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Towards a Democracy-Conducive Education in Digital Cultures. An Example from Geography Teacher Education

Sobre a educação democrática útil em culturas digitais: um exemplo da capacitação docente em Geografia

Fabian Pettig[1]

Abstract: If critique is condition of democracy, teacher education must find ways to foster a critical and emancipatory attitude towards today's challenges in order to be democracy-inducive. In this regard, a teaching concept, designed for and conducted in geography teacher education at the Friedrich-Schiller-University Jena (FSU), Germany, is illustrated in this chapter. The teaching concept addresses two contemporary challenges of sustainable teacher education: digital transformation and its consequences in an educational context, and the disconnection of theory and practice in higher education. Here, the focus is on the theory-driven conceptualization of the teaching format and the evaluation of its first iteration via experiential reflection and survey. In combination, these facets lead to several thoughts on geography teacher education, aimed at fostering critical and emancipatory involvement of prospective teachers with subject-specific learning opportunities of the digital in geography education.

Keywords: Teacher Education; Digital Geographies; Theory and Practice; Geography Education

[1] Pettig, Fabian Ass.-Prof. Dr. (University of Graz) teaches and researches in the department of Geography and Regional Science. His research revolves around transformative learning theory with a dedicated interest in the geographical, pedagogical and didactical implications of sustainability and digitality.

Resumo: Se a crítica é condição para a democracia, a capacitação docente deve encontrar caminhos para promover uma atitude crítica e emancipatória em relação aos desafios atuais a fim de influenciar democraticamente. Assim, um conceito de ensino delineado pela capacitação docente em Geografia e conduzido nela, na Universidade Friedrich Schiller de Jena, Alemanha, é apresentado neste artigo. Esse conceito de ensino envolve dois desafios contemporâneos de capacitação docente sustentável: transformação digital e suas consequências no contexto educacional; e a dissociação entre teoria e prática na educação superior. Aqui, os focos são na conceitualização conduzida por teorias de formatos de ensino e na avaliação de sua primeira iteração por meio da reflexão experiencial e pesquisa. Combinadas, essas facetas direcionam a diversos pensamentos no que diz respeito à capacitação docente em Geografia, com o objetivo de promover o envolvimento crítico e emancipatório de futuros professores com oportunidades de aprendizagem de temas específicos de educação digital em Geografia.
Palavras-chave: capacitação docente; geografias digitais; teoria e prática; ensino de geografia.

1. INTRODUCTION

Following Foucault, critique, as in questioning hegemonial discourses and current structures of power, is a practice of emancipation and thus condition of democracy. From a critical-pedagogical perspective, this chapter's emphasis is neither on the acquisition of technology-related competencies in (higher) education, nor on the use of digital tools and learning environments to increase the output of learning processes. Rather, it focuses on questions about the geography-specific learning opportunities that digital transformation presents to pupils, and on how to implement these educational processes in geography lessons.

In other words: How can teacher education foster a critical and emancipatory attitude towards the challenges and possibilities of the digital in geography education?

This chapter presents and evaluates the first iteration of a teaching concept, implemented at Friedrich-Schiller-Universität Jena (FSU) in the winter term 2018/19, which follows the question and involves and contributes to „reflexive teacher education" (Bernd, Häcker & Leonhard, 2017).

First, the subject-specific and university-didactical starting points of the teaching concept are indicated. Second, the concept is presented and clarified on the basis of these points. Third, the subsequent explorative evaluation – through experiential reflection and a survey – provides key insights that facilitate the proposal of several thoughts on geography teacher education, aimed at sensitizing prospective teachers to the need to design critical-emancipatory and subject-specific learning opportunities with the digital in geography lessons.

2. HORIZONS OF SUSTAINABLE GEOGRAPHY TEACHER EDUCATION

The following section has two aims: to identify and illustrate connectivities in the recent debate on teacher education, and to use these in the conceptualization of a seminar. These aims, simultaneously, embed the course in the current higher education discourse and propose a new teaching concept.

2.1 Perspectives on the digital in geography education

A recurring topos of late is the claim that digital transformation brought about fundamental societal change. This assumption is particularly relevant in geography,

since geographical knowledge and the communication thereof rely heavily on (digital) visualization: "geography is a quintessentially visual enterprise" (Sui, 2000, p. 322). Ash, Kitchin and Leszczynski (2018, p. 25) contend that „Geography [...] is in the midst of a digital turn". Unsurprisingly, within scientific geography „across all sub-disciplines, there has been a recognition of how the digital is reshaping the production and experience of space, place, nature, landscape, mobility, and environment" (Ash et al., 2018, p. 35).

Questions arise on how this reshaping of the lifeworld, of our vision of and connectedness to place, and of our concepts of space can be addressed and reflected in geography education. Thus far, addressing digital transformation in educational contexts was often equated with the digitalisation of learning environments, namely with an increasing use of smartphones and tablets in class. Although these approaches foster the use of digital (geo)media in school, the reasoning behind this usage is not specifically geographic. Hardly any questions are asked about geographical learning opportunities implied by the digital tool or environment. Instead, most arguments supporting the digital transformation of geography education proclaim that it has a positive impact on motivation merely by integrating digital learning environments into classes. Other arguments focus on the ease of storing and accessing information or highlight the optimization of imparting knowledge. Also, efforts were made to take into account the relevance of the digital for the spatial in the field of geography education. A prominent approach of the recent past is based on the concept of „spatial citizenship" (Gryl & Jekel, 2012; Gryl, Schulze & Kanwischer, 2013; Jekel, Gryl & Oberrauch, 2015). This concept incorporates a spatial dimension in citizenship education and centres on the appropriation of space via digital geomedia. Spatial citizenship proposes three principles that empower learners: the use of digital geomedia, a critical reflection on digital geomedia, and the communication of spatial visions and interests through digital geomedia. In combination, these principles allow learners to deconstruct the (digital) production of space and to actively enliven own places via digital geomedia. Currently, Felgenhauer and Gäbler (2019) argue that the international debate on *digital geographies* contains concepts and perspectives that facilitate a rethinking of the interrelatedness of the digital and space in geography education.

In this chapter, I argue along similar lines. The added value of a digital learning environment does not simply originate in its digitality. Instead, digital usage in geography education should be reasoned in a critical manner and from a true geographic perspective. Following this argument and the insights gained from the recent debate on *digital geographies* (i.e. Ash et al. 2018, 2019), the key question for geography education I propose is: In what way and to what extent does the usage of a specific digital tool, learning environment or (geo)media facilitate an understanding of the production and experience of space, place, nature, landscape, mobility, and environment? To be serious about this subject-specific insight into teacher education, it is essential to create opportunities for students, and to consider the possibilities and limitations of the digital in geography education from a geographical perspective.

2.2 Relating theory and practice in teacher education

Along with the subject-specific challenge of digital transformation, this chapter also focuses on the relationship between theory and practice in teacher education and more specifically, as a second source of the teaching format under investigation, on how to combine theory and practice. For several decades, the tension between theoretical and practical perspectives in teacher education has been a focus of international scientific discourse. More specifically, in Germany, questions on the relationship between theory and practice still is one of the most discussed topics in teacher education (Bresges, Harring, Kauert, Nordmeier & Parchmann 2019, p. 4).

This debate originated in Dewey's (1910/2019) concept of reflexive learning. Schön (1983, 1987), in his concept of reflective practitioner, built on this idea and distinguished between *reflection-on-action* and *reflection-in-action* as two dimensions of reflection. Whereas the former describes a reflection on a past action, the latter represents a mode of immediate and situational reflection that occurs in the moment of action. According to this viewpoint it is evident that professionals do not simply apply theory in practice, or that actions are the mere result of rational thinking, but that they realize their professional decisions based on *tacit knowledge* (Polanyi, 1966/2009). Therefore, to enable prospective teachers to correlate theory and practice in specific teaching situations, teacher education must create ways to foster reflection as a core characteristic of the professional self of teachers.

More recently, several approaches were developed to address this issue. In this respect, Cramer (2014, p. 351) identified seven recent trends in German teacher education that address the relationship of theory and practice, and that foster reflexive thinking. These are inquiry based learning; cooperation between different actors involved in the first and second phase of teacher education; curricular coordination of the first and second phase of teacher education; the use of case studies in teacher education; cooperation between universities and schools; students accompanying pupils' learning; documentation and reflection via Portfolio. The international debate on the theory-practice relationship in teacher education is just as diverse (Bresges et al., 2019, p. 4). Although there are numerous ideas on and divergent approaches to relate theoretical and practical perspectives in teacher education, there is little evidence of the best way to undertake this task. Furthermore, it is even questionable if there is *one* best way. However, it is evident that the idea of interweaving both perspectives without playing the one off against the other remains a contemporary challenge in teacher education at the international level; a moot point that is addressed in multiple ways.

3. CONCEPTUAL INTEGRATION

The following section describes the course that was conceptualized and conducted at the FSU. The teaching concept addresses the previously identified challenges in higher education in several ways. The goal of the course is twofold: First, to enable prospective teachers to experience the value of the digital in geography education. Second, by applying selected criteria, to empower prospective teachers to plan lessons and to reflect on the implementation of the digital.

3.1 Curricular anchoring

The course is anchored in the fourth academic year of geography teacher education at the FSU. Prior to this stage prospective teachers passed two didactical modules in geography education and completed the practical term. This practical term, which students complete during their third academic year, is a core element of the teacher education curriculum in Jena. Therefore, this course involves those prospective teachers who are in the last phase of their studies. This positioning of the course offers the unique situation that, as a minimum, students can benefit both from their prior practical experiences and from their theoretical knowledge on the didactics of geography, in order to reflect on new theoretical approaches discussed in this seminar; and that, as a maximum, they would be able to integrate practical and theoretical knowledge in their didactical reasoning.

3.2 Didactical Framework

The following concept interlocks the three modules that constitute the coursework elements of the didactical framework (see Figure 1 that illustrates the structure and

interdependent facets of the course): The first discusses and critically assesses three different perspectives of digital transformation in the educational context, namely geography education, media pedagogy and practice. The second requires the prospective teachers to work in tandems on projects throughout the term. In these projects they design geography lessons on self-chosen topics while critically using digital geomedia and/or digital tools. These first two modules are interconnected. Each session involves the use of an additional theoretical input to reflect on and refine the projects. In the third, the coursework culminates at the end of the seminar in a digital course-journal, orientated to common praxis-journals for educational contexts. This course-journal integrates the articles written by the tandems on their respective projects, which are reviewed in their first iteration by the lecturer and thereafter revised by the authors, into a mutual product that is sent to each course participant at the end of the term.

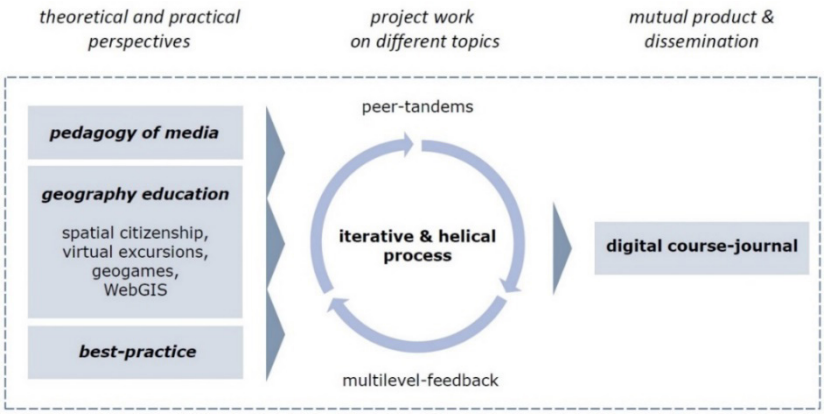


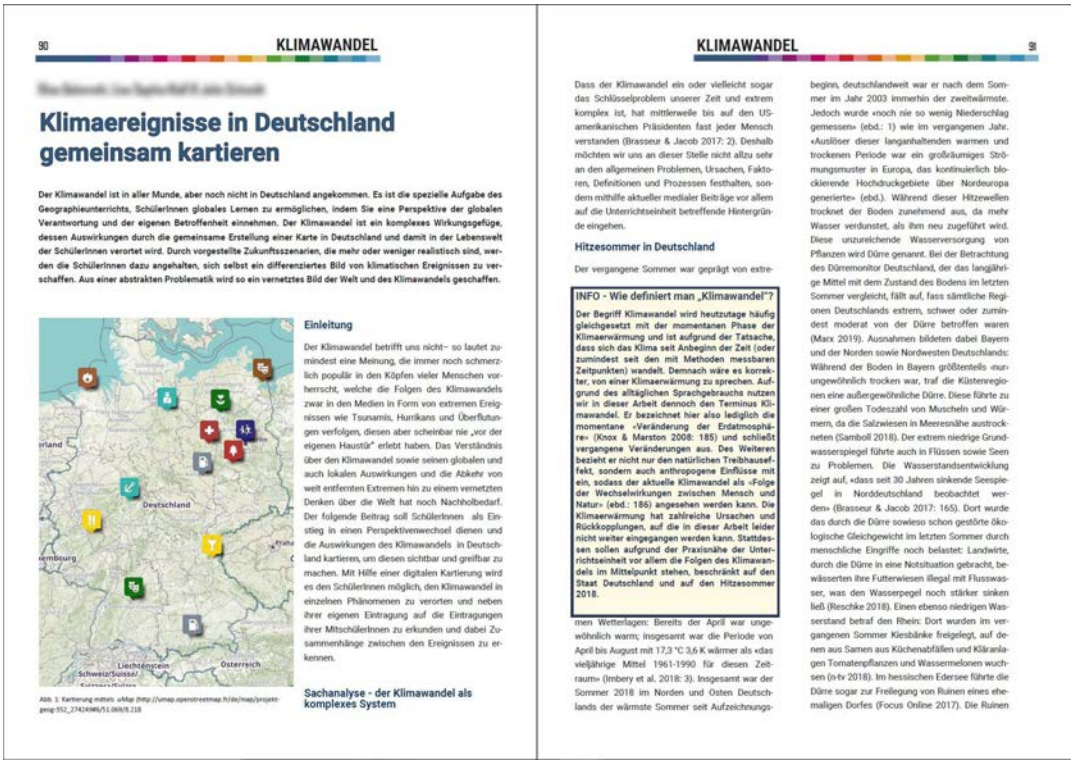
Figure 1. Elements of the coursework. This figure illustrates the structure and the interdependent facets of the course.

The seminar employs the notion of empowering prospective teachers to organise and plan geography lessons on self-chosen topics, while simultaneously considering digital geomedia or digital tools and rationalizing their didactical decisions geographically. Following this, the main goal of the seminar is to sensitize prospective geography teachers to critically and reflectively utilize the possibilities and challenges presented by digital learning environments. The framework follows several core principals:

- **Applying theoretical knowledge to solve practical problems.** To prepare for each lesson the students must read texts on the key concepts of the current debate on the digital transformation of society, and of the relevant educational contexts. As a next step, these theoretical positions are applied to different practical examples to provide a more thorough understanding of the applicable concepts and their practical use. For example: In one of the lessons the students must analyse the augmented-reality videogame "Pokemon Go!", with specific reference to the potential learning opportunity that it provides in geography education. Building on this analysis, the students must then design a geography lesson revolving around the app. In order to solve this task they have to combine their conceptual knowledge of Augmented Reality implementation with the educational contexts of the lesson, as well as with additional theoretical and experiential knowledge. Finally, the designs are presented, reasoned and critically discussed in order to transfer insights gained to the individual projects.
- **Working in peer-tandems on individual projects:** The students work in teams of two on self-chosen geographical topics. Their task is to develop a digitally supported learning environment for secondary school. During the term, 30

minutes of every session are reserved to refine and revise the projects, based on the respective theoretical approach prepared for each session. This structure is inspired by the "inverted classroom" concept (Handke & Sperl, 2012), which outsources the preparation of theoretical inputs and focuses on the application of theoretical perspectives to specific examples in class. In this manner the projects originate from a helical and iterative process, which oscillates between specific designs for school and theoretical inputs, and which leads to the continuous refinement and revision of the designs.

- **Cultivating multilevel feedback:** The continuous project work is accompanied by several feedback-loops. Whereas the focus at the outset is on a dialogical exchange between students and the lecturer, peer-feedback is used throughout the term and gains in importance. In addition, when the tandems present their projects at the end of the term, 15 minutes are reserved for peer-feedback. At the conclusion of the course the students are given written feedback on their projects and, if requested, they also receive more thorough, oral feedback.
- **Producing a mutual digital course-journal:** At the beginning of the term the students are provided with a digital layout which they use to digitize their projects at the end of the semester.[2] The students are required to refine their projects on a theoretical level, but also to reflect on the needs of specific teaching contexts and, accordingly, to rework their projects. Finally, the tandems produce several distinct designs for geography lessons. These designs include a thorough theoretical background, didactical reasoning and material (links, texts, tasks, etc.) to cover in class (see Figure 2). The results of the tandems are collated into a course-journal, eventually sent to each participant at the conclusion of the course.


90 KLIMAWANDEL

Klimaereignisse in Deutschland gemeinsam kartieren

Der Klimawandel ist in aller Munde, aber noch nicht in Deutschland angekommen. Es ist die spezielle Aufgabe des Geographieunterrichts, SchülerInnen globales Lernen zu ermöglichen, indem Sie eine Perspektive der globalen Verantwortung und der eigenen Betroffenheit einnehmen. Der Klimawandel ist ein komplexes Wirkungsgefüge, dessen Auswirkungen durch die gemeinsame Erstellung einer Karte in Deutschland und damit in der Lebenswelt der SchülerInnen verortet wird. Durch vorgestellte Zukunftsszenarien, die mehr oder weniger realistisch sind, werden die SchülerInnen dazu angehalten, sich selbst ein differenziertes Bild von klimatischen Ereignissen zu verschaffen. Aus einer abstrakten Problematik wird so ein vernetztes Bild der Welt und des Klimawandels geschaffen.

Einleitung

Der Klimawandel betrifft uns nicht– so lautet zumindest eine Meinung, die immer noch schmerzlich populär in den Köpfen vieler Menschen vorherrscht, welche die Folgen des Klimawandels zwar in den Medien in Form von extremen Ereignissen wie Tsunamis, Hurrikans und Überflutungen verfolgen, diesen aber scheinbar nie „vor der eigenen Haustür" erlebt haben. Das Verständnis über den Klimawandel sowie seinen globalen und auch lokalen Auswirkungen und die Abkehr von weit entfernten Extremen hin zu einem vernetzten Denken über die Welt hat noch Nachholbedarf. Der folgende Beitrag soll SchülerInnen als Einstieg in einen Perspektivenwechsel dienen und die Auswirkungen des Klimawandels in Deutschland kartieren, um diesen sichtbar und greifbar zu machen. Mit Hilfe einer digitalen Kartierung wird es den SchülerInnen möglich, den Klimawandel in einzelnen Phänomenen zu verorten und neben ihrer eigenen Eintragung auf die Eintragungen ihrer MitschülerInnen zu erkunden und dabei Zusammenhänge zwischen den Ereignissen zu erkennen.

Sachanalyse - der Klimawandel als komplexes System

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Dass der Klimawandel ein oder vielleicht sogar das Schlüsselproblem unserer Zeit und extrem komplex ist, hat mittlerweile bis auf den US-amerikanischen Präsidenten fast jeder Mensch verstanden (Brasseur & Jacob 2017: 2). Deshalb möchten wir uns an dieser Stelle nicht allzu sehr an den allgemeinen Problemen, Ursachen, Faktoren, Definitionen und Prozessen festhalten, sondern mithilfe aktueller medialer Beiträge vor allem auf die Unterrichtseinheit betreffende Hintergründe eingehen.

Hitzesommer in Deutschland

Der vergangene Sommer war geprägt von extremen Wetterlagen: Bereits der April war ungewöhnlich warm; insgesamt war die Periode von April bis August mit 17,3 °C 3,6 K wärmer als «das vieljährige Mittel 1961-1990 für diesen Zeitraum» (Imbery et al. 2018: 3). Insgesamt war der Sommer 2018 im Norden und Osten Deutschlands der wärmste Sommer seit Aufzeichnungsbeginn, deutschlandweit war er nach dem Sommer im Jahr 2003 immerhin der zweitwärmste. Jedoch wurde «noch nie so wenig Niederschlag gemessen» (ebd.: 1) wie im vergangenen Jahr. «Auslöser dieser langanhaltenden warmen und trockenen Periode war ein großräumiges Strömungsmuster in Europa, das kontinuierlich blockierende Hochdruckgebiete über Nordeuropa generierte» (ebd.). Während dieser Hitzewellen trocknet der Boden zunehmend aus, da mehr Wasser verdunstet, als ihm neu zugeführt wird. Diese unzureichende Wasserversorgung von Pflanzen wird Dürre genannt. Bei der Betrachtung des Dürremonitor Deutschland, der das langjährige Mittel mit dem Zustand des Bodens im letzten Sommer vergleicht, fällt auf, fass sämtliche Regionen Deutschlands extrem, schwer oder zumindest moderat von der Dürre betroffen waren (Marx 2019). Ausnahmen bildeten dabei Bayern und der Norden sowie Nordwesten Deutschlands: Während der Boden in Bayern größtenteils «nur ungewöhnlich trocken war, traf die Küstenregionen eine außergewöhnliche Dürre. Diese führte zu einer großen Todeszahl von Muscheln und Würmern, da die Salzwiesen in Meeresnähe austrockneten (Samboll 2018). Der extrem niedrige Grundwasserspiegel führte auch in Flüssen sowie Seen zu Problemen. Die Wasserstandsentwicklung zeigt auf, «dass seit 30 Jahren sinkende Seespiegel in Norddeutschland beobachtet werden» (Brasseur & Jacob 2017: 165). Dort wurde das durch die Dürre sowieso schon gestörte ökologische Gleichgewicht im letzten Sommer durch menschliche Eingriffe noch belastet: Landwirte, durch die Dürre in eine Notsituation gebracht, bewässerten ihre Futterwiesen illegal mit Flusswasser, was den Wasserpegel noch stärker sinken ließ (Reschke 2018). Einen ebenso niedrigen Wasserstand betraf den Rhein: Dort wurden im vergangenen Sommer Kiesbänke freigelegt, auf denen aus Samen aus Küchenabfällen und Kläranlagen Tomatenpflanzen und Wassermelonen wuchsen (n-tv 2018). Im hessischen Edersee führte die Dürre sogar zur Freilegung von Ruinen eines ehemaligen Dorfes (Focus Online 2017). Die Ruinen

INFO - Wie definiert man „Klimawandel"?

Der Begriff Klimawandel wird heutzutage häufig gleichgesetzt mit der momentanen Phase der Klimaerwärmung und ist aufgrund der Tatsache, dass sich das Klima seit Anbeginn der Zeit (oder zumindest seit den mit Methoden messbaren Zeitpunkten) wandelt. Demnach wäre es korrekter, von einer Klimaerwärmung zu sprechen. Aufgrund des alltäglichen Sprachgebrauchs nutzen wir in dieser Arbeit dennoch den Terminus Klimawandel. Er bezeichnet hier also lediglich die momentane «Veränderung der Erdatmosphäre» (Knox & Marston 2008: 185) und schließt vergangene Veränderungen aus. Des Weiteren bezieht er nicht nur den natürlichen Treibhauseffekt, sondern auch anthropogene Einflüsse mit ein, sodass der aktuelle Klimawandel als «Folge der Wechselwirkungen zwischen Mensch und Natur» (ebd.: 186) angesehen werden kann. Die Klimaerwärmung hat zahlreiche Ursachen und Rückkopplungen, auf die in dieser Arbeit leider nicht weiter eingegangen werden kann. Stattdessen sollen aufgrund der Praxisnähe der Unterrichtseinheit vor allem die Folgen des Klimawandels im Mittelpunkt stehen, beschränkt auf den Staat Deutschland und auf den Hitzesommer 2018.

Figure 2. Example from the mutual course-journal. Through the use of the uMap tool, this project enables pupils to produce a digital map that illustrates climate events in Germany, and to provide detailed information on the events in the form of embedded texts, videos and graphs. The authentic geographical value of the chosen digital tool in geography education emanates from the possibility to critically reflect on how place is produced by the map, as part of the climate change discourse.

[2] The layout in *.pub-format is orientated to established praxis journals on geography education.

4. EVALUATION

4.1 Experiential reflection on the seminar

In retrospect, the preparation of the course and the support of the individual tandems were challenging and time-consuming. Accompanying individual projects on self-chosen topics required recurring dialogical feedback, more specifically to support the students in realizing their projects. Moreover, the digital layout of the course journal had to be prepared in advance. Even though it can be used in future iterations, the initial preparation of the file was time consuming. Similarly, the review-process of the individual tandems' articles was not only necessary to improve the quality of the respective end-products, but also required effort and time. Nonetheless, in comparison to other modules, the quality of the individual projects was considerably higher.

It was noted that the participants benefited extensively from having insight into the projects of the other tandems. The transparency of the peer-tandem review-process, the feedback tandems received from each other, how each tandem made use of the input they received, and how their projects developed throughout the term, provided an important and beneficial learning opportunity to all participants. When reflecting on their own projects and on the projects of the other groups, the participants often argued on basis of the experience they gained during the practical term. Although the intense support and extent of peer-feedback was unfamiliar to the students, they nevertheless highly rated it.

Finally, the course-journal has the potential to disseminate educational and geographical concepts in the context of practice. Hence, every participant eagerly anticipated the finished journal and highlighted their desire to use ideas gleaned from it in class.

4.2 Explorative findings from the evaluation

The seminar was evaluated by means of a survey based on a standardised questionnaire, using a 5-point Likert-scale (1=min, 5=max), also showing the mean of all evaluated courses of the FSU (m^1) and of the department of geography (m^2) (Born, Loßnitzer & Schmidt, 2006). Provision was also made for open-ended free text comments. In total, 12 out of 17 students (70,6%) participated in the survey (7f, 5m). Although the students stated that they learned a lot about theories and scientific models (4,1 [m^1 3,9; m^2 4,1]), and how to apply them (4,1 [m^1 3,8; m^2 3,9]), it is noteworthy that the amount of practicable knowledge, which benefits their prospective careers, was rated much higher than the mean average (4,5 [m^1 3,8; m^2 3,7]). This assessment was supported by their free text comments in which the practical nature of the course was emphasized by several participants (e.g. "FINALLY a direct connection to practice, that prepares for the profession of a teacher"; "one of the best courses, that I visited so far, finally a noticeable relevance for practice and not only theoretical knowledge"). The significance of these findings is mitigated by the fact that m^1 and m^2 also include non-educational courses.

On the basis of the combined effect of these explorative findings, it is concluded that whereas the perceived value of theoretical knowledge was similar to the mean average perception of all university courses, this knowledge was, at the same time, rated as highly practice orientated. In respect of this seminar, the findings confirm that theoretical input was not neglected in favour of providing a mere training course for prospective teachers, but rather that students experienced and benefited from the interdependence of theory and practice in this teaching format. It is argued that this was (partly) achieved through the course-journal, as the students also positively evaluated the "products of the course" in the free text.

As caveats, it is important to note that these explorative findings are based on the first iteration of the course, that they only reflect a 70,6% participation rate in the evaluation, and that they did not involve the use of a control group or data (although the university

and institute-wide mean average statistics were included). Thus, these conclusions must be used with circumspection. Nevertheless, the survey data indicate a few notable tendencies that require further research in the next iterations of the course.

5. CONCLUSION: A FEW THOUGHTS ON GEOGRAPHY TEACHER EDUCATION

One of the objectives of sustainable teacher education is to address and discuss the changes and challenges that digital transformation introduces and poses to educational contexts, especially if viewed from a subject-specific perspective. In this respect, this chapter illustrates, documents and reflects on an example from geography teacher education. To determine the added value of the digital, not residing in the digital itself, it is necessary to sensitize prospective teachers about the need to critically and reflectively engage with the possibilities and challenges of the digital in geography education. The recent debate on *digital geographies* in human geography presents invaluable connectivities in this regard, as the competing approaches generate a new range of questions on geography education. The focus on learning opportunities that emanate from the digital in geography lessons means questioning access to, ways of thinking and talking about, and experiences of space, place, nature landscape, mobility and environment, and also questioning how the digital facilitates, influences or hinders these aspects.

Based on the experience and evaluation of this teaching format in geography teacher education, it is concluded that the teaching concept provides a possible alternative educational space for prospective teachers, and that it fosters a critical and reflective involvement in the changes and challenges of the digital in an educational context. The students perceive its large amount of practice orientated knowledge, as well as its ready-to-use products for practice, as motivating factors. At the same time, it allows them to interweave the theoretical and practical dimensions of geography education. The conceptual framework of this teaching format is applicable to other teaching contexts in two ways. Both the iterative project work and the proposed principles of higher education of this teaching format can be applied to other educational formats in the field of teacher education. These principles are the application of theoretical knowledge to solve practical problems; the use of peer-tandems working on individual projects; the cultivation of multilevel feedback; and the production of a mutual digital course-journal.

Future iterations of the aforesaid seminar need to be accompanied by further research on a much broader scale, such as research involving participant interviews at different stages during and immediately after the course, and a document-analysis of the articles written for the course-journal. This could provide more incisive insights into the individual learning processes of prospective geography teachers, especially regarding their ability to critically embed the digital in geography education.

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