

“AFTER I DO MORE EXERCISE, I WON'T FEEL SCARED ANYMORE” – EXAMPLES OF PERSONAL MEANING FROM HONG KONG

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What kind of meaning do students relate with mathematics education? To answer this question, the concept of personal meaning is developed and integrated in an interplay with context and culture. Personal meaning hereby denotes the personal relevance students relate with a certain action or object. Finally, the concept is illustrated with an example of personal meaning constructed by a 15-year-old student from Hong Kong. Along this example, the relation of personal meaning and (learning) culture is disclosed.

INTRODUCTION

The demand for meaning in the context of mathematics education and education in general has been noted for many years. Hurrelmann stated in the early 1980ies that students are in the need of meaning when dealing with learning contents at school (Hurrelmann, 1983). But what exactly is understood by the term *meaning* when thinking about school education? Do educators and students denote the same concept when using the term? To be more precise: What kinds of meaning are there? And which meaning do students see when dealing with mathematics in school context? To shed some light on the obscurity of this realm, this paper starts with briefly presenting different understandings of *meaning* before the focus is put on the perspective of the students. Then, the concept of *personal meaning* is related to the notions of context and culture. The discussion shows in what way personal experiences and perspectives are important for the student to construct meaning. Finally, examples of personal meaning constructed by a 15-year-old Hong Kong student are presented to illustrate the concept and to show its relations to the (learning) culture the student has been socialised in.

FROM MEANING TO PERSONAL MEANING

Meaning: A blurred concept

A review of the relevant literature shows that very different understandings of *meaning* are used. The notion may refer for instance to the act of leading the schema of an unconscious sensori-motor or mental activity to consciousness (Thom, 1973), to the development of a certain mathematical concept over time (Bartolini-Bussi, 2005), or to the collectively shared understanding and application of mathematical concepts (Biehler, 2005). These kinds of meaning deal primarily with mathematical concepts and develop a theory about its referents.

On the other hand, meaning can also be understood as a condition for students to engage in the action of learning (Alrø, Skovsmose & Valero, 2007), i.e. as an integrated aspect of acting (Lange, 2007) and the educational situation (Skovsmose, 2005), or as the personal relevance an object or action has for a certain student (Vollstedt, 2007). These interpretations move the focus from the meaning of concepts to the meaning of action, i.e. the educational process and the perspective of the students. The term *meaning* is therefore used here in a personal sense (Kilpatrick, Hoyles & Skovsmose, 2005).

Quite important differences between the understandings of *meaning* as described in the last two paragraphs can be detected. Howson therefore points out that

one must distinguish between two different aspects of meaning, namely, those relating to relevance and personal significance (e.g., ‘What is the point of this for me?’) and those referring to the objective sense intended (i.e., signification and referents). (Howson, 2005, p. 18)

To sharpen the terminology used, I will use the more specific terms *personal meaning* when denoting the personal relevance of an object or action for a certain person, and *objective* or *collective meaning* when denoting a collectively shared meaning of an object or action (Vollstedt, 2007; Vollstedt & Vorhölter, 2008 [1]).

Characteristics of personal meaning and its construction

As described in Vollstedt (2007), some assumptions can be made concerning personal meaning. It is characterized by the following traits:

- Personal meaning is subjective and individual. This means that every person constructs his/her own meaning with respect to a certain object or action. As the construction of meaning is not collective but individual, different students who attend the same lesson can also construct different meanings relating to the same object or action.
- The construction of personal meaning is also context bound. Here, context denotes on the one hand the subject context as well as the situation in the classroom. On the other hand, it also embraces the personal context of the students (see below).
- Personal meanings can be reflected on but normally do not have to. This means that the process of the construction of personal meaning can in some parts be dominant in the situation so that one is aware of it (e.g. in an Aha-experience); the meaning enters consciousness. On the other hand, meaning may remain latent and can be constructed implicitly.

The student's perspective

Bearing in mind that there are different understandings of meaning in relation with mathematics education, one has to decide which perspective to put the focus on: collective or personal meaning? This means one has to ask whether mathematical concepts or the students are in the centre of attention.

My dissertation project reported on in this paper (see below) evolves from the context of the Graduate Research Group of Educational Experience and Learner Development located at the University of Hamburg. In this research group we investigate processes of learning and *Bildung* from the learner's perspective. Special attention is paid to the individually experienced tensions resulting from societal or institutional demands on the one hand, and the learner's individual responses being rooted in his/her biography on the other hand. On the one hand, special emphasis is put on the way how students acquire knowledge and skills. On the other hand, research is done about how they develop the ability to come to decisions and to act responsibly in an increasingly complex and difficult world (Graduiertenkolleg Bildungsgangforschung, 2006).

Due to the connection to the field of Educational Experience and Learner Development, the focus of my study lies clearly on the learner's perspective. The study seeks to find out what kinds of personal meanings students construct in the context of mathematics education. Like Lange I therefore want to “look *with* children” (Lange, 2007, p. 271) instead of looking at them.

Personal meaning, context, and culture

Personal meaning cannot be constructed in a vacuum but is related to context. Context is here used as a cover term for both, situational context (i.e. context of the learning situation in terms of topic as well as classroom situation) and personal context. The personal context of a student then may consist of his/her personal traits (i.e. aspects which concern the student's self like his/her self-concept, motivation, or beliefs) and his/her personal background (i.e. aspects which concern the world around the student like his/her socio-economic status, migration background, or surrounding (learning) culture) (Vollstedt & Vorhölter, 2008).

Mercer describes context from the student's perspective in the following way:

What counts as context for learners [...] is *whatever they consider relevant*. Pupils accomplish educational activities by using what they know to make sense of what they are asked to do. As best they can, they create a meaningful context for an activity, and the context they create consists of whatever knowledge they invoke to make sense of the task situation. (Mercer, 1993, pp. 31–32, italics in original)

Therefore the student decides which information and experiences are relevant for him/her to deal with the given task. I interpret Mercer's description in a broad way as not only knowledge but also for instance beliefs, goals or other kinds of personal traits or background may be relevant for the student in a learning situation. These are, however, object to cultural influence as culture has a strong impact on the way how learning takes place in any learning situation (Leung et al., 2006).

This understanding goes along with Mercer, who states that learning in the classroom depends both on culture and context as learning is,

(a) culturally saturated in both its content and structure; and (b) accomplished through dialogue which is heavily dependent on an implicit context constructed by participants from current and past shared experience. (Mercer, 1993, p. 43).

When we take for instance the East Asian and the Western traditions, both, culture and context of a learning situation are very different as they are based on Chinese/Confucian and Greek/Latin/Christian traditions respectively (Leung, 2001). In how far culture also has an impact on the construction of personal meaning will be shown in the following section with the help of an example from Hong Kong.

PERSONAL MEANING CONSTRUCTED BY A HONG KONG STUDENT

To illustrate the concept of personal meaning, I will present some findings from a qualitative study which seeks to find out similarities and differences between the personal meanings constructed by students in two different learning cultures, namely Germany and Hong Kong. I will restrict myself here to Hong Kong data and results.

The study

In total, the study is based on 33 interviews with 15- and 16-year-old students in Germany (form 9 and 10) and Hong Kong (Secondary 2 and 3) [2]. In Germany I interviewed 16 students attending a grammar school; the 17 Hong Kong students attended band one EMI-schools (schools with the highest academic standards and English as medium of instruction [3]). The interviews began with a phase of stimulated recall (Gass & Mackey, 2000) based on a video-sequence of five to ten minutes from the last mathematics lesson the interviewee attended. The student was asked to utter and reflect on his/her thoughts he/she had when having attended the lesson. This was followed by a guided interview about various topics like the student's beliefs about and attitudes towards mathematics (lessons), his/her connotations of mathematics (lessons), or the feelings he/she associates with mathematics (lessons), i.e. personal traits. Aspects of personal background were not explicitly asked for [4]. In average, the interviews lasted for about 35 to 45 minutes. In the style of grounded theory (Strauss & Corbin, 1996), the theory of personal meaning was refined and deepened in the process of data evaluation. Data evaluation itself was a coding process following grounded theory with the aim to construct different types of personal meaning evolving from the data. These types are then reflected on from a cultural perspective.

Personal meanings constructed in the context of mathematics education in Hong Kong

Emma, a 15-year-old girl from Hong Kong, attends a highly selective band one school in which the classes are divided into academic achievement. She is a member of class *Secondary 3C*, which is the class of the top 40 students of her year. Although she attends this class, she explains that she has difficulties with mathematics and shows a low mathematical self-concept (Marsh, 1986). This low self-perceived ability in mathematics, being part of her personal traits (i.e. personal context), is an impor-

tant precondition for the personal meaning she constructs in relation with learning of mathematics at school. The following extract from the interview ([5]) may help to illustrate this point:

- 99 Interviewer: First of all, what comes to your mind when you hear the word *mathematics*?
- 100 Emma: First, at the beginning I feel, I'm afraid of mathematics. Because it is difficult for me to think. Think is the main problem for me. When I saw the mathematics sentence questions, I will feel scared. I think I don't understand, whether I understand that question or not, so that I feel scared. But after I do more exercise, I won't feel scared anymore and I feel I am safe.
- 101 Interviewer: So is it because of the language, the problem is given in or is it because it's something unknown, or do you know why you are scared?
- 102 Emma: I think it's not the language problem. I think is my problem because I think very slow. So I'm afraid I can't catch up with the other classmates.
- 103 Interviewer: But you are in C class and C class is the best, isn't it?
- 104 Emma: It is very difficult for me to go into this class because there is many pressure. There are many students are get high marks. So, there will be against students and students. So I need to study hard.

We can see that Emma comes to her low mathematics self-concept by means of internal and external references (Marsh, 1986). On the one hand she negates that her difficulties in mathematics are due to the fact that the mathematical problems and lessons are given in English (101-102), which is not her first language. The internal comparison of her self-perceived verbal ability with her self-perceived mathematics ability (Marsh, 1986) make her come to this conclusion. She also, on the other hand, compares her abilities in mathematics with those of her classmates (102, 104), i.e. significant others in her frame of reference (Marsh, 1986). Due to the selective process, there are lots of very good students in her class so that it is not astonishing that Emma experiences high pressure when she compares her own achievement with the ones of her classmates. Especially as she mentions that there is quite some competition going on between the students (104).

The reason Emma gives for her difficulties with mathematics is that she has problems to think fast enough (100, 102). Therefore she stresses that actively doing mathematics can help “train us our mind and the logic” (66). Also, practice can help her to overcome her difficulties (100) as well as meet the pressure experienced between the students (104). She also refers to this point in another sequence of the interview in which she explains the importance of good grades with relation to the pressure caused by the *Hong Kong Certificate of Education Examination* (HKCEE):

- 198 Interviewer: How important is it for you to achieve the mark you want to achieve in quizzes, or tests, or examinations, or whatever?

- 199 Emma: Do more exercise. And when you see the questions, you should not feel afraid of them. Just like homework or worksheets, not a quiz or exams. So that we can relax and we won't feel more pressure.
- 200 Interviewer: Is it important for you to get good marks?
- 201 Emma: Yes, because we need to study in form four. And when we study in form five, there is Hong Kong CEE. It is very important because if we got a pass in a Hong Kong CEE we can study in form six and form seven. And if we are not pass in a Hong Kong CEE, maybe we can't study in form six, form seven and so that at that time maybe we need to find a job. But it is very difficult to find a job with form five level because many companies needs a person who got a university level. So the competition is very big.

Emma describes how practice can help to overcome anxiety and pressure as quizzes and exams may lose their threatening power when having done enough exercises beforehand (199). Therefore she is of the opinion that “it is not enough for us to do the school work. We should do more, so we find more practice exercise” (230). Her aim is to “remember all the steps” (230) necessary to solve a question. As a consequence she can relax and does not feel more pressure (199). On the other hand, she explains that the results of the HKCEE are so important for Hong Kong students as their future depends on them (201). This means that Emma reflects here on her future opportunities or foreground (Skovsmose, 2005).

To meet this high pressure and competition, the warm and friendly atmosphere that relates her with the teacher is very important for her:

- 203 Interviewer: Which feelings do you relate with mathematics lessons?
- 204 Emma: Happy.
- 205 Interviewer: Why?
- 206 Emma: Because teacher is our friend and a friend teaches us things and it will be easy to remember a friend's words. So that we will more easily to understand mathematics and the explanation. So I think Ms. Wong's teaching method is good for us.

Describing her teacher as “friend” (206) shows Emma's strong need for relatedness (Ryan & Deci, 2004) with the teacher and its importance for her learning (206). This positive relation is the cause that Emma relates a happy feeling with mathematics lessons (204) in spite of great pressure and competition.

Taken together we can describe Emma as a girl with low mathematical self-concept who suffers from the high pressure experienced in her learning environment. Therefore she fears mathematics and examinations, especially the HKCEE. The situational context as well as personal traits are therefore highly influential for the personal meanings Emma constructs. The *positive atmosphere in the classroom* (resulting from the good relation with the teacher) *opposes high pressure*. In addition, *studying hard is soothing preparation for important exams* for Emma and works against her low mathematical self-concept.

Discussion from a cultural perspective

Emma's personal context as described in the last section can be explained with reference to the culture she was socialised in, i.e. the Chinese (a Confucian Heritage Culture (CHC) (Wong, 2004)). Leung shows that the CHC does have influence on how mathematics is taught in schools because “there exist distinctive features of mathematics education in East Asia and [...] those features are expressions of distinctive underlying cultural values” (Leung, 2001, p. 48). He identifies six features of mathematics education in East Asia and contrasts them with features in Western countries. To provoke discussion, he formulates these features in the form of the following six dichotomies (East Asia vs. West): product (content) vs. process; rote learning vs. meaningful learning; studying hard vs. pleasurable learning; extrinsic vs. intrinsic motivations; whole class teaching vs. individualised learning; and concerning the competence of teachers: subject matter vs. pedagogy (Leung, 2001). Leung, however, stresses the point that

[i]t does not mean that all East Asian societies are on one side of the dichotomies and all Western countries are on the other side. Very often, it is a matter of the relative positions of the two cultures on a continuum between two extremes rather than two incompatible standpoints. (Leung, 2001, p. 38)

Emma is certainly not the only student with a low mathematical self-concept who studies hard and practices as much as possible to pass the HKCEE. This behaviour is, as far as I can judge from observation and data evaluation, somehow typical for Hong Kong students. It seems to be culturally determined and can be related to the three features of East Asian mathematics education that refer to students' behaviour, namely rote learning, studying hard, and extrinsic motivation.

Emma's attitude to practice as many tasks as possible can be explained by the Chinese belief that practice makes perfect (Li, 2006). It is closely linked with the feature of rote learning which Leung describes to be rooted in the East Asian view on the nature of mathematics learning. In East Asia, rote learning or memorization are not negatively connoted but, on the contrary, accepted and necessary steps of learning (Leung, 2001). Also, memorization and understanding are not necessarily separated (as a Western view might presume) but may be intertwined to lead to higher quality outcomes (Dahlin & Watkins, 2000).

Closely linked to the belief that practice makes perfect is the belief that studying hard is necessary to gain deep knowledge of the subject. This belief comes from the East Asian view that learning is necessarily accompanied by hard work (Leung, 2001). How deeply rooted this belief is in China can be deduced from the Chinese characters denoting education: 教育. They consist of different parts which mean 'young people' (lower left part of the first character), 'hard burden' (upper part of the first character), and 'development' (second character). So taken together the characters of 'education' confer the idea that “young people grow and develop under the condition in which

they make every endeavor to tackle tough tasks” (Li, 2006, p. 131). Therefore, diligence and effort are needed to come to a deep level of pleasure and satisfaction as the outcome of study.

Finally, Emma studies hard to prepare herself for the HKCEE, which she has to sit in 2.5 years. Although the HKCEE is still fairly far in her future, it has already quite some power over Emma. This power comes, due to the large population, on the one hand from the serious competition between students for university admission. There is, however, also a historical argument of the big importance of exams in China or Hong Kong respectively. Throughout history, education has been a way for social advancement insofar as examinations had to be taken to be selected for important officer positions (Li, 2006). In addition, examinations are a warrantable source of motivation in the East Asian understanding. As Leung points out, “East Asians believe that, being human, we need some 'push' in our learning” (Leung, 2001, p. 43). Therefore, an optimal level of pressure is helpful to direct students' energy and attention to study and to learn.

From this illustration we can see that culture has an impact on the context of the individual in different ways: culture shapes the identity of mathematics education (see Leung (2001)) and with it the learning situation, and cultural beliefs seem to determine the individual's actions and beliefs about learning.

CONCLUSION

The discussion of personal meaning has shown in what way the personal context is important for constructing personal meaning in the context of mathematics education. It is of special importance that personal meaning may be explained with reference to culture (the Confucian Heritage Culture in Emma's case). Her personal meaning (practising mathematics soothes and prepares for important exams) could be related to the CHC on three levels. Some of her personal traits (being diligent) as well as some of the actions she carries out in line with her personal meaning (working hard, practising as much as possible) seem to be rooted in cultural beliefs which are part of the CHC culture. So – as culture seemingly does matter for the construction of personal meaning – it is at near hand to support Leung, Graf & Lopez-Real, who assume that “the impact of cultural tradition is highly relevant to mathematics learning” (Leung et al., 2006).

NOTES

1. The German term for *personal meaning* we use in our research is *Sinnkonstruktion*. *Objective* or *collective meaning* on the other hand are equivalents of *Bedeutung*.
2. In Hong Kong, compulsory schooling starts with primary school, which lasts for 6 years (*Primary 1* to *Primary 6*). Subsequently students attend up to 7 years of secondary school. After *Secondary 5*, the *Hong Kong Certificate of Education Examination* (HKCEE; similar to GCSE in the United Kingdom) has to be sit.

3. Secondary schools in Hong Kong are divided in band one to three. This division is based on the achievement of their students in the HKCEE. After finishing primary school, Hong Kong students are divided into different groups according to their achievement in relation to the standing of their school. Only high-achieving students are allowed to attend a band one school after primary school.
4. All students come from rather privileged and well-educated background. This can be argued by the kind of school they attend (private band one school/grammar school). For other aspects it was assumed that interviewees would give the information voluntarily or could be asked about it.
5. The transcripts of the interviews are simplified in language in the way that stuttering and break-ups are left out; grammatical mistakes are not corrected but left unchanged. As Emma is very fluent in English, it was not necessary to mark hesitation etc. in the quoted sequences.

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