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Subjective theories of teachers in dealing with heterogeneity

Elisa Bitterlich, Judith Jung and Marcus Schütte

Technical University Dresden, Germany; elisa.bitterlich@tu-dresden.de

This article presents initial results of a research project which investigates subjective theories and typical action strategies of teachers and student teachers in dealing with heterogeneity in school with a focus on the subject mathematics. These results are ultimately intended to contribute to the development of future teaching approaches. To reconstruct subjective theories of teachers and student teachers, group discussions were carried out. The initial results show the aspects of heterogeneity the participants deem important and the possible actions they discern for coping with pupil diversity.

Keywords: Diversity, heterogeneous grouping, teacher beliefs, group discussion.

Fundamental theoretical considerations

The fact that children and young people often differ in terms of their needs and preconditions for learning, and that this heterogeneity of learners sometimes presents teachers with significant challenges, are not new phenomena (Trautmann & Wischer, 2011). The heterogeneity of learners relates to different dimensions, such as cognitive performance, age, gender, linguistic-cultural background, social class and many more (Hinz, 1993). In accordance with current political discourses and social developments, these different dimensions are given unequal attention in pedagogical discussions. The impetus for a renewed focus on heterogeneity in Germany was provided by the results of international comparison studies (in particular PISA, 2000), which highlighted especially the sizeable differentiation in pupil achievement, the alarmingly high number of very-low-achieving pupils, and a close relationship between social background and academic success (Trautmann & Wischer, 2011). The UN-Convention on the Rights of Persons with Disabilities, which came into force in Germany in 2009, made the inclusive schooling of children with and without disabilities the subject of renewed debate. In addition, the phenomenon of increased linguistic-cultural differences among learners has come into focus in the last two years by the increased number of refugees entering Germany. For most student and practising teachers the heterogeneity of learners represents an important problem area in planning and teaching lessons which seems to be complex and fundamental. Askew (2015) expounds that the teacher's ways of thinking and talking about heterogeneity impact how they react to the differences that learners bring to the mathematics classroom. The following questions arise: "Why have so many, essentially well-founded pedagogical ideas not been realised? What prevents teachers from seeing heterogeneity as enriching, and dealing with it productively?" (Trautmann & Wischer, p. 9, translated by the authors). In order to answer these questions and create concepts for future seminars, not only a scientific reflection of this topic is supposed to be considered. Especially the perspective of those facing heterogeneity daily in their pedagogical work is to be included by analysing their subjective theories about heterogeneity, too.

In the framework of the Germany-wide "Qualitätsoffensive" for the improvement of teacher

training, the project “Synergistic teacher education in an excellent framework”¹ at the TU Dresden includes the sub-study “Heterogenität in der Lehrerbildung von Anfang an” (Heterogeneity in teacher training from the start). Based on qualitative questionnaires, group discussions, and participatory observations of everyday teaching in schools, subjective theories² and predominating patterns of action among teachers and student teachers will be surveyed in different kinds of school. On the basis of the survey results, the project intends to develop concepts for teaching events to make student teachers sensitive to the different facets of heterogeneity.

The concept of ‘Heterogenität’ (heterogeneity) is defined in various ways in the relevant German-language scientific literature, and indeed is often used without specific definition. A number of terms are used synonymously, ranging from ‘Vielfalt’ (plurality) to ‘Unterschiedlichkeit’ (difference), ‘Unbestimmbarkeit’ (indeterminableness) and ‘Beliebigkeit’ (arbitrariness), or English words like ‘diversity’³. In many scientific articles, the focus is placed on only one aspect of heterogeneity (such as language, culture, gender, or disability), and the relevant definitions insinuate a polarisation between ‘normal people’ and ‘the others’. However, authors like Prenzel (2006) and Krüger-Potratz (2011) articulate a different understanding of the concept of heterogeneity. We share this understanding of the concept of heterogeneity, which finds placing the focus on a few ‘dominant’ characteristics to be a reductive approach (Krüger-Potratz, 2011).

Diversity education is based on the ‘indeterminability of people’; it is therefore unable to diagnose ‘what somebody is’ or ‘what shall become of somebody’. It [diversity education] opposes all reification in forms of definitions of what a girl is, or a boy, a behavioural deviant, a Turkish woman... If people must be characterised, then this must be based on their dynamic development and the context of their environment. (Prenzel, 2006, p. 191, translated by the authors)

To analyse teachers’ subjective theories, and to develop concepts for teaching events that are based on the teachers’ views, against our understanding of the concept it nevertheless appears sensible to establish a theoretical categorisation of some of the individual facets of heterogeneity. Some of the existing studies on ‘beliefs’, as well as on teachers’ implicit or subjective theories about heterogeneous contexts in school, show a focus on selected individual aspects of heterogeneity in this way. On the aspect ‘heterogeneity’, in an interview study on belief systems of primary-school

¹ This project is part of the “Qualitätsoffensive Lehrerbildung”, a joint initiative of the Federal Government and the Länder which aims to improve the quality of teacher training. The programme is funded by the Federal Ministry of Education and Research.

² In the literature, concepts such as subjective theories, implicit theories, or naive theories, as well as teachers’ ideas and attitudes, or “beliefs”, are sometimes used synonymously in accentuating different aspects, and cannot be clearly differentiated (Törner, 2002). In this paper, we will discuss teachers’ subjective theories based on Heymann’s (1982, p. 146, translated by the authors) understanding of “the totality of knowledge elements and orientations affecting teachers’ actions in the conducting of lessons”.

³ While in the English speaking area, the Term „diversity“ is preferred and well-known, in Germany many publications tend to use only “heterogeneity”. But in some more actual publications we can see that “diversity” is more and more a common term for describing the plurality of pupils.

teachers working with children with special educational needs concerning cognitive development, Korff (2014) identifies a central challenge for didactic activity in mathematics teaching in the establishing of links between different approaches and varying levels of representation. On the aspects of gender and ethnicity, the ProLEG study⁴ addresses the question of how ethnic-cultural and gender-related perceptions influence teachers' educational activity (Winheller, Müller, Hüpping, Rendtorff & Büker, 2012). The results show that the respondents overwhelmingly see questions of children's gender as unimportant and considered themselves to be sufficiently competent in this area. In relation to ideas about ethnicity, the respondents attached equally low importance to 'Intercultural Education'.

Topics such as 'Individual Support', 'Social Learning', and 'Inclusivity' are given primary importance, while culturally sensitive approaches have the lowest priority, followed by 'gender-aware education'. (Winheller et al., 2012, p. 10, translated by the authors)

However, Zobrist's (2012) investigation attempts to approach heterogeneity from a broad perspective, without restriction to particular aspects of the concept. Using semi-structured interviews and 'simulated recall' in addition to teaching observation, the author attempts to produce a comprehensive view of the ways teachers deal with heterogeneity in mathematics teaching in secondary school. The results show that teachers tend to define heterogeneity especially in terms of different preconditions for learning and different kinds of social behaviour. Furthermore, special educational needs assessment is seen as highly relevant in dealing with diversity, but personal competences in this area are considered inadequate. Schönknecht and de Boer (2008) point out that in describing heterogeneity student teachers often seem influenced by an idea of polarisations and dichotomisations, as well as a limited perspective focusing on supposed 'problem children'. Also in relation to perspectives on the dimensions of heterogeneity, little differentiation is evident, with the use of a number of generalising (stereo)types (e.g. 'normal' and migrant children). They summarise:

Thus, addressing the construction of normality contributes to dealing with heterogeneity and difference, and can be a significant building block towards realising equality of opportunity in school. (Schönknecht & de Boer, 2008, p. 258, translated by the authors)

Regarding to Garmon (2004), both dispositional factors (like openness to diversity as well as receptiveness to others' arguments and ideas, self-awareness and self-reflectiveness, and commitment to social justice) and experiential factors (like intercultural experiences, support group experiences with individuals who encourage another person's growth and educational experiences) influence teachers' attitudes towards diversity.

Method

In order to gain a first impression of student teachers' ideas about the concept of 'heterogeneity' in the school context and to discover how they encounter diversity among children, a qualitative questionnaire with three questions requiring written answers was distributed to around 80 student

⁴ "Professionalisierung von Lehrkräften für einen reflektierten Umgang mit Ethnizität und Geschlecht in der Grundschule" (Professionalisation of Teachers for a Considered Relationship with Ethnicity and Gender in Primary School)

teachers training to teach mathematics. The students answered the following questions in their own words in running text or bullet points: What does the word ‘heterogeneity’ make you think about in the school context? To what extent have you addressed this topic (in your studies)? To what extent do you feel prepared to deal with heterogeneity in the school context?

In addition, we held group discussions with student teachers⁵ on the topic of ‘heterogeneity’. The group discussions were video recorded and transcribed and evaluated using the documentary method (Bohnsack, 2010). Group discussions can help to identify and analyse the implicit or tacit knowledge of the participants while they talk about a specific topic (e.g. heterogeneity). Between three and seven participants talked about a given topic for around 60 minutes. They have some special experiences in common or commonalities in their history of socialisation, thus sharing a “conjunctive space of experience” (Mannheim, 1982). The momentum of the discussion process, uninterrupted by the researcher, is important to discover these conjunctive spaces of experience, which become visible through “focusing metaphors” in which the group adjusts itself to those specific topics that are most relevant in their common experience (Bohnsack, 2010).

Concerning group discussions, the immanent meaning comprises that stock of knowledge which is made explicit by the participants themselves. This has to be distinguished from knowledge of experience, which is so much taken for granted by the participants that it must not and often cannot be made explicit by themselves. The participants understand each other because they hold common knowledge without any need to explicate it for each other. (Bohnsack, 2010, p.103)

Results

For reasons of space, this article will highlight a few clear results of the qualitative questionnaires as well as extracts from the overall transcript of the group discussions with teacher students.

Qualitative questionnaire

The students gave highly diverse answers to the question “What does the word ‘heterogeneity’ make you think about in the school context?” While one respondent (female, 23 years, fourth semester) answers only with a few key words (“diversity, differentiation, boys and girls, high-achieving, low-achieving”), other students give more complex answers, making clear their awareness of the unbounded, indefinable nature of the concept:

Every class is different (age, background, etc.). Every child therefore has different preconditions for learning, which one should include in the teaching. Differentiation is important (natural differentiation, internal differentiation, external differentiation). The application of learning environments to enable different approaches (with different difficulties/materials, etc.). (female, 21 years, sixth semester).

This student’s response also suggests how she would deal with diversity among children and where she thinks particular emphasis should be placed. On the question of how well prepared the students

⁵ Student teachers in this way includes teachers who have finished their university degree and are now in training for one or two years before receiving their final teaching license and students who want to become a teacher and who still have lessons in university.

feel to deal with heterogeneity in the school context, the majority of responses are sobering. Most of the students complain about a lack of practical experience, stating that although the university education in many respects provides a lot of theory, there are few opportunities to reflect upon the ideas and to try them out in practice. Furthermore, it is criticised that not enough attention is paid to the topic of heterogeneity (overall) in the study course; it is often covered quickly as a “marginal topic”, but not “dealt with in depth” (female, 22 years, fourth semester). On the basis of their experiences in the course of their studies, several of the students differentiate between the different teaching subjects; for example, one female student (21 years, sixth semester) remarks: “I feel better prepared in maths than in German. For example, by the ‘(Maths) Learning Under Conditions of Heterogeneity’ course”.

Extracts from the group discussions

The participants in the group discussions presented below were student teachers in training for primary-school and high school with the subject mathematics. The students are in the middle to last phase of their studies or have finished their university degree and are in training before receiving the final teaching license, meaning that all have already completed placements in schools. During the 60-minute discussion on the topic “What experience do you already have of diversity respectively heterogeneity among children in school and in teaching?” it becomes clear that those facets of heterogeneity that are dominant in the social discourse, such as native language, disability, social status, achievement and migration background also dominate the students’ discussions.

After a group of five female teacher students for primary school have talked about topics such as German as a foreign language and the meaning of academic language, one of the participants turns to the topic of inclusivity and the schooling of children with special educational needs in regular teaching. The following extract is a part of the discussion that develops on this point. The following transcript extract (the original version is in German) shows how the students encounter diversity among children, the challenges and opportunities they see in such diversity, and what experiences they have already gained in dealing with it.

Tina: I also think it’s very important how children gain another view of what is actually normal. A person sitting in a wheel chair is just as normal and can also move around. And that simply this acceptance and tolerance can develop amongst each other. That you simply know how to deal with the person and that it becomes natural from an early age on.

Bianca: I think this is also easier for children. I also always like that about children that they very openly go to other children who are a little bit different. I also think that this should be encouraged but it is also a fact that there are also mentally disabled children. I don’t know if they are also affected by inclusion?

Sarah: Yes.

Bianca: Well, I think that is difficult. Well, I was at a school for children with special needs and sat in on classes and I thought it was really bad.

Sarah: Well, otherwise, in front of the same class plus children with special needs that is not possible, I think. Then also structurally things would have to be changed.

Diana: Well, for all of us it is a challenge to stand in front of a class after finishing our studies. Even if they are top-performing and are all a relatively homogenous group.

Tina: But you will never have this homogeneous group (smiles and shakes her head).

Diana: (nods) Yes. You also don't have that in society. The whole society is extremely heterogeneous.

Extracts from a discussion between four female student teachers for high school shows a similar view on heterogeneity, however with a greater focus to specific problems of the subject mathematics.

Wiebke: The heterogeneity of the teachers also effects the lessons and what the children learn in the end. Therefore, also the teacher's competence of explaining.

Nathalie: (Laughs) Yes, especially in mathematics.

Tamara: And I also think what attitudes the teacher has towards heterogeneity. Meaning, is my attitude that I take everyone along or do I only take the top 50 percent along? Or drastically said, what is my opinion about somebody from a migrant background? That also plays a huge role.

Vera: Yes, that's true.

Wiebke: I mean, at the university this is addressed but how I should really deal with it ... It is nice to say that you need difficult tasks for those who are good and easy ones for those who are not so good at it. Yes, but in the end, all of them take the same test and are marked according to the same grading system.

A third extract is from a group discussion of four female primary-school student teachers which have already been in training at school for a few months. This brief passage of the discussion shows that student teachers who are already teaching in school seem to be more aware that there are differences between the theory they have learned in university courses and the dealing with heterogeneity in real life. Additionally, they critique some aspects of the education in university.

Linda: The only option is individualized teaching, if you want to give every single child the chance to take part in the lesson and to have fun.

Beate: And you have to accomplish this without straining oneself.

Isabel: Exactly! And I would like to know, how that can work (laughs). How can I differentiate without constantly feeling stressed at home?

Linda: Well, when I was at university, I often thought, „Bla, bla, heterogeneity, differentiating. How can this work?“ They [the university teacher educators] always treated this like a big cloud but they never told us specifically. And then, in school, you think, “Well, how does this work?“ And only through experienced teachers you understand “Oh, this is how you can approach this!“ And it doesn't always have to be three different worksheets. A more open form can work as well.

But I think that in university it was something which existed somewhere up high in the universe but which cannot be implemented.

Denise: In my point of view, such opened instruction was seen [in university] as a kind of sanctuary and I always thought, „No. I can't do it. I somehow am not able to do it at all!“ Because it is a Utopia to do this. But in the end, it is somehow possible and [at university] one should have used that as a starting point. Even though we heard keywords like “weekly schedule work”, we never spoke about this in depth. It was more like scratching the surface.

Isabel: Then we received lots of academic texts about this which we were supposed to read. Afterwards I knew as much as beforehand because the time to really understand the content was too short. This was easier with conversations. But I did not have a concrete plan either.

Beate: But now, in the courses for trainee teachers, we recognized that we all open our lessons. We do not carry out frontal teaching as we always imagined. That's why it is helpful to have somebody with experience, who has stood in front of children for many years and who was able to teach this to us in a normal way.

It becomes clear during the group discussions that the students are aware of the problem of how to judge children fairly despite potentially enormous diversity. They principally discuss the questions of how fairness can and should look in the school context, how it can be realised, and which obstacles and problems can exist in its realisation. They argue that differences play a secondary role for children and that “it is easier for children” to accept and tolerate each other because they are “a lot more open in that”. The participating students seem to agree that it is important to develop a broader perspective of what is ‘normal’ as early as possible. At the same time, they consider it to be difficult to hold collective lessons for ‘normal’ children and children with the need for special education, especially when there is only one teacher in class. Furthermore, they are aware that there is a dilemma between the need to differentiate in school and the society being extremely heterogeneous. While in a school context, every child is supposed to receive the best possible support suitable for its own needs, in society, diversity is nearly never considered or discussed.

Perspective

The results collected so far already provide initial insights into student teachers' subjective theories and guiding ideas on heterogeneity in the school context. Further group discussions will be carried out in the near future, and questionnaires distributed. The framework will be expanded to include practising mathematics teachers in different kinds of school in Saxony. Thus, data on teachers' and student teachers' subjective theories on diversity in pupil populations will be available for comparison. Consequently, individual teachers who participated in the group discussion will be selected to receive classroom visits. Through participatory observation we hope to be able to undertake a comparison between the collective opinion emerging in the group discussion and the models of activity that are actually applied by teachers for dealing with diversity. All these data will ultimately serve the development of concepts for events for student teachers with the aim of making them more sensitive to heterogeneity and more prepared to deal with it.

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