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THE IDEOLOGY OF RELEVANCE IN SCHOOL MATHEMATICS

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While (or because) the relevance of mathematics is a pedagogical, political and economic issue for both the practicing teacher and the researcher in mathematics education, we lack a sober discussion of the relevance of mathematics in academia. The normative discourse prevailing in mathematics education research is shown to be ideological and ignorant of critical objections. The main focus, however, lies on the perception of the relevance of mathematics by school students. The analysis of interview data shows that, in the discourse of the students, relevance is reduced to learning, skills and mundane applications. This one-dimensional restriction of the discourse does not only result in a lack of options for a more nuanced identification with mathematics, it is also efficient in obscuring other functions of school mathematics.

THEORIES OF RELEVANCE

The assumption that mathematics education in school is relevant for the life of the learners is not only crucial for the legitimisation of mathematics as a school subject, it also constitutes a basis on which power and resources are given to mathematics educators, be it in schools or research institution. Therefore, it eventually is a condition of possibility for this publication, as my research is financed by a German institution in the light of this assumption. Nevertheless, a critical contestation of this assumption should lie in the interest of anyone who considers research a self-critical endeavour.

In academic discourses, relevance is usually addressed through the discussion of educational goals of the mathematical subject, and different countries cultivated different and yet similar discourses about the relevance of the educational goals of mathematics. In the German case, to which I will confine myself here to provide an example, two contributions from the 1990s have shaped the discourse and also official curricula until today. Both contributions depart from the concept of 'general education' (*Allgemeinbildung*) which, in the German educational tradition, means an intellectual, ethical and aesthetical *Höherbildung*, that is an 'elevated formation', of the individual through experiences with and knowledge of cultural products of universal importance. The line of argument then states that general education is necessary for everyone to live a self-determined

life, and that education in mathematics is a part of that general education. In the first contribution, Heinrich Winter (1995) sees the relevance of mathematics for general education in allowing students to make the experiences (a) to perceive phenomena in the world around us in a mathematical manner, (b) to understand mathematics as a deductively ordered world, and (c) to obtain problem solving competences which are fruitful beyond mathematics. In the second contribution, Hans W. Heymann (1996/2010) discusses the unique contribution of mathematics to the goals of general education which he sees in (a) the preparation for later life and in the promotion of (b) cultural competence, (c) an understanding of the world, (d) critical thinking, (e) the willingness to assume responsibility, (f) communication and co-operation, and (g) in the enhancement of the students' self-esteem.

These normative discourses assume a utopian classroom in which mathematics education can fulfil its idealistic goals. In contrast to that, contemporary school education in mathematics is reported to show activities and provide experiences that serve other social functions. Elsewhere, I have identified (a) the supervision of children, (b) their mathematical qualification, (c) their integration into and the legitimisation of the current social order, (d) their selection for further opportunities in education and occupation, and (e) the projection of societal hopes and fears onto mathematics education as such functions (Kollosche, 2016). This critical discourse provides explanations which are closer to the everyday experiences in the mathematics classroom but stand in conflict with the liberal educational theory represented, for example, by the concept of general education. Within this field, Paul Dowling's (1998) analysis of mathematics textbooks leads to a description of myths, which are established in the mathematics classroom and closely relate to the issue of relevance. He describes the belief that "mathematics can refer to something other than itself" as the "myth of reference", which tends to have totalitarian ambitions, claiming mathematics to refer to each and everything (p. 6). Under the "myth of participation" he understands the belief that mathematics is necessary for "optimizing the mundane activities of its students" (p. 8). Dowling, then, does not only argue that these beliefs are unjustified, but argues that they play a paramount role in the formation of the mathematical subject, the installation of mathematics as a tool of power and the reproduction of social differences. Relevance, here, is at least partly an ideological illusion.

As a consequence, the relevance of school mathematics can be formulated from different and yet unreconciled perspectives. These perspectives can be first of all considered theoretical discourses. However, these discourses have an impact on the way in which mathematics as a

discipline is perceived by school students. Answers to the question “Why is mathematics relevant for me or us?” do not only motivate learning and provide it with an orientation, they also help to make sense of the experiences in the mathematics classroom altogether and to form a relationship to the discipline of mathematics, which might last a whole life-time. Eventually, the answers are political in that they transport a specific narrative which ascribes social importance to mathematics. In order to analyse the formation and the functions of such discourses among school students, this contribution will develop an understanding of the discourses on the relevance of school mathematics as an ideological narrative, before specific student statements recorded in an interview study are interpreted.

RELEVANCE AS IDEOLOGY

Developments in ideology critique (Žižek, 1994a) do not understand ideology as false consciousness which has to be destructed via the confrontation with the material reality of our existence in the Marxian sense. Instead, Slavoj Žižek (1994b) has generalised the concept through a psychoanalytic expansion. In his conception, “the real” is understood as the world we live in in its chaotic complexity which exceeds the capacity of thorough understanding. “Reality”, then, is our cultural representation of that world; but as reality reduces an unintelligible complexity to mental and cultural representations, it necessarily leaves phenomena unexplained. The unexplained becomes problematic as what Žižek, following Jacques Lacan, calls a “symptom”: an anomaly which cannot be explained with our representations, which destroys the tissue of our reality and endangers our whole conception of reality. Ideology, here, represents a narrative as part of our reality, which succeeds both in hiding the symptom and in linking to our desires and fears. For example, does the liberal parole for *liberté*, *égalité* and *fraternité* not correspond with every child’s dream to break free from the protection of her parents and to unite with her equals, and thus –in the form of utopian ideals– give liberalism an esteem which helps covering the traumatic experiences of patronising and injustice in our contemporary liberal societies?

Interestingly, Žižek’s (1994b) conception presents ideology as a necessity of any discourse. Ideology critique, then, does not only consist of the unfolding of the covering nature of a certain narrative. This step might not even be necessary, as often people already know that their actions and thinking is following an illusion. Nevertheless, Žižek points out, these people are acting “as if” this illusion was real. The question of ideology critique therefore is, how the illusion works and why it is attractive. Following Lacan, Žižek eventually argues that ideology is fuelled by the unconscious, by the promise of an unarticulated desire, by the promise of what Lacan calls *jouissance*.

In the case of the philosophical legitimisation of mathematics education discussed in the beginning, the construction of mathematics education through its educational goals is of fundamental importance for the survival of mathematics education as a school discipline and as a research field. Its integrity, however, is endangered by the experiences from the mathematics classroom, especially by the lack of the educational offers envisaged for students by Winter (1995) and Heymann (1996/2010) and by humiliating situations that cannot be justified within the scopes of a liberal theory of education (Kollosche, 2015). The symptomatic character of these experiences of contradiction is evidenced in their absence in the discourse. Just as the symptom is an unintelligible utterance of the real, experiences that contradict any liberal educational ideals are the unintelligible of the classroom experience. Their social relevance cannot be negotiated in any consistent discourse; their pervasiveness can only be met by limiting these experiences of contradiction to a deficient and yet-to-be-developed reality. The goals which justify the educational enterprise in mathematics are positioned in a utopian space which will never be realised. But why would a mathematics educator want to follow this ideological illusion, where is the *jouissance* in that? Assuming that the belief in the importance of mathematics and the possibility of education as *Höherbildung* is what motivated her to –for whatever reason– become a mathematics educator in the first place, and that the preservation of this motivation allows her a further identification with her economically privileged role in society, already a superficial consideration provides a reasonable explanation: The mathematics educator will find any discourse that installs mathematics as the tool for the desired *Höherbildung* attractive and any antagonistic experience threatening. The belief in the relevance of mathematics, therefore, has an ideological function. In the case of the student, however, the motivation might lie differently. How does this difference relate to the relevance ascribed to mathematics?

THE STUDY AND ANALYTIC METHODS

While students often do not enjoy their engagement with mathematics, different studies have shown that a vast majority of students do consider the school subject of mathematics “important” (Kislenko et al., 2007; Kollosche, 2017). Thereby, it has not yet been studied *how* students ascribe relevance to mathematics. However, these acts constitute instances of central importance for the role of mathematics in learning and in the political subjectivation of the learner. Here, student data will be used to reconstruct themes in the construction or destruction of the relevance of mathematics, to understand their ideological nature and to outline their socio-political implications. 23 students from grade 8 to 10 in regular public schools in and around Berlin were interviewed in school rooms

during the school day by master students attending a research seminar at the Universität Potsdam in 2016. While two students went to the same class, all the other students attended different classes in different schools in the German states of Brandenburg and Berlin. The semi-structured interviews focussed widely on the students' relationships to mathematics, and featured the question "Do you believe that your mathematics lessons are or will be important for your life?"

In a thematic analysis (Braun & Clarke, 2006), I identified all statements which referred to the relevance of mathematics, grouped them into themes and interpreted them separately. Shaped by a Foucauldian paradigm (Foucault, 2011), I understand the students' answers as acts of constructing and legitimising a discourse around the subjectivity, that is the development and performance of techniques of the self, with which the students meet the requirements of the mathematics classroom. Following Žižek (1994a) but denying myself a deeper juxtaposition of both theories within the limits of this contribution, I will add Žižek's ideas for a psychoanalytical ideology critique to the Foucauldian discourse analysis in order to be better prepared to explain the detailed mechanisms of this power-knowledge. The leading question of the analysis therefore is: "How do students articulate their subjectivity in the field of discourses on the relevance of mathematics, and how can this articulation be understood from the perspective of an interplay between power and discourse?"

THE VOID OF RELEVANCE

A vast majority of 20 out of the 23 interviewees regard mathematics as personally relevant and associate this relevance to the mastery of mathematical skills. When asked why he stated that mathematics would be "important", Christian (all names changed, all answers translated into English by D. K.) follows a discourse which is very common under the interviewed students:

Christian: What is it important for? Well, generally for later life. You often get in touch with numbers. When you have a profession, you have to be able to calculate. For example, so that they cannot cheat you at the checkout, then you must know a bit of maths. [...] In other professions you also have to do mental maths, like a bus driver – they have to do mental maths as the checkout only tells the price. And the police, in my opinion, they must know what they get, how expensive the fine is and what the change will be.

On a superficial layer of analysis, it is astonishing that Christian associates the relevance of mathematics with learning skills in *elementary mathematics*, such as calculating sums of money, which he left behind in the classroom in primary school. Seemingly aware of this restriction, he adds that "in many professions maths plays an important role", but "not

to the extent of what we are doing". Concerning some contents he "wonder[s] what you need that for in maths, but what must be, must be." This restriction of the relevance of mathematics to elementary skills after the assertion of a general relevance of mathematics appears frequently in the interviews of the students. When it comes to restricting the everyday usefulness of the contents of school mathematics basically to those of primary school, this position is shared by Heymann's (1996/2010) legitimisation of mathematics education. However, it is interesting to note that while the students have made both experiences of relevance (in the past when they covered elementary skills in class) and experiences of irrelevance (in the present when confronted with advanced contents), students nearly consistently stick to the narrative of the general relevance of mathematics for life. In the light of these conflicting experiences, the students could just as well state that mathematics is irrelevant and position the example of elementary mathematics as an exception to that rule.

In Lacan's terminology (Žižek, 1994b), the assumed relevance of mathematics may be considered a master-signifier, a symbol that does not refer to any signified but serves as the basis of an ideological narratives and may be filled with various and often changing meanings, be it mathematics' contribution to general education or its relevance for the individual future. Christian's difficulties and ambiguities in explaining the relevance of mathematics show that, in his discourse, the idea of the relevance of mathematics is empty and does not point at any graspable experience or different discourse. This common speechlessness is best demonstrated by Kai:

Interviewer: Do you believe that your mathematics lessons are or will be important for you?

Kai: Yes, sure.

Interviewer: How?

Kai: Everyday life of course. Also, depending on what job you're doing, but architect, for example, you need very much. And well..., no idea.

Sverker Lundin and Ditte Storck Christensen (2017) refer to Johan Huizinga to understand mathematics education as a play whose "holy seriousness" results in an identification with the game's objectives. Indeed, allying with the discourse which presents mathematics as generally relevant eases the participation in the mathematics education enterprise which students cannot escape anyway. Thus, the empty promise of the relevance of mathematics serves as the ideological patch which on the one hand covers the symptoms of irrelevance and allow the students to enjoy mathematics in the hope of a bright but opaque future.

Admittedly, this future sometimes takes more graspable forms,

occasionally in the form of professional aspirations or present forerunners. But when Olivia, who considers mathematics “indeed relatively important”, or Tim, who thinks that mathematics “will be quite helpful later”, say that they will need mathematics, because they want to become a farmer or a construction engineer respectively, their claim of the relevance of mathematics has somewhat materialised but has not changed its nature: The students explanation stops at that connection between relevance and profession, the relevance still lies in an inapproachable distance and does not connect to anything the students are doing in the classroom.

Two students report of singular experiences of the relevance of mathematics. Daniel uses mathematics when he is “doing constructions” (of what kind, we do not know) with his father and states that “then it is beneficial to know maths well”. Bianca tells:

Bianca: Even if people don't like to hear it: Unfortunately, maths is really important for your later life. Because, just recently, we had this sine function and I thought I would never need it again. Then we were at home and my mum came with a slip and said: “You must calculate that.” And there, I saw precisely that I need it for that. [...] Well, you had the diagonal of a screen and there's that right angle and the other two angles were indicated on a webpage, but not how wide or high this screen was [...]. Fortunately, I could calculate that somehow.

Apart from this episode, Bianca's interview resembles that of Christian. In this episode, the role of mathematics is ambiguous. From the perspective of problem solving, the prediction of width and height of a screen, which only the proportions and the length of the diagonal are known of, is a remarkable intellectual achievement. From a pragmatic perspective, Bianca could as well have found a webpage which provided her with the answer to her mother's question. And of course, Bianca's singular experience only connects one mathematical content with her life, but not all. However, the centrality of this episode in Bianca's account suggests that it prove enough for her to assume the validity of a far more general assumption, namely the relevance of the mathematics she learns at school. It is as if this episode is the unique moment where the empty signifier of relevance and her school practices connect, and this moment fills her fantasy of a meaningful learning with life.

THE MATERIALITY OF RELEVANCE

On a deeper layer of analysis, it is astonishing that Christian associates the relevance of mathematics with learning *skills*. Indeed, *all* the students connect the relevance of mathematics solely with the mastery of mathematical techniques which can be beneficially applied in present of future life. This is even the case with Anna, the only student who expresses an unrestricted denial of the relevance of mathematics:

Interviewer: D'you generally believe that mathematics isn't necessary for your further life?

Anna: No, actually not, as I said, I got my mobile, I can always put everything into it if I have to calculate something or so. No, apart from that, I don't need it.

Interviewer: But, for example, what about situations like this one: You go shopping and on a pullover you have a tag that there is a 30% discount on the original price. Then you would like to know the new price of the pullover if you want to buy it.

Anna: Then, I would go to the shop clerk and ask her for the new price.

Even Anna, who does not admit any relevance of mathematics in spite of her interviewer's intervention, sticks to a discourse that associates the relevance or irrelevance of mathematics with the application of mathematical techniques. This materiality of mathematics education, that is the restriction of its educational scope to the learning and application of techniques, contradicts all normative discourses on the relevance of mathematics education. Interestingly, none of the educational goals expressed by Winter (1995) and –with the preparation for later life– only one of Heymann's (1996/2010) seven goals are associated with mathematics education in the discourses of the students. This means that neither the ideology of relevance that is cultivated in the classroom regards any of these goals as a part of the mathematical experience, nor do students make experiences in these dimensions which have the strength to find expression in their interview statements. Apart from the fact that the absence of any formational goals of mathematics education in the dominant classroom discourses sheds a bad light on the practical effectiveness of the theoretical legitimisation of mathematics education, that absence also limits the explanations with which students can make sense of their school experiences with mathematics and construct their discourses of relevance:

Interviewer: There are also many students who do not like maths at all. What do you believe is the cause of this?

Emma: [...] That you simply do not feel like it, because during exercises you simply think that you won't ever need that again. Because as long as you can calculate a bit, for shopping or so, then this is usually enough. Because none of us wants to study anything with maths later. And that's why it sometimes appears so senseless. And you do not understand why you should do it now, although you know that you actually won't need it ever again.

However, it would be naïve to believe that the mere introduction of alternative goals into the classroom discourse of mathematics education would lead to significant changes in the perceptions and motivation of the students. Instead, the implementation of these goals demands for a

completely different style of teaching mathematics, a style which allows the students to experiences and reflect on the educational goals envisaged. Hitherto, such a teaching of mathematics is not only a yet unrealised project, it is also dubious if this project can be realised at all. Any attempts to implement new forms of teaching would demand enormous efforts by the teachers, and the reports of the students indicate that teachers usually avoid these.

The narrative that mathematics education is about learning skills that are needed in present or future life thus reduces the relevance of mathematics education to the materiality of learning. This narrative is obviously supported by Dowling's (1998) myth of reference, assuming that mathematics will be generally important in any further occupation, and by his myth of participation, assuming that mathematics will be needed in future life. But the 'myth of importance' described here goes beyond the mere insertion of an image of mathematics as a universal and indispensable tool of power. It does not only provide the ideological basis on which the learning of mathematics can be legitimised individually, it also erects the boundaries of the relevance discourse. By cultivating the discourse that the relevance of school mathematics lies in the preparation with mathematical skills needed in a distant and opaque future, the answer to the question for relevance is relocated in a space where it cannot be reached critically. With this indisputable position, it gains a symbolic power, which other, more immediate goals of mathematics education cannot have. It is therefore effective in excluding more immediate goals from the discourse and from classroom practice. Put simply, it is much easier to prophesy that a specific mathematical content will be needed in a distant future than to prove how it promotes cultural competence, an understanding of the world or even critical thinking in the here and now. This is how the materiality of relevance is productive in shaping the discourse.

HIDDEN RELEVANCE

On the last layer of analysis, it is astonishing that Christian associates the relevance of mathematics with *learning*. As discussed elsewhere (Kollosche, 2016), qualification is only one of the social functions in mathematics education that are discussed in research, and it is empirically unclear in how far mathematics education after primary school contributes to the mathematical qualification of learners at all. Of all the other functions identified in mathematics education, only selection is mentioned by the students, and only three out of 23 interviewees raise this topic. When asked what mathematics is needed for, Emma answers:

Emma: [...] And for school you also quite need it, because otherwise you do not achieve your marks and then you fail. So yes, you actually do need it.

Emma, who also believes in the relevance of elementary mathematics, here adds another dimension to the discourse of relevance. Irrelevant to whether the specific knowledge and skills acquired in the mathematics classroom are of any practical use at all, she addresses the relevance of mathematical achievement for a successful school career. While Emma only mentions the role of mathematics in assessment, Vanessa focusses on the ultimate function of such assessment when she states that “you have better job opportunities if you are good in maths”. Patrick points in the same direction when he states that mathematics provides you with the cultural capital, in the sense of Bourdieu (1986), necessary to occupy elite positions in society:

Interviewer: Wait a second! Why would you include it [mathematics] into your timetable at all?

Patrick: Because I think you often need maths for your later career, if you want to become something, well, something big or so. Want to lead something, you would also need maths.

Notwithstanding these statements, the vast majority of interviewees did not at all mention selection in regard to the relevance of mathematics. The fact that the mathematics mark has a function as an indicator of economic success (Maaz, 2006) is either not obvious to the students or avoided as a topic to include in the interview discourse on the relevance of mathematics. Alexandre Pais (2014) argues that the devaluation of low achievers in the selection process is Lacan’s traumatic real, which appears as an unintelligible friction of the educator’s reality and has to be covered by the ideology that mathematics provides emancipatory qualification for all students. Thus, the widely ignorance of the relevance of selection through mathematics may serve as an example of how the classroom discourse limits the issue of relevance to socio-politically unproblematic realm of qualification for the future.

FINAL DISCUSSION

The normative discourse and the students’ discourse on the relevance of mathematics are unable to address the social functions of mathematics education identified in research. However, this failure of the discourses is juxtaposed to their productivity of limiting the perceived relevance of mathematics to a utopian future. In the case of the normative discourse, this future is the ideal mathematics classroom which provides a truly emancipation education; in the case of the students’ discourse, it is the future in which they will profit immensely by the mathematical skills acquired in school. In both cases, the participants are given what Žižek (1989) calls a “forced choice”: In order to enjoy your profession as a teacher or your mandatory learning as a student, you cannot surrender yourself to critical thoughts about the relevance of mathematics but have

to gratefully accept the narrative of the relevance in the future. The students' reports reflect this ambiguity towards the relevance of mathematics, but also document how this ambiguity is in all cases concealed by the experientially empty claim of a 'general importance' of mathematics. In the light of this inner disunity of the learner, it may be a relief to student that she is forced to attend school mathematics –an obligation without which school mathematics might cease to exist:

Interviewer: Would there be maths in your self-made timetable?

Vanessa: Probably yes, because you simply need it for your further life. I believe I would not do maths by myself, and so I would force myself to do it a little.

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