collins et al., 2016; Cook et al., 2018) and particularly physiotherapists (e.g., Merolli et al., 2019; Wahlin, 2018) and the use of various social media networks in this context. In addition, there are individual guidelines in the field of physiotherapy for the use of social media networks in the sense of science communication or for further education (Merolli, 2015; Physiotherapy Alberta College + Association, 2019).

Up to date, we did not find a teaching-learning concept that combines 'learning by research' with 'science communication'. However, Weisskopf and Ziegler (2021) state that science communication should become part of scientific education (Weisskopf & Ziegler, 2021).

Within our new teaching-learning concept, we follow the approach to effectively combine learning by research with science communication within the existing Master's degree programme of M.Sc. SMG at the GSU.

2. Concept

The new teaching-learning concept is currently implemented from the first to the third semester of the M.Sc. SMG in the following modules: SMG 5 – Sport, Movement and Coaching Science (1st semester); SMG 7 – Intervention (2nd semester); SMG 11 – Review (3rd semester); SMG 12.2 – Clinical exercise science in geriatric health care (3rd semester). The content, skills and career orientation present in these modules continue to exist (see module handbook: https://www.dshs-koeln.de/fileadmin/redaktion/Studium/Organisation/Studienunterlagen/Modulhandbuecher_neu/Master-Sport/SBG_PO20212.pdf, (German Sport University Cologne, 2021). They are accompanied by aspects of science communication, to add new learning objectives and expand the skills of the students.

Figure 1. Instagram and twitter account of the project @MScSBG.

The content that students create within the project are shared on instagram and twitter through the SMG-account (@MScSBG).

2.1 Learning objectives

The following new learning objectives related to science communication are added to the curriculum:
Students are able to

- … communicate research findings.
- … critically reflect on and communicate about their learning progress.
- … communicate the findings from their experiences and their learning progress to others.
- ... consider specific characteristics of social media communication and use different communication tools effectively.
- … compare different social media networks in terms of their suitability for specific objectives and target groups.

2.2 Implementation strategy

The research-led teaching remains the focus of the modules, but is meaningfully expanded in the sense of learning by research to include the new area of 'science communication' as an important innovative aspect in the following modules:

SMG 5 – Sport, Movement and Coaching Science (first semester)
Module description: Students gain knowledge of training and exercise science for the specific target group of older adults. In theory and in practice, relevant test batteries and exercises for older adults are discussed and implemented in practice. In theory, scientific studies are also critically examined. Building on this, a study protocol is designed in the second part of the semester, in preparation for the module SMG 7 - Intervention in the second semester.
Science communication aspects:

- getting in touch with and getting to know science communication
- self-experiment
- gaining experience
- making first steps

Figure 2. *SMG-Students thinking about first steps in science communication in the module „SMG 5 – Sport, Movement and Coaching Science".*

Semester Course: At the beginning of the semester, the students are provided with initial information and content for the area of science communication in an understandable way. Based on this, some example accounts of the social media platforms twitter and instagram are critically analysed and evaluated. In a first task, students should search for and analyse relevant accounts with thematically suitable content. In addition, various online applications for graphic processing are presented by the lecturer and tested by the students.

In the further course of the semester, students select suitable scientific studies for the main areas of 'endurance training, strength training, coordination training and fall prevention training for older adults' based on a literature search. They present these to the others in small groups and critically discuss relevant aspects. In parallel, the audience collects key words (hashtags), formulates 1-3 short key sentences for a message of the quintessence from the study. Students think about potential persons to link to (authors and/or organisations), as well as suitable emojis. This content is collected by the lecturer and the whole course agrees on a final version, which is then uploaded via moodle (learning management system of the German Sport University) and posted on twitter via the SMG course account (@MScSBG) in the respective semester week.
Until the next module session, students use this information together with their own notes to draft potential instagram posts or stories. Here, special attention should be paid to the observance of image and licensing rights, so that the students 'only' use their own images or licence-free images. All ideas for instagram content are looked at together in the following course session (at the same time used as a review of the lesson material from the previous session) and a TOP 3 is selected for each topic. The TOP 3 compilation is published on instagram via the SMG course account (@MScSBG).

SMG 7 – Intervention (second semester)
Module description: Students go through the complete research cycle together with the lecturer according to the learning by research approach. The development, implementation and evaluation of a scientific study in a project team is done in terms of project management. Each student can effectively contribute his or her strengths to one of the different expert groups (for further details of the teaching-learning concept, see (Morat, 2020)).
Science communication aspects:

- deepening the content
- specialisation on:
  - communication about the progress of the project
  - communication about critical reflection on one's own learning

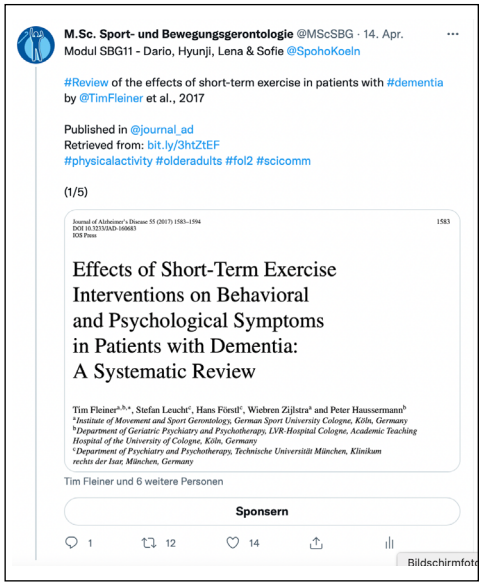

Figure 3. *Instagram post regarding the project progress in the module „SMG 7 – Intervention".*

Figure 4. *Tweet on twitter to present the different types of reviews (here: systematic review) in the module „SMG 11 – Review".*

progress
» social media team competition: twitter versus instagram
» uniform design, collaboration with others

Semester Course: At the beginning of the lecture period, the students are divided into team twitter and team instagram, with two students (experts) as managers or captains. Each team first develops its own communication or transfer strategy. This also defines how and when aspects for critical reflection on individual learning progress or project progress are communicated. Based on this, the teams create a uniform design for their posts and agree on the further organisation within the team. At least one artefact must be posted per week and per team. Three colleagues from the SBG 7 lecturer act as an independent jury for the social media team competition throughout the semester and follow the activities of both teams. At the end of the semester, each jury member gives a statement and names their winning team. After the joint semester review, the winning team is announced and awarded a price.

SMG 11 – Review (third semester)

Module description: Different types of reviews (scoping review, integrative review, systematic review, meta-analysis) are compared by authors of reviews presenting their publications to the students and answer questions ('Meet the expert' special). All students work on different review topics in teams of two under the supervision of an expert (lecturers) to answer their specific research question. Students go through all the steps required for a review. In predefined sessions during the semester term, the steps and findings worked on up to that point are presented and critically discussed (for further details of the teaching-learning concept, see (Morat & Fleiner, 2021)).

Science communication aspects:
» deepening the content
» specialisation on:
  » presentation of different types of reviews
  » transfer of scientific findings to the public
  » generally comprehensible reproduction of the contents of the 'meet the expert' special

Semester Course: To get to know the different review types and to compare similarities and differences, the lecturer provides the students with videos of the recorded presentations of the publications by the authors via moodle ('Meet the expert' special). In this context, the students are given the task of creating a twitter thread and an instagram post about the respective publication in small groups. For orientation, the students are provided with published examples. The artefacts are presented to the others in the course and the contents of the publications are discussed in depth. The artefacts are then posted on the two platforms via the SMG course accounts (@

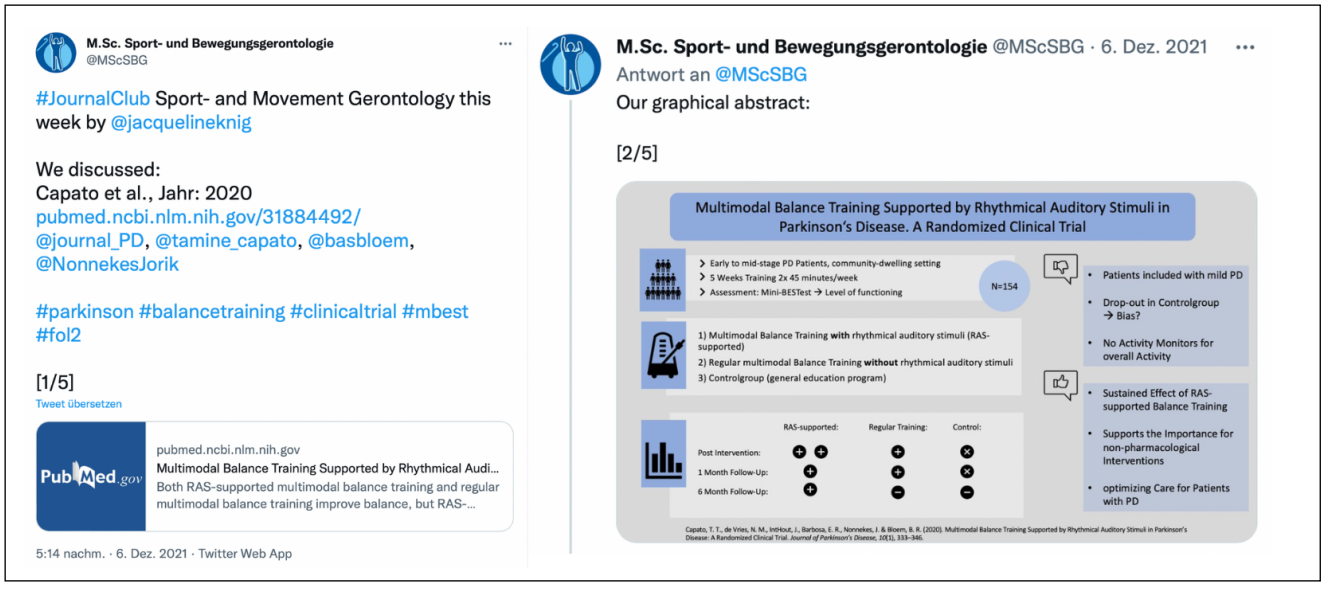

Figure 5. *Twitter thread on the SBG 12.2 Journal Club: introduction [1/5]; graphical abstract [2/5] not illustrated: study quality [3/5]; key aspects of the discussion [4/5]; questions to the authors [5/5].*

MScSBG) on twitter and instagram, respectively. Students finish the module with a written assignment in the form of the final review on the specific topic they worked on in a team of two throughout the semester term. A compulsory part of the assignment is the creation of a twitter thread or instagram post or story.

SMG 12.2 – Clinical exercise science in geriatric **health care (third semester)**
Module description: A direct insight into clinical geriatric health care as well as enabling students to think and to act as clinical scientists are the main goals. Core elements are evidence-based practice, conceptual work, modern communication strategies, and a focus on multiprofessional practice. The graded credit for this module requires students to create clinical physical activity concepts for previously assigned different clinical target groups.
Science communication aspects:

- student-led journal club:
  - presentation and moderation of a discussion on current evidence
  - communication via graphical abstract in social media (twitter)
  - initiation of a discussion with publicity, peers and authors of the study

Semester Course: Each student is assigned to a published study on current aspects of sport and movement gerontology in the health care of older adults. One study is discussed together on a weekly basis, all students read the study in advance, prepare queries and discussion points. On each course day a student presents his /her study in 10 minutes and leads a group discussion focussing on the transfer of the study results into everyday care and corresponding research gaps. After the discussion, the expert prepares a report on the study via graphical abstract and the group discussion: level of evidence, research and care gap, discussion, queries as well as five key words, which are important from this study for a concept development. Subsequently this documentation is published via twitter thread to the publicity, peers and authors of the study are tagged in the thread in order to answer open questions or initiate a further public discussion.

2.3 Evaluation

Within the teaching-learning concept, the students are motivated at several points in time to assess their competences in relation to the learning objectives mentioned. The time of the surveys are, for example, at the beginning of the lecture period, at the end of the lecture period, after a final exam or after the submission of an assignment and are individually aligned to the semester course of the modules. To this purpose, the students are motivated to make their subjective assessment with regard to the learning objectives in an online survey. Using a 5-point ordinal scale that ranges from 'completely disagree' to 'completely agree', students have to give their rating regarding the five learning objectives.

Various criteria will be used to evaluate the concept. First of all, the evaluation of the change in the students' assessment of the learning objectives is of interest. But also, qualitative feedback from the lecturers, students and other persons involved in the project can reveal helpful optimisation possibilities. In addition, the regularly accompanying teaching evaluation within the SMG Master's degree programme can provide further information about the quality of teaching in the modules. A comparison with the previous implementation and evaluation of the modules without the supplementary specific focus on science communication is to be planned. Based on this experience, the teaching-learning concept can be further developed and implemented.

3. Future implications

Pilot implementations for some parts of the teaching-learning concept have already been tested and optimised. The experiences from this, as well as the implementations of the new concept in the first semester in the SMG 5 module, are very promising. If this is also reflected in a positive change with regard to the learning objectives and good evaluations of the modules, a further successful project progress is expected.

After completion of the initial pilot phase and testing of the concept, the materials used are to be made available to all interested persons in a revised and optimised form as OER material (Open Educational Resources). In addition, guides and video tutorials for the various parts of the teaching-learning concept are planned. In addition to the scientific investigation of the concept, this should also promote its further dissemination. The concept could be transferred in an adapted form to many training and teaching contexts and could be used there to consider the important aspect of science communication in order to optimally prepare students for the professional world.

3.1 Career orientation

The learned competencies should prepare students for their entry into careers in health science research and the health professions. Barton and Merolli (2019) describe that health professionals of all ages use social media for their professional development, with the highest proportion among 18-34 years old persons (Barton & Merolli, 2019). In addition to personal development and interactive exchange with other experts, social media networks (e.g., twitter, instagram) are also used to communicate scientific findings in an understandable and (graphically) appealing way to multipliers, decision-makers, but especially to the general and interested public. Many employers expect the professional use of ICT (information and communication technology), but this content has not yet been sufficiently integrated into studies (Rott, 2014). Within our new teaching-learning concept students are enabled to expand their skills in this area.

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