

BELIEFS: A THEORETICALLY UNNECESSARY CONSTRUCT?

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In this paper I analyze different existing definitions of the term beliefs, focusing on relations between beliefs and knowledge. Through this analysis I note several problems with different types of definitions. In particular, when defining beliefs through a distinction between belief and knowledge systems, this creates an idealized view of knowledge, seen as something more pure (less affective, less episodic, and more logical). In addition, attention is generally not given to from what point of perspective a definition is made; if the distinction between beliefs and knowledge is seen as being either individual/psychological or social. These two perspectives are also sometimes mixed, which results in a messy construct. Based on the performed analysis, a conceptualization of beliefs is suggested.

Key words: belief, definition, individual, knowledge, social

INTRODUCTION

There exists plenty of research in mathematics education focusing on aspects of beliefs, in recent years evident by books covering this specific topic (e.g., Leder, Pehkonen, & Törner, 2002b). However, Thompson (1992) points out that although the topic has been popular in educational research for many years, little attention has been given to theoretical aspects of the concept of beliefs. Specifically for mathematics education, Op't Eynde, De Corte, and Verschaffel (2002) note the same type of lack of theoretical studies about beliefs.

In many studies, the term ‘belief’ is not explicitly defined, but it is assumed that the reader knows what is meant (Thompson, 1992). For some purposes this might suffice, and in general different types of definitions, from informal to extended types, could be suitable depending on the situation (McLeod & McLeod, 2002). In addition, a theoretical perspective can focus on different aspects, for example by being more or less philosophically or psychologically oriented. When Schommer (1994) discusses different types of beliefs as key concerns in the conceptualization of epistemological beliefs, she argues that interesting results, perhaps of a more applied type, can be achieved also without explicit focus on the more philosophical aspects, but that the inclusion of such aspects would improve the conceptualization of beliefs. A philosophical perspective can include what McLeod and McLeod (2002) describe as part of a more elaborate definition, such as relations to nearby concepts. For beliefs, this elaboration could include relations between beliefs, knowledge, and different affective constructs.

When studying beliefs, instead of analyzing and arguing around different types of definitions of beliefs, it seems most common to describe different definitions found in the literature and then choose one of these or create your own for the study in question (if a definition is at all given). Even if it is perhaps impossible to create a general definition that is suitable for all types of research (as noted by Abelson, 1979; McLeod & McLeod, 2002), there is a need to discuss and analyze different types of definitions. In the present paper the focus is on such analyses.

Purpose

As the title of the present paper implies, I am taking a critical perspective regarding the concept of beliefs and suggestions of how this construct can be defined. This critical stance has evolved from informal, personal reflections when having read different types of studies of beliefs, and similarly as Pajares (1992), having noted a certain messiness regarding definitions and properties of beliefs. I have not only noted such messiness when looking at the breadth of different studies, where plenty of different types of definitions or properties are described, but also when trying to analyze the internal coherence of singular articles regarding definitions and properties of beliefs.

The main purpose of the present paper is to dig deeper into these reflections, in order to see what types of problems seem to exist when trying to define beliefs and also if and how these problems can be resolved. In particular, I will suggest a type of reconceptualization of beliefs, emerging from noted problems around (1) the point of perspective taken when defining and describing properties of beliefs, and (2) relationships between beliefs and knowledge.

It is important to note that I am not suggesting that the ideas presented here should be seen as final in some sense, but that they primarily constitute a starting point in my attempts to reconcile with some experienced problematic issues, for continued discussions and reflections and for continued work on a larger research project (see Österholm, *in press*). Also, I am not suggesting that I am presenting an entirely new perspective, regarding the mentioned reconceptualization, but as can be seen by references given throughout the present paper, others have presented similar suggestions, although sometimes done from other perspectives or focusing on somewhat different aspects of beliefs.

Research about beliefs

Historically, the interest in educational research in the study of beliefs seems to come from realizing that a focus on “purely cognitive” factors (in particular, content knowledge) is not sufficient when trying to describe and explain students’ problem solving activities (Pehkonen & Törner, 1996; Schoenfeld, 1983) or teachers’ classroom behavior (Speer, 2005). The relationship between (content) knowledge and beliefs is thus a central aspect. This relationship is also the most commonly referred to when discussing the definition of beliefs, and different views about this

relationship can also be seen as a major reason for experiencing beliefs as a messy construct (Pajares, 1992).

Since there can be different types of knowledge, such as procedural or conceptual, while beliefs are usually formulated as statements, the comparison between knowledge and beliefs can focus on factual, declarative knowledge.

BELIEFS – AS SEEN FROM DIFFERENT POINTS OF PERSPECTIVES

Abelson (1979) describes a cultural dimension of beliefs; that if all members of some type of group have a specific belief, then they might not label it as a belief but as knowledge. This cultural dimension corresponds to what other authors describe as a social property of knowledge (e.g., Op't Eynde et al., 2002; Thompson, 1992); that for something to be seen as knowledge it has to satisfy some type of truth condition – a condition that is negotiated and agreed upon within a community (of practice). Thus, depending on what social community you belong to, you can have different views on what is seen as knowledge and what is seen as belief. From this perspective, when focusing on social aspects, the difference between belief and knowledge can be defined by saying that knowledge fulfills the mentioned social criteria but that beliefs do not, or perhaps *cannot*, since there can exist statements that cannot be evaluated using existing criteria within a certain community.

This relative property of beliefs highlights the importance of taking into account from what perspective a labeling of something as a belief or as knowledge is being done. In addition, there is also the possibility of changing perspective when deciding on the definition of beliefs, from defining beliefs from a social perspective to defining beliefs from an individual perspective. For example, when Leatham defines beliefs he describes the relationship between belief and knowledge by seeing that

there are some things that we “just believe” and other things that we “more than believe – we know.” Those things we “more than believe” we refer to as knowledge and those things we “just believe” we refer to as beliefs. (Leatham, 2006, p. 92)

This type of definition describes the relationship between beliefs and knowledge as a psychological property. A somewhat different defining property of beliefs, but also from the individual perspective, is given by Abelson (1979); that the believer is aware that others may believe differently. This property includes a social dimension but the distinction between beliefs and knowledge is still being done from the individual perspective, and is psychological in nature. From this perspective, when focusing on the individual, the difference between belief and knowledge can be defined by seeing beliefs as something related to uncertainty, either in relation to other parts of an individual's beliefs/knowledge or in relation to what others claim to believe/know.

Sometimes an author describes some defining properties of beliefs that are from an individual perspective and some other properties that are from a social perspective. For example, I have mentioned Abelson (1979) when describing both these

perspectives, and Pehkonen and Pietilä (2003) also include both these perspectives when differentiating between beliefs and knowledge. The simultaneous use of these different perspectives when defining a concept could be a cause for creating a messy construct. However, it is often difficult to decide if all given properties should be seen as part of a homogenous definition or as something that can be inferred from a (sometimes implicit) definition or from empirical results.

From this analysis we can see that a central distinction in the discussion of beliefs and knowledge is from what perspective a definition or description is given, whether these concepts are construed as individual or social. This distinction deals with whether the decision regarding differences between belief and knowledge is located in the individual (i.e., that it is psychological in nature) or if it is located in the social community. Independently of which of these perspectives is used when defining beliefs, there is also another aspect of different perspectives; that different persons can have different views on what is regarded as knowledge and what should be labeled as belief, that is, there is a relative property of beliefs. This property is caused by taking the relationship between beliefs and knowledge as a starting point when defining beliefs and is also based on a general view of knowledge (which has previously not been stated explicitly in the present paper), that knowledge is “not a self-subsistent entity existing in some ideal realm” (Ernest, 1991, p. 48), but that knowledge is seen either as an individual construction (what Ernest labels as subjective knowledge) or as a social construction (what Ernest labels as objective knowledge).

TYPES OF DEFINITIONS OF BELIEFS

Sometimes it can be difficult to analyze some of the definitions and properties of beliefs since authors do not always motivate or describe these defining properties in detail. For example, it is sometimes mentioned, without further explanation, that beliefs can be conscious or subconscious (e.g., Leatham, 2006; Pehkonen & Törner, 1996), but since the concept of consciousness in itself is very complex (e.g., see Velmans, 1991) it is difficult to interpret such a suggested property of beliefs. In particular, the interpretation becomes more difficult if some definition of beliefs has not been given, or if no connection is made between a certain property of beliefs and a given definition.

One way to define beliefs is to focus on the claim that a person believes that (or has the belief that) a certain statement is true. The question of what you mean by such a claim deals with the definition of beliefs. For example, a belief can be seen as a type of knowledge that is “subjective, experience-based, often implicit” (Pehkonen & Pietilä, 2003, p. 2), or as a personal judgment formulated from experiences (Raymond, 1997, p. 552). However, many such definitions seem to be of an informal type (as labeled by McLeod & McLeod, 2002), since they most often do not explicitly describe what is meant by all words used in the definition and how these words/properties create a construct different from nearby concepts.

Another way to define beliefs, or at least to describe some properties of beliefs, is to focus on relationships between different beliefs, and thereby describe characteristic properties of so-called belief systems. Certain differences between belief systems and knowledge systems can then be taken as a characterization of beliefs. In the literature it seems common to refer to Abelson (1979) and Green (1971, as cited in for example Furinghetti & Pehkonen, 2002; Leatham, 2006; Op't Eynde et al., 2002; Pehkonen & Pietilä, 2003; Raymond, 1997) who both have proposed such differences between the two kind of systems. Since references to belief systems seem quite common in the mathematics education literature, I will in the next section analyze the notion of belief system regarding the view of knowledge that is implicitly, and sometimes explicitly, created through the separation of belief and knowledge systems.

While a definition that focuses on a singular belief/statement can be done from both an individual and a social perspective, implicit in the type of definition that focuses on belief systems seems to be a view that such systems are psychological constructs.

Properties of belief systems – creating an idealized view of knowledge

There is no consensus in the research community on the positioning of beliefs on a cognitive-affective scale (Furinghetti & Pehkonen, 2002), but it is sometimes claimed that a difference between belief and knowledge systems is that the former has, or at least has a relatively stronger, affective component (Abelson, 1979; Speer, 2005). However, it is unclear why, for example, a certain belief about mathematics teaching should have a greater affective component than the knowledge of the relationship between the diameter and the circumference of a circle. The situation (or the several situations) when the knowledge about the circle has been dealt with could very well have been strongly loaded with affect, for example from the joy of discovering this relationship or the dislike of having another fact to memorize. Such existing affective components of knowledge are also pointed out by Pajares (1992).

Also, it is seldom explained in detail how or why beliefs should be regarded as ‘more affective’ than knowledge, and when McLeod (1992) describes a framework for the study of affect, it is pointed out that beliefs are not emotional in themselves but that the role of beliefs is one (central) factor when attitudes and emotional reactions to mathematics are formed.

Some claim that belief systems are more episodic in nature than knowledge systems; that beliefs have a closer connection to specific situations or experiences (Abelson, 1979; Speer, 2005). This property seems to lie close to the clustering property described by Green (1971, as cited in Leatham, 2006), which permits the belief system to consist of clusters of beliefs that can be more or less isolated from each other. Leatham (2006) describes this property as a means to explain the contextualization of beliefs and that a person can hold different beliefs that can seem to contradict each other, if these beliefs belong to different clusters. However, learning and thereby knowledge is also always situated and context dependent, “resulting in clusters of situated knowledge” (Op't Eynde et al., 2002, p. 25).

Another suggested difference between belief and knowledge systems is that belief systems are built up using quasi-logical principles while knowledge systems are built up using logical principles (Green, 1971, as cited in Furinghetti & Pehkonen, 2002). For example, it is claimed that relationships between beliefs cannot be logical “since beliefs are arranged according to how the believer sees their connections” and also that “knowledge systems [...] cannot contain contradictions” (Furinghetti & Pehkonen, 2002, p. 44). If a person’s knowledge system is not built up around how this person sees the connections between different components of the system, it seems unclear exactly who or what is creating the structure within the system. In this case knowledge is perhaps not referred to as an individual, psychological construct but seen as a social construct. However, also when seeing knowledge from such a perspective it becomes difficult to reconcile with the statement that knowledge systems cannot contain contradictions, since the history of mathematics includes examples of such contradictions, for example regarding the connection between convergence of series and the limit of the general term (see Leder, Pehkonen, & Törner, 2002a, p. 9). You could explain this by viewing knowledge as something absolute and thus maintaining that knowledge systems cannot be contradictory, by seeing contradictions as stemming from beliefs and not from knowledge.

In summary, regarding the relationships between beliefs and knowledge based on existing suggested properties of belief systems, knowledge is described as less affective, less episodic, and more logical and consistent. These properties create an idealized picture of knowledge, as something pure and not ‘contaminated’ with affect or context.

A PROPOSED CONCEPTUALIZATION

Based on the analysis about different types of definitions of beliefs that can be made from different points of perspectives, I here discuss a conceptualization of beliefs that take into account the criticism that has been put forward. I am not suggesting that this conceptualization is necessarily suitable for all types of studies or situations, but that it is one way to relate to some of the problems that seem to exist when defining and describing beliefs.

Beliefs are seen as being related to uncertainty in some way. From some observer’s perspective a statement can be labeled as a belief for different reasons, but all related to some degree of uncertainty, as described in the following examples.

The first example is that if a statement cannot be included in, or directly related to, some (traditional) existing (scientific) content domains, such as mathematics or pedagogy, it can be labeled as a belief. For example, Ernest (1989) and Schoenfeld (1998), who do not explicitly discuss the definition of beliefs, describe beliefs and knowledge as two separate categories. Included in these categories are *knowledge* about teaching and learning, and *beliefs* about the nature of teaching and learning,

where the former can be included in the domain of pedagogy while the latter perhaps cannot (but perhaps can be included in the domain of philosophy).

A second example of a reason for labeling something as a belief is if a statement contradicts something that is part of some scientific domain. For example, this is done by Szydlik (2000) who discusses content beliefs, which for example include to see the existence of gaps in the real line.

Both these examples are from a social perspective since they relate to domains (i.e., communities of practice), but the property of uncertainty was also mentioned earlier when discussing beliefs defined from an individual perspective. What an individual regards as belief is something that is more uncertain than knowledge. The level of uncertainty refers to how confident a person is that a statement is true. That is, a person has some (implicit) criteria from which it can be decided if something is labeled as belief or knowledge. Törner (2002, p. 80) describes this as measuring certainty on a scale from 0 to 1, where knowledge can be seen as a special case in his framework of beliefs, possessing the certainty degree of 1.

Thus, uncertainty can be seen as a more general aspect of beliefs, regardless of from what perspective the concept is defined, either the social or the individual.

Unlike uncertainty, an aspect that can differ depending on from what perspective beliefs are defined is whether a belief, when compared to knowledge, is seen as a different type of psychological object. From a social perspective it becomes difficult to motivate that beliefs and knowledge refer to such different types of objects since the difference by definition is a social construction. Therefore, when studying the behavior of individual persons (such as teachers' activities in classrooms or students' problem solving activities) the social perspective does not seem suitable when defining beliefs. This has also been highlighted by other authors, for example by arguing that

individuals (for the most part) operate based on knowledge as an individual construct. That is, their actions are guided by what they believe to be true rather than what may actually be true. (Liljedahl, 2008, p. 2)

Others have also suggested that one should focus on the study of conceptions as a whole, which includes what some label as beliefs and knowledge (e.g., Thompson, 1992). However, there could be a reason to study beliefs as defined from an individual perspective, such that beliefs and knowledge from this perspective can be seen as psychologically different types of objects, since experienced differences in the degree of uncertainty could affect behavior differently. Empirical studies seem necessary for deciding if there is a reason to make such a distinction or if it is more reasonable to see the whole of a person's conceptions.

These presented perspectives on beliefs mainly focus on singular statements and not on properties of a system of beliefs compared to a system of knowledge. This type of conceptualization is chosen because of the problems noted about the systemic view

when defining and describing properties of beliefs, in particular the tendency to create an ideal and problematic view of knowledge. Also, the presented perspectives put an emphasis on the person making a claim about relationships between beliefs and knowledge, which some authors also have noted, but have not taken as a more fundamental aspect.

CONCLUSIONS

In the present paper, two main issues have been highlighted through the analysis of existing definitions and descriptions of properties of beliefs:

- (1) The important issue of explicitly focusing on the point of perspective taken when defining and describing properties of beliefs, in particular the difference between taking a social or individual perspective regarding where the difference between belief and knowledge is located.
- (2) The problematic issue of trying to define, in an objective manner and focusing on the individual, the difference between beliefs and knowledge through the separation of belief and knowledge systems.

Due to these issues one can question the necessity of the concept of beliefs, since the difference between beliefs and knowledge is not construed as so absolute, but that the meaning of the concept can be relative with respect to the person labeling something as a belief. In this way, beliefs are not seen as being used for making an important theoretical distinction between belief and knowledge, but more seen as a linguistic tool to signal what type of object/statement is in focus, as seen from the person making a claim about beliefs. Thus, the notions of belief and knowledge may say more about an observer than they do about some important theoretical distinction between two types of entities “within” the person being observed. In this sense, the concept might have lost some of its theoretical importance.

The most central point in my analysis and criticism is directed towards certain contradictory aspects in the existing literature, in particular that a common psychological perspective presented through the distinction between belief and knowledge systems implies a more idealized view of knowledge than what is existent in the social perspective of knowledge. Most often, when aspects of both these perspectives are mentioned, there is no in-depth analysis of possible relationships or contradictions between these aspects. Even when Op’t Eynde et al. (2002) perform a more in-depth analysis of the social perspective, they also claim the existence of a psychological difference between beliefs and knowledge, by mentioning the quasi-logical property of beliefs. I see this use of a mixture of different perspectives as a central cause for the creation of beliefs as a messy construct. Thus, a main topic when defining beliefs is to decide, based on what is being studied, which perspective is the most suitable one when defining beliefs, the social or the individual, and then to be consistent within this one perspective.

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