Socio-Political Aspects of Personal Experiences in University Teacher Education Programmes

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This paper presents and applies the subject–scientific approach to learning, which integrates a socio–political dimension to learning on a theoretical level and provides analytical categories for research. An ongoing qualitative study about learning experiences of pre–service mathematics' teachers throughout their university studies is presented. The analytic categories are exemplified by the case of the student Helena. She is splitting her learning in various institutional contexts, which realise different functions in her learning trajectory that could be interpreted in their socio–political dimension within the subject–scientific approach.

Introduction

In Germany dissatisfaction with the current institutional arrangements of teacher training are expressed by teacher students as well as lecturers. Research, addressing German teacher training, mainly follows a deficit approach, excluding voices of the teacher students. The presented study focuses on the limits, obstructions and opportunities from students' standpoints of institutional arrangements of teacher education in university settings in Germany.

Pais and Valero (2011) demand a dialectical approach in considering the socio-political dimension in mathematics education research. Mathematics education practices are embedded in social, economic, political and historical practices and discourses, which establish mathematical rationalities. Furthermore mathematics education research practices also construct naturalised discourses on how mathematical rationalities in the social world are formed. A reduction of mathematics education research to learning theories, that only focus on the individual learner and deny the societal and political magnitude

of education, is strongly criticised. Learning cannot be seen disconnected from socio-political practices that also constitute mathematics education. Mathematics education practices are given meaning by social, political, economical and historical configurations.

Yet, how can learning be conceptualised in mathematics education research without leaving out the socio-political dimension? In the following, a theoretical framing of learning – the subject-scientific approach – based on German Critical Psychology and the communities of practice approach, is introduced. The subject-scientific approach integrates social, political, economical and historical configurations already on a theoretical level and not just as additional variables (Holzkamp, 2013b). The analysis starts from the subject's standpoint and proceeds to relate the findings to societal arrangements.

How Is Society Taken into Account in Critical Psychology?

The subject-scientific approach takes the subject standpoint as starting point for further analyses. Holzkamp (1985) proclaims a paradigm-change considering meaning-reasoning relations, instead of behaviour-determination. He argues that humans recognise the world from their own perspective and with purpose; the reality is interpreted by the subject in connection with her or his experiences and intentions as well as in view of their *life interests.*

Subjects are conceptualised within societal and political structures, able to consciously react to their environment, according to what is reasonable from their standpoint (Holzkamp, 1985). What seems reasonable depends on the subject's *personal situatedness* (*Personale Situiertheit*), a concept that contains the past and future prospects of the subject's unique biography.

Human beings can only be understood in their relation to the societal system. The subject stands in a two-sided relation to society (Holzkamp, 2013a). On the one hand, human beings are producers of their life conditions and reproduce their life conditions; on the other hand, they are subjects to their life conditions. Holzkamp summarises the idea of the subject-scientific approach as follows:

… we are attempting to elaborate this two-sided relation as an interrelationship, i.e. to analyse human beings as producers of the life conditions to which they are simultaneously subject, and to conceptualise the mediation between the vital necessities of sustaining the societal system as a whole and these necessities on the subjective level of the discrete individuals (p. 20).

Analytical Lense

The analytical concepts presented here are designed dialectically; they are not confined to the individual, but all are defined as mediating the two-sided relation between subject and society (Holzkamp, 1985).

Capacity to Act

The core-category *capacity to act* (*Handlungsfähigkeit*)[1] describes the mediation between the individual and societal life-sustaining activities (Holzkamp, 2013a). In cooperation with others, the individual is capable of gaining more control over her or his own life conditions. It includes both the individual's opportunities and constraints to act. The (subjectively perceived) quality – opportunities to act and constraints of those opportunities – of the own capacity to act is reflected in the individual's *existential orientation* (*Befindlichkeit*). Overcoming the dependency on current situations and gain of influence over one's own life prospects is seen as the central moment in prospectively developing one's own individual life quality (Holzkamp).

Antagonistic class conditions of capitalist society are specific for the historic conditions we are living in (Holzkamp, 1985). Hence by trying to increase one's capacity to act, in particular gaining more control over life-sustaining conditions, the subject is risking getting in conflict with agents of power (Holzkamp, 2013a), and therefore the risk of provoking restrictions has to be anticipated. Thus, the category capacity to act is a dual concept describing two analytically split alternatives, depending on how the subjects tries to resolve her or his *subjective need* to broaden their influence on her or his life-conditions.

In a variety of different situations, it can be reasonable for the subject to act within the given limits of current situations, even though,

in principle, the development of the *capacity to act* by broadening one's own influence over one's life-conditions is always possible (Holzkamp, 2013a). Acting within given limits characterises the *restrictive alternative of capacity to act* (*restriktive Handungsfähigkeit*) while extending one's own capacity to act in cooperation with others describes the *generalised alternative of capacity to act* (*verallgemeinerte Handlungsfähigkeit*).[2]

Knowledge entails a critical and emancipatory potential for extending one's own *capacity to act*, but it is controlled by institutional power structures (Holzkamp, 1995). The learning process is initiated by difficulties that could not be overcome without learning. The intended outcome of any learning process is mastering those difficulties. Students' learning actions are based on their premises for action that depend on the possibilities offered by their particular societal context and how these are interpreted (Holzkamp). Learning is conceptualised as activities, reasonable from the standpoint of the subject. The analysis of learning processes aims to reveal contradictions in societal arranged learning environments.[3]

Communities of Practice

The communities of practice approach highlights that learning is situated in social practices (Lave, 1988). It criticises a perspective on learning processes emphasising isolated acts of learning that build *trees of knowledge* and favours the view of *landscape of practices*. Knowledge is not decontextualized, therefore new knowledge is located in communities of practice. The approach deepens the theorizing on social learning environments and conceptualizes relations between different learning contexts that take place at the boundaries, where diverse communities of practices can be connected (Lave & Wenger, 1991). Boundaries can provide learning opportunities, but also divide communities of practice and can be a source of separation and fragmentation of and into different communities. Some people act as brokers between different communities of practice, while others (who are potential brokers) do not provide cross-boundary connections. A crucial point in the analysis of learning processes is the participation/non-participation in (between) communities of practice.

Learning Trajectories

The social practice of learning is arranged in a variety of institutional settings, e.g. school, university, vocational training and sports clubs (Dreier, 2008). Different learning problematics are faced in different contexts in one's own personal learning trajectory. The contrasting and comparing of different learning problematics across different places might lead to new learning tasks.

Dreier (1999) acknowledges Holzkamp's concept of *capacity to act* (as mentioned above) and emphasises aspects of the social contexts of actions that the subject is part of. His analytical categories are building up on Holzkamp's concepts of capacity to act and the communities of practice approach, providing a further distinction to grasp the importance of different settings in a more specific way.[4] The categories – *aspects of situatedness, forms of cooperation, mode of participation* – guiding the analysis are presented in the following passage. These concepts cannot be seen as stable or fixed, but are changing throughout the subject's life trajectory, changing participants, societal and political situatedness.

Aspects of situatedness: The opportunities and the nature of the learning processes are affected by the specific institutional arrangements the social practice of learning is located in (Dreier, 2008). These institutional arrangements have to be taken into account by the learning subject (Dreier, 1999). The learning subject has to balance her or his own personal learning goals and the scope of the specific institution. Therefore, it is important to understand the relation between *the personal situatedness of* the subject (as mentioned before) and the situatedness of social context. These aspects of situatedness can help to reconstruct limits and obstructions to the learning process (Langemeyer, 2006).

Forms of cooperation: The quality of learning and understanding, as well as the affective relation to it, are strongly influenced by the participatory dimension of the subjects' activities (Dreier, 1999). Hence different forms of cooperation, that structure the subjects' participation in social contexts, have to be looked at in more detail. The particular position the subject occupies in the present social context affects her or his opportunities. By merging the concept of capacity to act and participation, Dreier suggests that

"[t]he fundamental human duality between acting within the existing limits of social practice and extending its scope of possibilities is grounded in a similar duality of modes of participation, i.e. of participation in the reproduction of the current state of affairs or of contributing to change it so that participants may extend their degree of disposal over the social practice" (p. 6).

Mode of participation: Subjects take part in different social contexts and find themselves in different contexts (Dreier, 1999). Thus, it must be taken into consideration how subjects manage the participation in heterogeneous social contexts. Subjects change their personal mode of participation according to the specific local contexts. Dreier explains:

"When subjects move from one context into another, their structure of personal relevance changes. Which particular structure of social conditions matters for them depends on their present location" (p. 12).

The subject's *stance* describes her or his standpoint in relation to the institutional settings that guides her or him in the transition between contexts (Dreier, 1999).

Research Design

The following exemplification (The story of Helena) of the prior introduced concepts are part of an ongoing qualitative study addressing learning experiences of pre-service mathematics teachers in the institutional context of university teacher education programs in Germany. Teacher training in Germany is organised in two phases. The first phase is situated at university (Bachelor and Master's degree) and the second phase is a practical training. The study only looks at the first phase of teacher education. Mathematics teacher degree programs include the study of math, math didactics and general pedagogy, provided by the particular departments.

So far nine pre-service teachers – aiming to be primary, secondary or vocational school teacher – have been interviewed. The university students had different educational backgrounds and were at different stages of their current studies. The educational programs for

pre-service teachers of different school types vary in their structure and mathematical requirements.

Data is obtained from semi-structured interviews, supported by the assembly of a Mind Map done by the interviewee. The interview addresses questions about students' learning activities, the student's personal situation, social support and conditions of studying. Additionally, the student is asked to complete a Mind Map on what she or he considers being important for her or his learning process.[5]

The subjective standpoint of the students is basis of the analysis. The data is analysed using a combination of grounded methods (Strauss & Corbin, 1990) and techniques provided by objective hermeneutics (Wernet, 2009). Grounded methods are used to identify manifest topics that are perceived to be important for their learning by the students and their relation to each other. Objective hermeneutics aims at latent meaning structures and shifts the view from the subject's perspective to underlying shared structures.

The Story of Helena

In this paper, the case of Helena is discussed. The data is presented in form of a vignette (Erickson, 1986). The original German excerpts of the interview, referred to in the presentation of the case, can be found in the endnotes.

The interview with Helena took place during the fifth bachelor semester of her studies to become a primary school mathematics teacher. Throughout the interview a long learning trajectory of becoming a teacher was revealed: She had already studied in another teacher education programme, but after the first phase at university, she did not proceed to the second phase. Afterwards she worked as a substitute teacher before enrolling in the present mathematics teacher education programme. In addition to her university studies, she attends a course at another institution to get a supplementary qualification in progressive education.[6]

Even though Helena is an atypical case because of her long learning trajectory, problems of teacher education are revealed that also concern other students with a more prototypical learning trajectory.

Aspects of Situatedness

Helena's first teacher education programme (aiming at being an economics high school teacher) left her with a strong feeling of insecurity towards her future profession. Her economics studies contained university mathematics classes, which Helena characterises as "beyond good and evil, what a teacher will EVER need at all".[7] She experienced a devaluation of her skills as a teacher-student compared to economics-major-students,[8] which led to a lack of confidence in her mathematical skills. The strong focus on the subject matter courses led her to the conclusion of not being prepared to be a teacher[9] considering teaching methods. Her personal situatedness can be described by insecurity towards her skills related to her future profession. From this arises a strong subjective need of gaining confidence.

The first teacher education programme did not provide her with a secure knowledge base she can rely on in her practical phase. It reflects problems of university teacher education in general:

- The practical significance of university studies remains unclear to teacher students.
- In the hierarchy, teacher students are treated as a lower class than the students majoring in one subject.
- Especially mathematics classes seem to create a lack of confidence in mathematical skills, instead of providing students with the feeling of security and the ability of handling mathematics.

Forms of Cooperation and Modes of Participation

Her current studies of becoming a mathematics primary school teacher are split in two different institutional settings: A mathematics teacher education programme at university and an additional course on progressive education.

These two different institutions serve different functions in her learning process and therefore differ in forms of cooperation and modes of participation. In the university programme, she situates her learning of mathematical skills, while in the progressive education course she situates her learning of teaching methods.

(University) mathematics: She anticipates regaining confidence in her mathematical skills during the university programme. Helena still positions herself in a contradictory way to her mathematical skills. She refers to mathematics as a personal strength,[10] but on the other hand, she has the subjective need to gain confidence in mathematics and to develop basic mathematical skills.[11] The first topic she brings up in the interview is the need to strengthen her confidence in her own mathematical skills, again.[12] This confidence remains an issue throughout the interview, indicating the magnitude of this topic for institutionalised teacher education.

She refers to the mathematical content class that she is currently taking, as a class she "is obliged to"[13] take. The mode of participation in class context leads to knowing requirements for attaining a certified qualification, but do not necessarily imply deep engagement in mathematical activities. She openly admits that one reason she is taking a certain class is an anticipated good grade in the written exam.[14] Getting a good grade helps her to build up confidence in her mathematical skills, by stressing the "high demand"[15] of the mathematics classes, (she refers to it several times throughout the interview) she is strengthening this experience. Her preparation for a mathematics exam can be described as rote learning. Helena just receives mathematics knowledge from others. Mathematics remains a tool of power over her.

Just focusing on Helena's learning in university classes would deny here actual learning efforts to pursue her goal of becoming a mathematics teacher. Her forms of participation differ between her university communities. She participates in a learning group[16] that she strongly relies on for framing her learning activities in university context. Helena refers to her learning group meetings as one of her central learning strategies and stresses the importance of learning together for mathematics.[17] The learning group has developed binding group norms.[18] She relates the extensive preparation of homework (for university classes) to the participation in the learning group and not to the particular class contexts. The mode of participation in this learning group requires all members to be committed to their studies, actively engaging in mathematics activities and striving for high achievements. In her learning group her mathematical abilities are being recognised; here she is part of a mathematical community.

Progressive education course: During her last semester at the

former teacher education programme she got to know about progressive education theories for the first time. She decided to become a teacher at a progressive education school and complete her second phase of teacher training at a progressive education school.

The progressive education course provides her with a set of teaching methods, which is theoretically related to a stage model of (mathematics) learning. These teaching methods therefore help to build up a secure basis for teaching and build up the needed confidence regarding her pedagogical content knowledge.

Consequences of Institutional Splitting

Asked for the relationship of her university studies and her progressive education qualification course, she does not perceive it to be benefitting her in her current situation, but anticipates her progressive education qualification course to be of benefit in the future.[19] Her work as a substitute teacher remains a disconnected experience in her current learning as well. Helena clearly has the stance of not relating the two institutional settings. Helena does not act as a broker between the different learning contexts. Due to not connecting both of her learning opportunities (subject knowledge and teaching methods), her personal teacher studies remain fragmented.

In her Mind Map, she does not integrate her substitute work as a teacher and just mentions progressive education approaches to be missing in university context. She is not linking these experiences to the learning in the mathematics teacher education programme. Also, in other Mind Maps, the problem of learning in university context remains detached from other experiences, indicating a specific situatedness.

The splitting of the different components of a teacher education programme seems to be a limiting boundary in teacher education. The presented case here is quite drastic because it is fragmented between different institutional settings. Also other students report difficulties of relating the modularised components – math, math didactics and general pedagogy – to each other in a holistic picture. The conjunction of these components in regard to teaching practices is crucial for teachers' development. The institutionalised teacher education in this fragmented form seems to leave the connections at the boundaries of

the different components open to the students.

Due to the fragmentation the power over the knowledge for teaching remains split. This intensifies the feeling of being exposed to others that possess the knowledge that is relevant for their future profession.

Further Questions

The cross-boundary connections between the components of math, math didactics and pedagogy need to be taken a closer look at, in order to develop ways of fostering the cross-boundary learning opportunities and enabling future teachers to obtain an integrated view. Attaining an integrated view and the confidence in associated skills are crucial for teacher's professional development, but seem to be an obstruction to teacher learning so far.

- How can an integrated view be supported in an institutional teacher education setting?
- How can institutional teacher education foster the confidence skills relevant for teaching?

The affective relations at the intersections of the components seem to play a crucial role. The hypothesis emerged that challenging students' confidence in university mathematics classes is related to dissatisfaction with university teacher education programmes concerning the subjective need for more practical significance in teacher education. This possible relation and its constitution, as well as students' subjective need of more practical significance of university studies, need to be further examined. Is the demand for more practical significance for teaching an anticipated way of regaining power of the knowledge for teaching?

Notes

1. The German term *Handlungsfähigkeit* is difficult to translate into English. Different translations can be found in publications in English: *action potence, agency, power to act*, and *capacity to act*

2. Hereby it should be mentioned, that by enforcing one's own needs at the costs of others also narrows one's own possibilities in life by isolating oneself and the reduction of possibilities to alliance-formation with others

3. The subject-scientific approach of Holzkamp (1995) differs from the activity theory approach to learning, used in mathematics education research (e.g. Roth & Radford, 2011). Both approaches (Langemeyer, 2006) see contradictions as essential for the analysis of learning. But what is meant by contradictions differs (Langemeyer). In the activity theory approach, contradictions mark the starting point for learning, Holzkamp, however, defines contradictions as a hindrance to learning.

4. Klaus Holzkamp, Jean Lave and Ole Dreier worked together collaboratively. Even though their studies about learning have different foci, they shared basic conceptions and their theorizing inspired each other.

5. The students complete the Mind Map by themselves. Just the word "Learning" is given and they are asked to write down on blank paper in key terms, what they perceive to be important for their learning process. They can also relate their key terms with arrows to each other and use signs to indicate importance and the affective relation.

6 Certified progressive education teachers have to complete the two phases of general German teacher training and additionally the course in progressive education. These two institutions do not collaborate.

7. Es war jenseits von Gut und Böse, was JEMALS ein Lehrer überhaupt braucht.

8. [ ] wurden wir eigentlich NUR geprüft, ob wir irgendwie mit denen [Fachstudenten] mithalten können

9. Ich fühlte mich da auch ÜBERHAUPT nicht gut vorbereitet als Studentin auf meinen Lehrberuf.

10. Mathe war schon immer eine Stärke von mir

11. Ich muss immer noch Grundlagen [in Mathematik] auch nachholen um

12. [ ] so dass ich so Sicherheit erlangt habe durch das Studium auch wieder in diesem Fachbereich [Mathematik].

13. „Elementare Funktionen" MUSSTE ich besuchen

14. [ ] weil ich gedacht habe, dass man bei Herrn [Name des Dozenten] auch ganz gut die Klausuren bestehen kann.

15. E.g.: auf diesem HOHEN Niveau im Mathematikstudium irgendwie zu beherrschen

16. Helena collaborates with other mathematics teacher students in her semester

17. Also in Mathematik treffe ich mich mehr mit meiner Gruppe. [ ] In Mathematik bin ich auf meine Gruppe angewiesen.

18. wir sind wirklich ein Team, wir legen ALLE Wert darauf, dass wir uns treffen und die Hausaufgaben auch schon vorbereitet haben und das ist eben auch ein Bestandteil vom Lernen bei mir

19. Also fürs Studium eher weniger. [ ] für meinen Beruf als Lehrerin profitiere ich UNENDLICH.

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