

Implementing Geographical Key Concepts: Design of a Symbiotic Teacher Training Course Based on Empirical and Theoretical Evidence

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Abstract

A central desideratum for the professionalization of qualified teachers is an improved practice of further teacher education. The present work constitutes a course of in-service training, which is built upon both a review of empirical findings concerning the efficacy of in-service training courses for teachers and theoretical assumptions about the professional competences of teachers, conducted in two Federal States of Germany from October 2014 to October 2015. The course focuses on geographical key concepts-central geographical (big) ideas that are systematically recurring, aiming at the promotion of conceptual learning within geography classes. By this means, they meet a major challenge of the field, facing a great variety of complex topics and the difficulty to support a cumulative construction of geographical knowledge. But there is little experience about the advantages and difficulties that occur by using the key concept approach in geography classes. Thus it is one aim of the in-service training to gain insights into the needs and potentials of geographical key concepts. That is why the teacher training course is labelled as symbiotic, as teachers learn about a new approach and supply practical experiences about it. The term symbiotic indicates a two-way learning process, as researchers thus can learn about the key concepts from a practical point of view. Hitherto, the weak efficacy of further teacher trainings is often criticised, taking into account inflexible teacher beliefs and a wide gap between theory and practice. Based on these considerations (professional competences of teachers, geographical key concepts, criteria for effective in-service training) this paper represents a first step of a study. On the one hand, a symbiotic in-service training course on geographical key concepts is introduced that might be capable to modify teacher beliefs, for example with respect to individual ideas of the subject-matter or the subjective theories about teaching and learning in geography classes. On the other hand, the expected practical experiences can help to identify obstacles for the use of key concepts in geography classes. At the end of this article an outlook on the study's broader research interest and on the documentary method as a tool to meet these aims is given. Excerpts of first data available can illustrate the further research

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process.

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Introduction

In favour of a continuous professionalization of geography teachers in-service training courses are getting more important. Therefore efforts for a practical implementation of innovations in geography classes come to the fore. Furthermore, the findings of Trends in International Mathematics and Science Study (TIMSS) and of the Programme for International Student Assessment (PISA) reveal the students' deficits in knowledge and skills (Moschner, Kiper & Kattmann, 2003). Critical self-reflections of the subject recommend a reframing of teaching and learning in geographic education (Schultze, 1996) to allow transferable competences, which can be applied in multifaceted and complex (geographical) contexts. These two problems constitute the centre of the present study.

On an international level there have been agreements to establish guidelines of professionalization for the education of geography teachers. The *International Charter on Geographical Education* for example provides a description of required skills to plan geography lessons, for subject-matter knowledge and values and attitudes towards the educational mandate of the subject geography (IGU, 1992, 17ff). In the German-speaking context a general framework for teacher education is specified in a similar way, defining the required competences of geography teachers, which are seen as the target dimension of teacher education (DGFG, 2010). The aim is to manage the challenges of professional practice in general and the more specific challenges of geography education (Hof & Hennemann 2013; Kanwischer, Köhler, Oertel, Rhode-Jüchtern & Uhlemann, 2004).

These efforts of professionalizing face several problems. The poor transfer of pedagogical and methodological innovations into school practice, which is identified as a constraint of professionalization, has often been criticised (for example Van Driel, Beijaard & Verloop, 2001; Lücken 2012; Siegmund, Ulrich & Volz 2011). In the light of a constantly emerging and fast developing knowledge-based society, a consecutive advancement of professional competences, also after being qualified, is of central relevance, even after the completion of the teachers' training (OECD, 2005, 9). This is why increasing attention should be paid to in-service training of teachers. Indeed the potential impact of further teacher trainings on the knowledge and actions of teachers (and in consequence of students) is empirically confirmed (Krauss et al. 2008, 245). The term theory practice problem (Neuweg 2007, 8) describes a gap between the academic debate and the practice of teaching, which forms the framework for the low transfer of innovations into the school context. The relatively high persistence of teacherbeliefs is identified as one of the causes for this theory practice problem (Kunter & Pohlmann, 2009, 273; Pajares, 1992). Therefore it is necessary to develop possibilities for the further education of teachers that close the gap and which are able to modify these beliefs.

A number of questions concerning students' learning processes in geography classes are raised and gain broad public attention. The focus of the discussion is not only on the students' actual and expected state of knowledge, but the debate is also about the question what kind of knowledge this is, or should be (Hemmer & Hemmer, 2007). Regarding this point we distinguish two paradigmatic counterparts: on one side a declarative knowledge that consists of single facts and - in contrast to this - abilities and skills that aim for application in concrete problems or situations (thinking geographically, Jackson 2006). Geographical reflections on the subject (Schultze, 1996) serve as a stimulus for the research of methodological innovations for a new learning in geography class. The goal is a kind of knowledge which helps to cope with (space related) complex issues and situations on the level of both thinking and acting (DGfG, 2012). Geographical thinking is meant to be facilitated by aligning geographic education to geographical key concepts, recurring central ideas of factual thinking that are replicable for students and teachers. Key concepts as the core of geographical understanding contribute to promote cumulative learning in geography classes. They serve as principles for structuring the work with complex problems and support the choice of topics for geography class, like a filter of relevance in the light of the vast variety of topics (Parchmann, 2007). Taking into account that key concepts are not meant to be additional topics. It is rather a re-orientation of teaching and learning in class, in which key concepts ought to be used as a geographical lens to look through and focus on the problem areas of teaching.

Both fault lines intersect in one point: the beliefs of teachers about the subject geography and the teaching and learning in geography class. It can be presumed that the following aspects of teachers' beliefs affect how far they rearrange their teaching on the basis of key concepts: their individual understanding of learning (e.g. learning as an individual process of construction versus as a transmission of knowledge; Dubberke, Kunter, McElvany, Brunner & Baumert, 2008) and their notion of the nature of geography (e.g. geography as a systemic discipline of human environment analysis versus as a discipline of landscape analysis). Because of the fact that geographical key concepts concern such a deeply inscribed understanding, integrating this methodological instrument into the course of further in-service training for teachers is a central challenge. By implementing this instrument epistemological beliefs and subjective theories on teaching and learning in class can be addressed.

Purpose

At this point, the focus shall be on the question how an in-service training which meets these considerations can be designed on the basis of a review of empirical evidence. References to corresponding research questions and research methods, which are (not yet) prioritized at this point, are provided in the outlook.

In the scope of this contribution, a theoretical framework for teacher professionalization is first introduced in order to structure the professional domains of competence. Geographical key concepts are located within this classification. Afterwards, the starting position for professionalization activities is outlined. It points to those of the teachers' beliefs which concern the nature of the geography that existed

before the start of the in-service training course. Then those geographical key concepts which are being used throughout the course of the in-service training are shortly presented. After referring to the findings of previous research on in-service training for teachers - including ten criteria of efficient further teacher trainings - the programme of a geographical in-service training course is presented. It fulfils these criteria and focuses on the teachers' and students' development of geographical understanding. With respect to the criticism on the low efficiency of common (e.g. short term and one-shot-approaches) in-service training courses, it is the central aim of this paper to develop a programme for the design of alternative in-service training courses. This programme was conducted between 10/2014 and 10/2015 and the data analysis has started recently. Thus the paper turns its attention on the presentation of the in-service training as the core of the design of the study. Finally, there will be an outlook on the continuing process of the study by explaining the methodology of the accompanying empirical research.

Current State of Research: Theoretical Background

Teacher Professionalism

In order to develop fruitful further teacher trainings, a theoretical and empirical clarification concerning professionalism of teachers is necessary. Competence is composed of cognitive, motivational, volitional and social constituents (Weinert, 2001). From that point, pedagogical, professional competence can be seen as an interplay of the dimensions professional knowledge, beliefs and values, motivational orientation as well as abilities for self-regulation (Baumert & Kunter, 2006; Krauss et al. 2008). Since the dimensions of professional knowledge and beliefs are of particular importance in the course of this study based on key concept, this paper will focus on these levels.

For an internal differentiation of the dimensions theoretical pre-works are considered. Concerning professional knowledge, Shulman's typology is taken into account. He considers it as a conglomeration of the constituent's *content knowledge*, *curricular knowledge* (the subject-matter knowledge of the teachers), *pedagogical content knowledge* and *pedagogical knowledge* (Shulman, 1986, 9ff). Besides the knowledge resources mainly subjective, profession-related beliefs are seen as another central component of professional competence of teachers (Pajares, 1992; Reusser, Pauli & Elmer, 2011, 478). The associated subjective theories (e.g. how teachers see the processes of teaching and learning) and epistemological beliefs (e.g. the nature of the subject or beliefs concerning the characteristics of geographical enquiry) refer to subjects, phenomena and processes of the classroom (Kunter & Pohlmann, 2009, 267). A clear functional distinction of both dimensions of professional competence is not possible because of the fact that learning (of knowledge) in the course of the in-service training always takes place in the context of subjective beliefs. These can be seen like a filter, i.e. only such knowledge will be adopted which is compatible with these beliefs (Riese & Reinhold, 2010, 171).

Subjective theories, which function as an individual knowledge for the categorization of information being developed in the long term, influence, for example, the ambitions of teachers or their classroom management (Dann, 2000, 87). There are varying

concepts of teaching and learning in terms of subjective theories, e.g. learning according to the *construction view* or the *transmission view* (Dubberke et al., 2008, 194). For instance constructivist beliefs (*construction view*) of teachers involve a preference to formulate comprehension-evoking tasks and the understanding of learning as an interactive discourse (Baumert & Kunter, 2006, 500). Epistemological beliefs comprise individual ideas and theories of a person concerning the “structure of knowledge“ (Helmke 2012, 113), the common process of knowledge acquisition (Baumert & Kunter, 2006, 498) as well as domain-specific contents of learning (Reusser et al., 2011, 485). For this reason, epistemological beliefs with the notions of “nature and structure of subjects“ (ibid, 486) represent an essential part of individual ideas of the subject-matter. They pre-structure the way in which the world is encountered and are therefore of high directive relevance for pedagogical action in the geography classroom (Helmke, 2012, 113). Key concepts, the central subject of the in-service training course, need to be located in between explicit areas of knowledge (knowledge about the key concepts itself, knowledge about their relevance and role within the subject and possible applications of the concepts in the design of geography lessons; *content knowledge, pedagogical content knowledge*) and implicit areas of beliefs (epistemological nature of the geography, the aspiration for teaching and learning in geography classes or the process of knowledge acquisition in general).

Ideas of Teachers about the Nature of the Subject

There is only little research on the geography teachers’ understanding of their subject in the German-speaking context. In general, the conveying of coherences and interconnections is a central motif of teachers (Kanwischer et al. 2004, 139-144). Especially natural scientific perspectives but also humanistic and interdisciplinary positions are being pursued (Kanwischer et al., 2004, 133). Generally there is a strong orientation towards the conveying of factual knowledge (ibid.).

In the international context, many studies refer to a model based on Walford (1996) and Catling (2004). They aggregated the different clusters of subject-related beliefs to common types of teachers: First, *globalists*’ main interest is focused on the global framework as a living sphere. Second, *interactionists* emphasize interdependencies of man and his environment Third, *spatialists* mainly respond to spatial distribution, relations, processes and spatial consequences of the human-environment-interaction, or, fourth, *placeists*, who want to locate places, describe them and explain their genesis (Morley 2012, 125f; Walford 1996, 73-76; Catling 2004, 149-158).

In search of “big concepts in geography“ (Walshe, 2007, 97) represented among teachers, an explorative study revealed a focus on “planning, place and process“ (Walshe, 2007, 97). Similarly, as part of the present study a survey was conducted by means of a questionnaire and group discussions (see below). The goal was to assess the concepts of the subject that were relevant for the (forty-two) teachers, who took part in the study prior to the in-service training course. Several aspects were addressed, for example the explanatory approaches and subject-related ideas that are relevant for the teachers. Other examples were the participants’ ideas about which abilities and skills should be located in the competence domain of factual knowledge.

Frequently named concepts can be observed in figure 1. The entries are already pre-structured and are allocated to key concepts, which were used in the in-service training and which are explained below. The survey found a strong orientation towards content and topics in regard to the ideas about the competence domain of factual knowledge. Additionally, methods like the interpretation of maps or satellite images are frequently mentioned as the core of factual knowledge in geography. This result serves as a starting point for the work on geographical key concepts that meets the needs of the participating teachers.

Figure 1.

Ideas of the participating teachers about the key concepts of the subject (own illustration; own data)

change/ process	perception & representation	interaction	diversity	human-environment- system	structure	function	scale levels
emerge- vanish		interconnectedness		interconnectedness	space pattern		local- global
increase- decrease		push-pull		nature- culture	spatial order		magnifier/ -
processual		individuals	disparities	cycles	disparities		window to the world
cycles		society		causal circle	layers		
adaptation				hazard -			
persistance- change				system earth			
compensation							
balance							
Space & Place	physical space	mental space	sustainability	general key concepts (not subject specific)		topics	methods
	center-periphery		economy- ecology	advantages-	deindustrialization	maps	
	spatial localization		sustainability	disadvantages	metropolization	statistics	
			finiteness	cause- effect	location theories		
				models, theories	population		
				issue-	development		
				problem- solution			

Geographical Key Concepts in the Course of the In-Service Training

Several approaches of geographical key concepts are taken into account for the work during the in-service training for teachers. For a start, the four concepts of space that were developed for the spatial science of geography are essential within the German-speaking context (Wardenga 2002). Another crucial idea is the system-concept with its sub-components (DGfG, 2012), as it is suggested by the educational standards for the subject geography. Ultimately, by referring to Taylor’s approach, an international approach is included (Taylor, 2008), which is increasingly adopted in the German-speaking field of geography didactics (Taylor, 2011; Uhlenwinkel, 2013; Schuler, Vankan, Hoffmann, Coen & Rohwer, 2013).

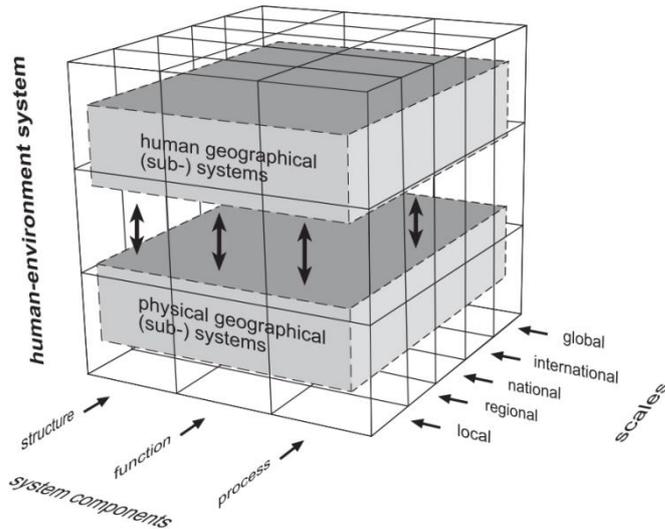


Figure 2.
System and system components as key concepts in Geography (DGfG 2012, 11).

In the German educational standards *system* is seen as the principal key concept (see Figure 2). It is comprised of human- and physical-geographic sub-systems, which interact with each other and which can be analysed with the aid of the key concepts *structure*, *function* and *process*. This analysis can take place on different scale-levels. Yet, especially the deliberate shift between the scales can lead to further explanations (DGfG, 2012, 11).

With the goal of a systematic analysis of space, four concepts of space are applied in geography didactics: space as container, as a system of relations, as a space (or place) of perception and as a construct (Wardenga, 2002). The first two emphasize the physical respectively the measurable space, while the latter two focus on a mental space or the subject's perspective (thus they bear likeness to the term place). Therefore four systematic views on space are possible. In the course of the spatial analysis, one can, for example, elaborate on the specific-tangible features and the elements and characteristics of space (space as container), or the exchange relationships and the interconnectedness between differently scaled spaces (system of relations). Subjective perceptions of these conditions (space of perception) and the resulting assessment, which is (re-)producing certain meanings of space (construction), are also of great relevance (Rhode-Jüchtern, 2009, 136)- and are not named by the teachers before the start of the in-service training (see figure 1).

Taylor's key concepts represent an attempt to synthesize previously published proposals from the English-speaking context (Taylor, 2008, 51). Alongside time, the geographical key concepts space and place form the centre. Furthermore, Taylor proposes four organizing concepts: diversity, perception & representation, change and interaction (for explanations see Taylor, 2008, 52).

The orientation of instruction towards key concepts implements a particular idea of teaching and learning. In contrast to a classical prescription of topics and content

through the curriculum, which is also the notion held by some participating teachers, significant (geographical) real life problems and issues are initiating the learning process now, which seeks to develop geographical understanding. Geographical key concepts then serve as a subject-specific lens (as a means to focus on selected features) for systematic analysis of geographical issues. The ability for a geographical thinking is gradually developed through the constant recurring of key concepts as explicative thinking strategies (Beyer, 2011, 11). Hence it is not (only) the geographical topics that makes up the heart of the intended subject-matter knowledge, but the ideas and concepts of the subject (Uphues, 2013, 22).

Some starting points can be discerned with reference to the human-environment-perspective, the interaction, or consideration of processes or alterations before the in-service training. Nevertheless, aspects of the mental space (place), perception and representation or a specific scale shift have hardly played any role so far. The great relevance of content knowledge and its instruction according to the curricular standards are particularly remarkable. This already points towards the necessity to amend the individual beliefs.

Criteria of Effective In-Service Training for Teachers

Following Wade (1985), four efficacy dimensions of in-service training courses for teachers can be distinguished: the reactions of the participants (satisfaction, perceived relevance), their learning progress (cognitive or affective areas of learning), the alteration of their teaching (planning and action) and the students' learning. When knowledge and beliefs of teachers are addressed within the scope of the in-service training, and not the mere application of new teaching methods, notably stronger effects on student achievement are detectable, "especially in the area of intelligent, complex learning" (Lipowsky, 2004: 472).

Low efficacy is attested to the contemporarily common, short-term one-shot-events, which are mainly attended by individual teachers with a consumer attitude (top-down-approaches). Often there are few connections between theory and practice (Gräsel, Parchmann, Puhl, Baer, Fey & Demuth 2004; Van Driel, Beijaard & Verloop, 2001). These approaches are restricted by their low efficacy in terms of teaching development and the transformation of individual beliefs (Gräsel, Fußangel & Pröbstel, 2006).

Based on this critical examination and the findings of previous empirical research some features of further teacher education were derived, which can help to design in-service training in an efficient way. A number of ten characteristics can be distilled in accordance with meta-analyses (Timperley et al., 2007; Hattie, 2009; Lipowsky 2009, 2011; Lipowsky & Rzejak, 2012) as well as with the complementing analysis of area-specific research (among others Berkemeyer, Järvinen, Otto & Bos, 2011; Garet, Porter, Desimone, Birman & Yoon, 2001; Gräsel et al., 2004; Lücken, 2012). These criteria are allocated to the three areas *structural features* (external framework), *didactical features* (internal design) and *activities* (as forms of actual teacher participation) (see Figure 3; for detailed descriptions of the criteria see Fögele & Mehren, 2015; Fögele, Höhnle, Mehren & Schubert, 2015).

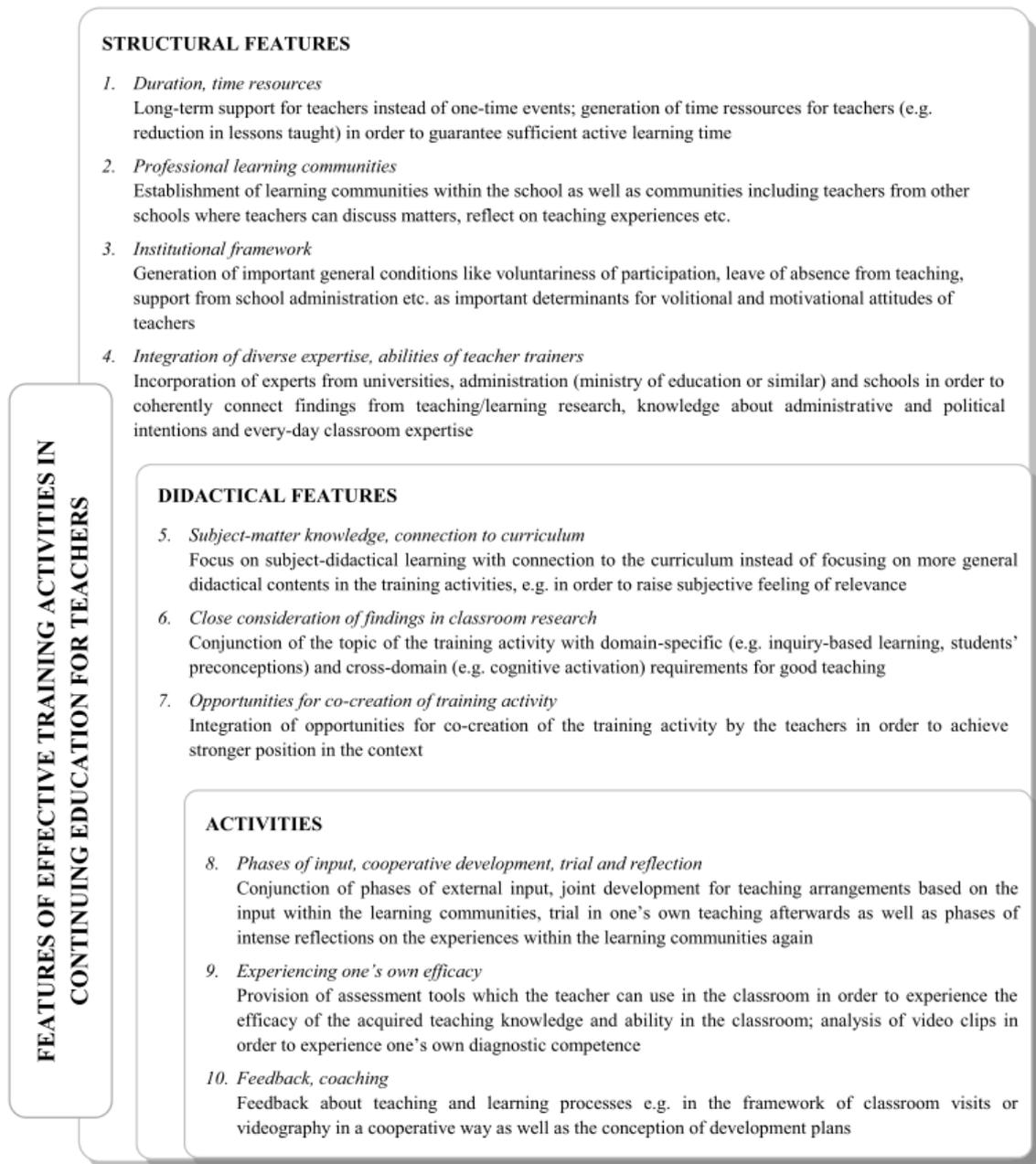


Figure 3. Empirically-based features for designing effective training activities in further teacher education (Fögele, Höhnle, Mehren und Schubert, 2015).

The Programme of the In-Service Training Courses on Geographical Key Concepts

Based on these ten criteria a course of in-service training was designed, which addresses the work with geographical key concepts. In total 42 teachers (secondary school, state-run) participated in this programme, which is conducted in two federal states in

Germany. The course takes place within a period of six months, in which three three-day meetings are scheduled (Figure 4; not included: a fourth follow-up-meeting six months after the third session). Teachers involved in this professionalization programme should be enabled to emphasize geographical ideas in their teaching and to provide support for their students to think geographically so that they can tackle new issues with a geographical view. At the same time there is only little evidence about which challenges one might encounter when transferring the key concepts into practice. In this sense, the in-service training course is labelled as *symbiotic* (Parchmann, Gräsel, Baer, Nentwig, Demuth & Ralle 2006). Through the exchange of theory (university) and practice (school) a mutual learning process is expected to be initiated. Therefore participating teachers provide feedback through frequent questionnaires. Even more important for the study are group discussions among the teachers on the objects of the in-service training. These discussions were conducted at the beginning and at the end of every session. Starting with an open question (for example “How did you perceive the last three days?” or “Please talk about the experiences you made in your geography classes during the last two months”) teachers talk about their perspectives on teaching and learning in geography classes, how they understand the geographical key concepts and where they see opportunities and obstacles of this approach for their teaching. It is of great interest for the study how these perspectives may change during the six-months-period. These insights can lead to further support for teachers to emphasise geographical thought in their geography classes as we learn about specific requirements of teachers within the scope of the key concept approach. Currently the data analysis is in progress. Thus the in-service training as the intervention of the study is presented in this paper, concluded by an outlook on the following data analysis.

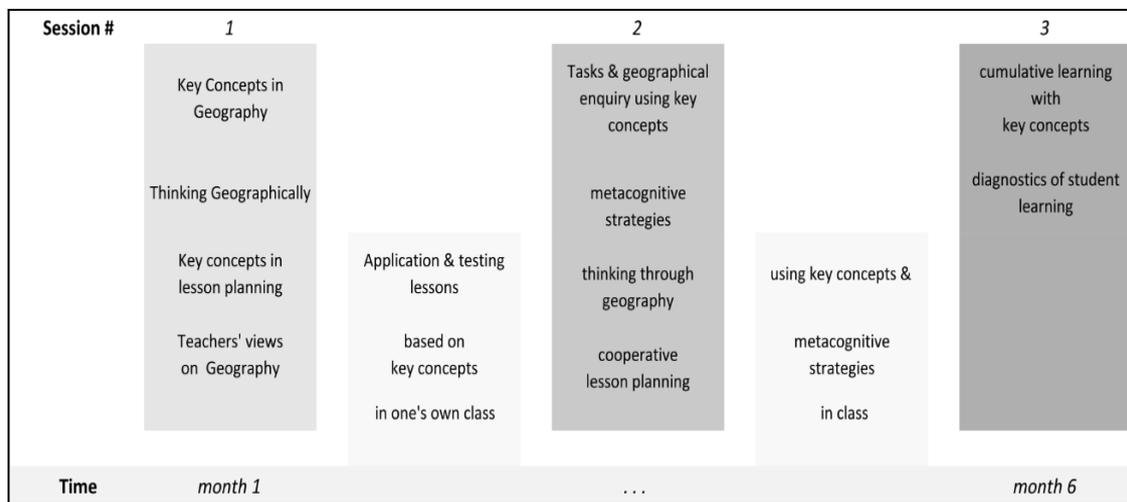


Figure 4. Programme of the in-service training course (own illustration).

The in-service training programme comprises the conveying of the key concept approach, opportunities for reflection of the individual teaching practice and the understanding of the geographical subject-matter, practical exploration and mutual exchange among the participants (see Figure 4). This will be presented in the following.

Session 1

Each session has its own focus in terms of content and in their progression they build on each other. Nevertheless the key concept approach provides the overall framework. In the beginning, this methodological instrument is introduced, followed by considerations upon which modifications of the logical structure of geography lessons are necessary. For this purpose the approach and subject-related orientations of teachers are interrelated. As a means of reflection prompts, the perspectives of university students of geography on the subject as well as the ones of pupils are discussed. The usage of key concepts comes along with a distinct notion of learning in geography classes. Thus, different ways of teaching and learning are discussed, followed by some instructions how to develop geography lessons by using key concepts. Therefore the participants modify instructions of a geography lesson through the implementation of key concepts to emphasize a distinct geographical perspective.

During that session, the approaches of geographical key concepts are presented partially in an inductive (starting from practical testing) and partially in a deductive (based on theory) way but every approach is regarded from both a theoretical and a practical point of view. Therefore all concepts were implemented in concrete drafts of geography lessons. Within this course the above mentioned approaches were considered. In the end of session one, the participants have the opportunity to exchange their experiences, their difficulties and requirements for further explanations but first of all to express their future prospects for an implementation in class. As a first step the teachers get several drafts of geography lessons that are based on key concepts and that correspond to the class levels they teach. It is the aim to test at least one of these examples in their own class as a basis for a further development.

Session 2

The second session takes another step towards the actual planning of lessons by cooperatively developing approaches to establish key concepts by the design of enquiry tasks (geographical enquiry).

After reflecting upon the practical testing that took place since the first session, methodological processes for the establishment of metacognitive strategies are presented. Approaches for the development of geographical thinking strategies in geography classes are compiled that are based on geographical key concepts (for example the students' ability to an alternating usage of different scale levels during their analysis). In this course, the use of activating tasks, which encourage independent and problem-solving involvement with geographical challenges, is essential. In the sense of the approach thinking through geography these tasks are embedded into selected methodological processes (Leat 1998). After an additional input on the effects of these strategies on the students' learning, the participants deal with some sample pages of common textbooks for geography classes. These are again not based on key concepts (as they are not yet implemented in Germany) and sometimes use hardly challenging tasks for the students. These pages are now modified by the teachers. By this means they discover particular ways to create opportunities for pupils to think geographically.

At the end of this session, these experiences are practically implemented within a cooperative planning of a lesson as a preparation for the subsequent testing phase in their own classes. For the time after this second session, the participants work on their own as well as in teams to develop their lessons based on key concepts.

Session 3

The concluding session focuses on the diagnosis of student learning and the students' ideas about geography. Assessing these ideas can help to support the specific development of geographical thinking in the sense of the key concepts. Based on their own experiences with key concepts they made during the preceding month in practice, different ways to assess the students learning are developed.

Moreover, the emphasis is now on the cumulative learning in geography class, in order to systematically initiate conceptual (instead of additive) learning across the grades and over the course of a school year. This is crucial for the key concept approach. Because of its degree of abstraction, the concepts need to be learnt step by step, sometimes through means of inductive or deductive strategies in class. Considerations are necessary on how teachers can lead their students to the understanding of the concepts. Which kind of support do they need in order to work with key concepts autonomously, to think geographically in the sense of the key concepts?

These questions are at the core of this final session to develop arrangements for an everyday implementation of key concepts. Thus the participants work on the curricula for geography class to emphasize corresponding geographical big ideas. Which issues build on each other in the sense of similar geographical patterns, a progression of geographical thought and so on? Findings of this work are used, firstly to develop schemes for the further lesson planning and secondly to create different tools for the everyday work in class to support pupils in their independent usage of key concepts (for example classroom-posters that contain fundamental explanations to each key concept approach).

To point out the unique method, the in-service training course is presented according to the criteria of effective in-service training that were introduced in Figure 3. Thus the programme is designed in accordance to empirical research that constitutes the basis for these criteria. Subsequent to the in-service training courses one additional focus of the data analysis will be on the actual relevance of the different features for the learning of the teachers. At this stage the ten criteria will be concretised within the context of this study to illustrate the shape of the in-service training as an example for the development of further programmes.

Structural features:

1. *Duration, time resources*: Nine session days in total over a period of six months. This amount of time enables a sufficiently long phase between each session that is necessary to put the theory into practice. In the course of the extensive sessions, opportunities for active examination, trial and reflection are provided alongside

intensive inputs. In addition, teachers are supported since the in-service training has an approved official status (temporal relief).

2. *Professional learning communities*: Over the period of six months, an intensive exchange among the group and in particular among the base-groups is initiated. Each base-group consists of five to six teachers, who gather for planning and reflection phases on a regular schedule, which enables constructive work.
3. *Institutional framework*: The in-service training takes place in cooperation with the Bavarian Academy for Further Teacher Education and Human Resource Management (ALP Dillingen) and the Teachers' Training College in Speyer, Rhineland-Palatinate. Hence, they are highly institutionally connected and recognized as an official further education programme. Eventually, this ensures a financial relief, e.g. by covering accommodation and travel costs. These structural features are highly responsible for motivational and volitional attitudes of the participants.
4. *Integration of diverse expertise, abilities of teacher trainers*: Collective learning in the sense of the symbiotic approach is expected because of the participation of geography teachers, representatives of geography education (in particular Giessen University and University of Erlangen-Nuremberg, both in Germany) as well as the institutions mentioned above, and the resulting exchange of expertise from practice, theory, education administration and from all phases of the teacher education.

Didactical/Methodological features:

5. *Subject-matter knowledge, connection to curriculum*: Through the orientation towards geographical key concepts, a focus on subject-matter learning is guaranteed and is at the core of these in-service training. By incorporating the teachers' situative conditions (e.g. topical suitability of case-studies for the respective grades that are taught, etc.), a curricular connection is provided.
6. *Close consideration of findings in classroom research*: The work done in the sessions as well as the processed facets of the teaching follow the findings of classroom research. For example, by taking into account an activating task culture, the diagnosis of student learning or the fostering of inquiry learning and the usage of metacognitive strategies for an enhanced learning in geography classes.
7. *Opportunities for co-creation of training activity*: The programme is designed adaptively (which is very important for a symbiotic approach). By means of questionnaires and in the course of regular feedback discussions, the teachers' needs and challenges are recorded and integrated in the planning of the subsequent session. This adaptation enables a mutual (and symbiotic) learning process and also helps to retain the participants' motivation.

Activities:

8. *Phases of input, cooperative development, trial and reflection*: Each session follows a circular sequence of several phases (see Figure 5).

Didactical/methodological input, cooperative development of teaching units for trial purposes, the actual conduction of the different parts in the own classes as well as within the in-service training, and cooperative reflection all aim for successive advancement of teaching and the underlying didactical/methodological concepts.

9. *Experiencing one's own efficacy*: By the application of suitable diagnosis instruments in class, the teachers experience their own efficacy concerning their teaching and concerning possible modifications of it in the process of the in-service teacher training course.
10. *Feedback, coaching*: By the establishment of feedback-structures (e.g. within the base-groups) and the co-constructive development of lessons, the deprivatization of teaching is fostered, and, consequently, cooperative thinking about teaching and the actual design of lessons is supported.

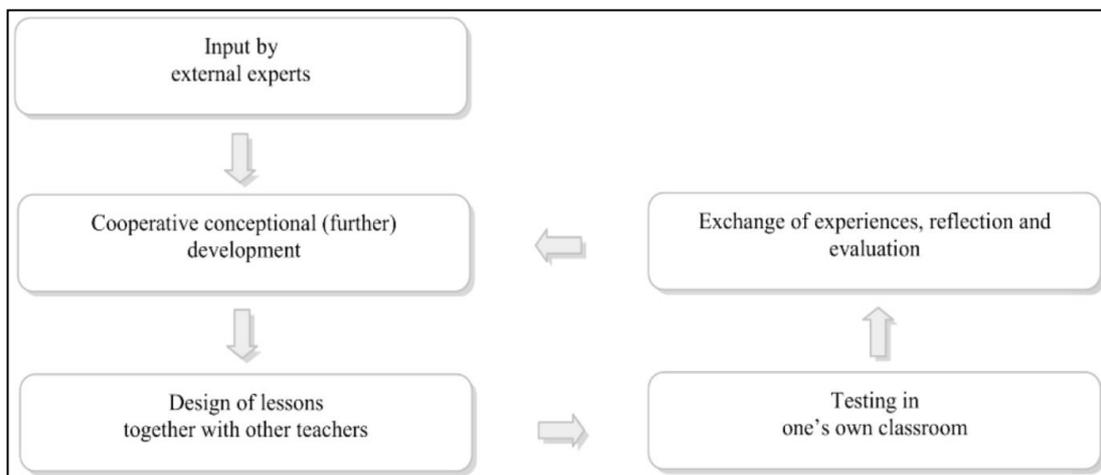


Figure 5. Circular arrangement of phases of input, development, testing and reflection in the framework of successful training in further teacher education (see Gräsel et al., 2004; Fögele et al. 2015).

Outlook and Conclusion

As stated above, this paper represents the design of an in-service training that was held from October 2014 to October 2015 as the intervention of a study on the implementation of key concepts. As a next step the collected data will be analysed based on these questions:

1. Which beliefs concerning geography and its key concepts exist among the teachers; and which developments can be identified within the course of the in-service training course?
2. Which beliefs concerning the students' learning in geography class exist and in how far can they be modified in the frame of the in-service training?
3. Which suggestions can be derived for the design of future in-service training for geography teachers?

For the purpose of data generation, group discussions with the teachers about their experiences are conducted each time in the beginning and at the end of a session. For this reason, each teacher is attached to a base-group, consisting of five to six people. In total, 41 teachers took part in the programme. The seven base-groups met at six points in time. Thus, 42 group discussions, each lasts about one hour, represent the data basis for further research.

The programme is designed according to the ten criteria for the development of effective in-service training that were derived from previous literature. For this reason, alterations of deeply inscribed beliefs of geography and teaching and learning in geography lessons are expected. Accordingly, while examining professional knowledge and skills of teachers, the focus ought to be oriented towards the reconstruction of these orientation schemes. Explicit thinking processes and the implicit orientations of individual teachers form the matter of the empirical research. In the frame of the present study, a process-analytical procedure is used, which monitors the alteration of these beliefs in the course of the further teacher education (Lamprecht, 2012). Thus, in line with the guiding research questions mentioned earlier, one can gain information on the degree to which the beliefs of the teachers concerning the subject of geography and the students' learning in geography class have changed by the involvement with key concepts.

Following Mannheim (1980) and Luhmann (1997), the research approach of the documentary method suggests that on a theoretical-reflexive surface explicit knowledge is conveyed and in its 'literal meaning' easily accessible for the empirical research. In this context this might be a discussion about the key concept approach, for instance in the sense of evaluation from the perspective of teaching practice. However, in practice, implicit (practical) knowledge is characterized by a deeper inherence. The way in which implicit (in terms of the method: conjunctive experiences as similar backgrounds among teachers) experiences are expressed (e.g. metaphorically) can provide an access to what stands behind the explicit statements (see figure 6). Within the context of the present study, teachers may find a common orientation, concerning the students' knowledge and skills that should be aimed for in light of one's own understanding of the geographical subject-matter. This 'background' is named *document-sense* (or: *document-meaning*), because it must be reconstructed from the text (analytical steps: formulating interpretation, reflective interpretation, comparative analysis, generation of a typology) with reference to the discourse among the participants of the group discussions first (for the theory and practice of the documentary method see Bohnsack 2006; Bohnsack & Nentwig-Geeseman, 2010).

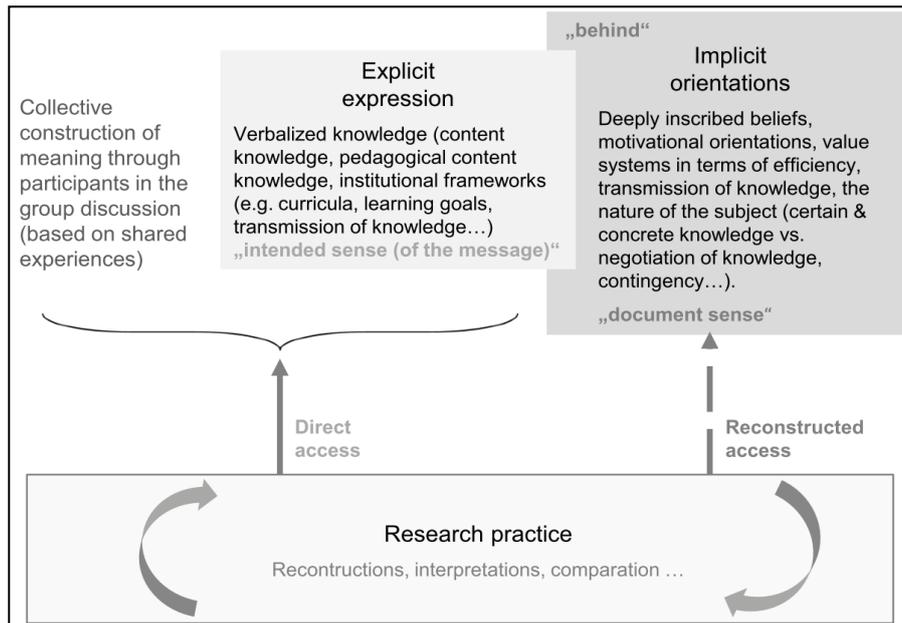


Figure 6. *Researchers' access of explicit and implicit knowledge, by means of the documentary method (Applis & Fögele 2014).*

Am: *“That it the challenge! That they really learn interconnected thinking. I demonstrate it to them as a jigsaw puzzle. You have different pieces, and the more pieces you have, the more you will understand how it works when you put them together. That is why I try to say ,please no rote memorization‘! As I’ve realized that my favourite question is more and more: why?”*

Ef: *“But they do not know the most fundamental things. So how can they understand interrelations and connections? And thus I hope to learn during this course about how to prepare the lessons so exciting that they get the point!” (own data).*

The exemplary excerpt (see above) from one group discussion can illustrate this approach (data from the pilot study). Am (male) and Ef (female) talk about the intended way of learning in their geography classes. Instead of rote memorization students should learn interconnected thinking. Here they face the students' lack of fundamental knowledge (formulating interpretation; reproduction of the explicit topics in the text). Illustrated with the metaphor of a jigsaw puzzle Am indicates his little interest in single pieces of information. But as he describes the development of understanding as an addition of more pieces of information, he thus implicitly expresses his orientation on factual knowledge (reflective interpretation). Ef confirms this orientation as she expresses her dissatisfaction about the previous knowledge of the students. Other sequences of this group discussion show the group's intention to learn strategies for their geography classes to impart knowledge in a more efficient way (comparative analysis within the text). This orientation contrasts with other group discussions, where teachers search for opportunities to support pupils in their autonomous understanding,

or within the metaphor of the jigsaw puzzle: to help them to see the big picture instead of collecting different pieces of information (comparative analysis in contrast to other group discussion). These different orientations could have further impacts on the groups' individual access on the key concept approach, which is to be analysed henceforward. On the one hand it is one aim to generate different types of teachers in the context of conceptual learning in geography classes as a means to create transferable conclusions based on the qualitative data. On the other hand it is intended, with respect to the symbiotic approach, to support different types of teachers in dealing with the key concept approach to strengthen conceptual (geographical) thinking in geography classes. Thus it is very important to gain insights in different kinds of needs and orientations of teachers.

Based on the expected findings, empirically and theory-driven conclusions can be drawn in terms of the construction of in-service training courses, which aim for a further development in these relatively persistent areas of professional competence of teachers.

Various major challenges are inherent in the implementation of the didactical/methodological instrument of key concepts, since the key concepts approach is based on fundamental beliefs about the nature of geography or the learning and teaching in geography classes. For one, it requires an intensive metacognitive involvement with one's own teaching as well as with the underlying idea about the reference discipline geography. On the other hand, methodological impulses compete with external conditions, such as curricular standards and final exams. This reveals the decisive importance of the design of the in-service training.

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