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Understanding and teaching critical thinking—A new approach

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ABSTRACT

Developing students' critical thinking is a major educational goal in societies around the world. In spite of this, the research community has had serious problems handling this highly prized goal. In reference to these problems, several issues have been discussed, one being the theory issue, where the theoretical development has been pointed out as insufficient, especially theory concerning the learning experience connected with the development of critical thinking. This article introduces the use of the phenomenographic theoretical approach in the field of critical thinking. Taking anempirical study as an illustrative example, the article shows how phenomenographic theory, in apromising way, could be used for understanding concrete expressions ofcritical thinking and designing teaching to develop students' critical thinking.

1. Introduction

Developing students' critical thinking skills is regarded as a highly important educational goal in many societies around the world, as it is seen as promoting such disparate qualities as democracy and personal development (Behar-Horenstein & Niu, 2011; Beyer, 1995; Facione, 2006; Martin, 2005; Tsui, 1998). Despite the importance of critical thinking as an educational goal, the research community has had serious problems in tackling questions related to this topic. In 2004, Kuhn and Dean described critical thinking as one of the "major unsolved problems of pedagogy" (Kuhn & Dean, 2004:269) and over the years there have been several research reviews concluding that we know very little about critical thinking and how to promote it (Brunt, 2005; McMillan, 1987; Tsui, 1998). One of the more recent of these ended by appealing to the readers to "critically analyse the substance of empirical studies on teaching critical thinking" (Behar-Horenstein & Niu, 2011:38).

Against this background, several issues have been debated in the critical-thinking research community. Three of the more prominent ones have been *the definition issue*, *the measuring issue* and the *theory issue*.

The definition issue concerns how to define critical thinking. It has been said that the phenomenon of critical thinking is an elusive and complex one, and that it is futile to attempt capture it in any definition (Brodin, 2007; Tsui, 2007). As a result of this, there has been an extensive debate on what critical thinking really is (Brodin, 2007; Johnson & Hamby, 2015; Mason, 2007; Moore, 2013; Petress, 2004; Phillips & Bond, 2004; Tsui, 1998). One area of debate has concerned what to include and exclude in the definition. Is critical thinking just a set of skills or does it have dispositional aspects as well? Is creativity an important element or not and should emotions, intuition and societal change be brought into the definition (Brodin, 2007; Mason, 2007)? Another important area of debate has been whether critical thinking is subject specific or general (Mason, 2007; Tsui 1998, 2007). McPeck has argued that critical thinking is something subject specific, depending heavily on the subject that is to be critically thought about, and that every subject therefore has to find its own definition (McPeck 1990a, 1990b). Although admitting that the subject matter is involved, the strongest voices in the field, such as Ennis (1987, 1993) and Paul (1992), both long-term authorities in the field (Menssen, 1993), and Facione (1990), leader of the group that developed the APA/Delphi definition, have argued that there are indeed general

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principles of critical thinking that have wide usability and go beyond specific subjects. They have consequently advocated generic definitions of critical thinking. Having failed to reach full closure on any of these questions, the debate still continues to this day.

The measuring issue concerns how critical thinking skills are measured when studied empirically. Over the years, there has been a heavy reliance on standardised multiple-choice tests (Brunt, 2005; McMillan 1987; Norris 1986; Tsui 1998), such as the Cornell Critical Thinking Test and the Watson-Glaser Critical Thinking Appraisal (Behar-Horenstein & Niu, 2011; Tsui, 1998). There are indeed advantages to these kinds of tests. For example, they give clear-cut answers that do not allow for different interpretations when assessed, and so have high inter-rater reliability, and there is also the possibility of quite easily conducting large-scale studies, for example, measuring critical-thinking skills in big cohorts of compulsory school students, thus aiming at generalizability. The heavy reliance on these kinds of test, however, has also been criticised. One criticism has been that these tests can only handle what are called well-structured problems with logical solutions. That is not an unimportant part of critical thinking, but it leaves out what are called ill-structured problems, in short, problems where there is no definite answer and it is up to the individual to make judgements based on reasoning (King & Kitchener, 1994; Kuhn, 1991). Another criticism has been that these tests only measure product (right or wrong x-marks on multiple-choice questions) while neglecting process (how the application of critical-thinking skills led to the answers) (Norris, 1985; Tsui, 1998, 2002; Norris, Leighton, Phillips, 2004; Newmann, 1991; Larsson, In press). Against this background, suggestions have been made to increase the use of alternative measuring methods, such as open-ended essay tasks, when measuring critical thinking empirically (Brunt, 2005; Tsui, 1998). This kind of essay task has been said to make the students reveal their critical-thinking skills, i.e. the essay format forces the students to make their reasoning processes explicit. These kinds of tasks are also better suited to ill-structured problems, because they can be formulated to allow for uncertainty, postponed conclusions etc. (King & Kitchener, 1994, 2004; Kuhn, 1991). However, from a measuring point of view, one problem with such tasks is that they allow the possibility of different interpretations when assessed, making the inter-rater reliability somewhat troublesome. This, coupled with the fact that they are more suited to small-scale studies, because the empirical data for analysis soon becomes voluminous, makes for studies with a lower degree of generalizability.

The theory issue was raised by McMillan, in 1987. In his research review, he observed a lack of theoretical development within the field, especially concerning the "theoretical description of the nature of the learning experience" in connection to the development of critical thinking (McMillan, 1987:14). Over the years, there have been some attempts to meet his criticism. Kuhn is one researcher who has connected her studies to theories from a cognitive development tradition (Kuhn & Dean, 2004; Kuhn, 1991, 1999). In short, her view rests on an assumption that an individual's skill in thinking critically rests on that individual's mental models on a meta-level, the level where models are selected and their use is monitored (Kuhn & Dean, 2004). To become more qualified in critical thinking, a person has to change her/his mental models to more advanced ones. This could be, for example, a change in the mental model of causality, from a co-occurrence causality model to a multivariable model of causality. Kuhn affirms that this change is dependent both on maturity and on learning experiences. In designing learning experiences that promote this kind of change, it is important not to focus merely on the direct performance level, for example describing *what* a multivariable model of causality is and *how* to use it. Instead the learning experience should be directed towards the mental models on a meta-level. For example, with regard to the causality models, the learning experience should be designed to focus on *why* the multivariable model of causality is preferable and why the other model is less effective, so that the multivariable model becomes the preferred choice for the individual (Kuhn & Dean, 2004). Another pair of researchers who have connected their studies on critical thinking to a cognitive development tradition are King and Kitchener (King & Kitchener, 1994, 2004). Though close to Kuhn, King and Kitchener focus purely on the individual's assumptions about knowledge and how knowledge is acquired, and link this to an individual's ability to think critically. In their model, there are seven different hierarchically ordered views of knowledge, linked to seven hierarchically ordered skills in thinking critically, where only the two most advanced views of knowledge actually allow for critical thinking. According to King and Kitchener, a change in one's view of knowledge (and consequently critical thinking) is due to both maturity and learning experiences. In order to create learning experiences that facilitate more advanced views of knowledge, King and Kitchener propose that the experience should be designed to challenge the individual's current view of knowledge. If this is successfully done, the individual becomes aware of the inadequacy of his/her current view of knowledge and over time changes his/her view to a more advanced one. This change concurrently makes his/her critical thinking more complex (King & Kitchener, 1994).

Though attempts, such as the ones mentioned above, have been made to give a theoretical description of learning experiences connected to the development of critical thinking, many studies (Sendag & Ferhan Odabasi, 2009; Tsui, 2002; Wheeler & Collins, 2003; Chowning, Griswold, Kovarik, & Collins, 2012; Fung, 2014) still lack a clear-cut and thoroughly developed theory to describe changes in critical thinking due to different types of learning experiences. On the whole, McMillan's observation from three decades ago still holds true.

Using an empirical study as an illustrative example, this article focuses on the theory issue. The article introduces phenomenography (Marton & Booth, 1997; Marton, 1981) as a new approach in the field, with a theory that can be used both to understand manifestations of critical thinking and, building on such understandings, to describe and explain learning experiences that can enhance critical thinking among students. In this way, the article aims to contribute to theoretical development within the field and to suggest an alternative approach, rooted in the phenomenological and hermeneutical traditions, to those approaches that have been tried so far (Sandberg, 1996). Grounded in interpretative traditions, the phenomenographic approach uses qualitative methods to obtain data for its analysis. In the study presented in this article, open-ended essay tasks were used. As such, the article also indirectly addresses the measuring issue, showing how these kinds of essay tasks could be used and so gives one alternative to the predominant usage of standardised multiple-choice tests within the field.

In the article, the phenomenographic approach and its conceptual framework will be developed alongside the empirical study and the implications of the results.

2. The empirical study

2.1. Aim

The study I will take as my point of departure revolves around lower secondary-school students solving an essay task designed to elicit critical thinking about the philosopher Robert Nozick's views of justice.

Within the phenomenographic approach it is an axiom that there is only a limited number of distinctly different ways in which people are capable of understanding, seeing or experiencing any specific phenomenon they meet (Marton & Booth, 1997). Those different ways of understanding a phenomenon are logically related and as a rule they can also, in an educational setting, be hierarchically ordered in relation to a norm or an educational goal (Marton & Booth, 1997). If the phenomenon consists of a task, like the one on Nozick's views on justice, that calls for critical thinking, then according to this assumption, there can only be a limited number of hierarchically ordered different ways of understanding the task among people at a collective level. Furthermore phenomenography makes the assumption that an ability to act in a certain way in relation to a phenomenon is delimited by a certain way of understanding that specific phenomenon (Marton & Booth, 1997; Marton, 1996; Marton, Runesson, Tsui, 2004). This means that each of the different ways of understanding a particular phenomenon delimits a specific way of acting in relation to it. If the phenomenon consists of a task that calls for critical thinking it could then be said that each of the different ways of understanding the task delimits a specific way of handling it, or more precisely, a specific type of critical thinking in relation to the task. In the light of the hierarchical order among the different ways of understanding such a task, it can also be said that a more powerful way of understanding delimits a more powerful type of critical thinking in relation to the task. Similarly, a less powerful way of understanding the task delimits a less powerful type of critical thinking in relation to the task.

With this as a background, the aim of the study was:

- To educe and describe the different hierarchically ordered ways of understanding the task and the types of critical thinking they delimit.
- To use the findings from the first aim to discuss how to improve students critical thinking using phenomenographic learning and teaching theory.

2.2. Method

2.2.1. Definition of critical thinking

As stated in the introduction, there has been a great deal of debate on how to conceptualise critical thinking. This study was designed to connect to Robert Ennis's generic definition of critical thinking (Ennis, 1987, 1993). This decision was based on three factors. Firstly, the article argues for a use of phenomenography at a general level when conducting research and designing teaching on critical thinking, using the presented study, with its particular content, only as an example of how to use the approach. Such an intent makes the generic property of the Ennis definition suiTable Secondly, the Ennis definition is one of the most recognised definitions of critical thinking in the field, and therefore connecting the study to this definition links the study to the overall body of work within the field (Masson, 2007; Menssen, 1993; Moore, 2013). Thirdly, most other well-established definitions within the field are generic in nature, for example, the Rickard Paul definition (1992) and the APA/Delphi definition (Facione, 1990), the latter having been formulated by 46 of the USA's and Canada's leading critical-thinking experts.

Ennis defines critical thinking as "reasonable reflective thinking focused on deciding what to believe or do". It is indeed a very dense definition and Ennis makes more than 150 different specifications on what this definition actually means (Ennis, 1987). However, Ennis also makes an abridgment consisting of only 10 specifications (Ennis, 1993). This study was designed to be in reasonable accordance with 4 of the specifications in the abridgment, namely a person's ability to:

1. Identify conclusions, reasons, and assumptions.
2. Judge the quality of an argument, including the acceptability of its reasons, assumptions, and evidence.
3. Develop and defend a position on an issue.
4. Draw conclusions when warranted, but with caution (Ennis, 1993:180).

2.2.2. The task

The task began with the students reading a text introducing some of Robert Nozick's thoughts on justice (see Appendix A). Based on this text the students were then asked to scrutinize Nozick's standpoints. In this they were urged to reason about strengths and weaknesses in his way of arguing for his standpoints and to explain why they saw a strength as a strength and a weakness as a weakness.

2.2.3. Task design

Several considerations were made when designing the task. For example, the text, as well as the wording of the actual task, were designed to be age-appropriate. Moreover, the task was created to be in reasonable accordance with the four specifications from the Ennis definition. The task was also formulated as an essay task, giving access to the student's reasoning process and so making it possible to analyse from a phenomenographic point of view (Newmann, 1991; Norris et al., 2004; Norris, 1985; Tsui, 1998, 2002; Larsson, In press). Finally, on a continuum between well-structured and ill-structured problems, the task was designed to be close to

the ill-structured end of the continuum (King & Kitchener, 1994; Kuhn, 1991).

2.2.4. Participants

The students participating in the study were aged 15–16 and were in their last year in the Swedish compulsory school. There was a total of 19 participants (labelled S1-S19), 11 girls and 8 boys: 6, 8 and 5 of them had respectively the lowest, medium and highest grades in civics; and they came from 3 different schools. The number of students participating was decided upon using empirical saturation, i.e. new students were added until there was no more relevant variation within in the targeted group. In order to provide a theoretical sample of a broader population, the composition of the students group was based on a desire to have a variation in sex, prior achievement and school attended (Ojo & Booth, 2009). Because the task relied heavily on reading and writing ability, students who had recently immigrated to Sweden and students with dyslexia were excluded from participating.

2.2.5. Implementation

The empirical study was implemented in such a way that each student worked alone on separate occasions, without any time limit, to solve the task. Each student wrote down their response to the task in a word file on a computer that was blocked for internet access. There were no other tools available to solve the task except for a dictionary and pencil and paper if the student wanted to make notes. While the student solved the task, I sat in an adjoining room and from time to time I looked in to check that everything was alright.

2.2.6. Empirical analysis

To derive the different ways in which the students understood the task about Robert Nozick's views on justice a phenomenographic analysis of the students' written answers was made (Sandberg, 1994). The possibility of doing this rests on the theoretical assumption mentioned above, namely that the act − i.e. the answer or, so to say, the critical thinking in relation to the task − is delimited by a certain way of understanding the task (Marton & Booth, 1997; Marton et al., 2004; Marton, 1996). In other words, the different answers to a task reflect the limited number of ways of understanding the task. The analysis set out to discover these different ways of understanding the task, to group them together in a category system of logically related hierarchically ordered ways of understanding and to present them in what, in phenomenographic terms, is called an outcome space (Marton & Booth, 1997). At a global level, the key question in deriving the categories was: "For the student to arrive at this answer, how would he or she have understood the task?" (Marton & Säljö 1997 [1984]; Svensson 1997 [1984]). The analysis in itself involves an iterative process of reading the essay-answers repeatedly, interpreting and reinterpreting, looking at similarities and differences, grouping and re-grouping them in order to finally put what emerges as the same understanding of the task in the same group (Booth & Ingerman, 2002; Marton & Booth, 1997; Sandberg, 1994). As this is an interpretive process, the results are not seen as incontrovertible, but should provide a fair and well-founded picture of the different ways of understanding the task represented in the empirical data (Booth & Ingerman, 2002).

2.3. Empirical results

From the data analysis, an outcome space was established with an internal structure that can be illustrated as in Fig. 1. In total, five different ways of understanding the task were found, ranging from what are here labelled A to E, each of which leads to a particular type of critical thinking, also labelled A to E, where E is more complex than D, D is more complex than C, and so on, to the least complex, A.

To give a better understanding of the outcome space, I will now turn to a more detailed description of the five different ways of understanding the task, linking them to empirical extracts from the students' answers, i.e. a certain type of critical thinking.

To be able to do this, it is first necessary to make some further theoretical distinctions.

From a phenomenographic point of view, the most important characteristics of a specific way of understanding a phenomenon relate to what is called the internal horizon (Marton & Booth, 1997). The internal horizon is constituted of the components or parts of the phenomenon that are being discerned and how these components are organized (Marton & Booth, 1997). Thus a certain way of understanding a phenomenon is constituted of a whole of discerned components and their internal organization. In view of the hierarchical structure of the category system, this ordinarily means that a more complex way of understanding the phenomenon consists of a whole of more relevant discerned components with a higher degree of internal organization, in relation to an educational norm, usually equivalent to the scientifically established norm of understanding, for the phenomenon in question. Similarly, a less complex way of understanding the phenomenon is seen as a whole with fewer relevant components discerned and with a less integrated organization in relation to the norm (Marton & Booth, 1997).

In line with these theoretical claims, the analysis to derive the different ways of understanding the Nozick task targeted the internal horizon of a way of understanding and ordered its constituents hierarchically according to a norm. This means that each different way of understanding the task is described in terms of a whole of discerned components and their organization. This also means that a more complex way of understanding the task consists of a whole of more relevant discerned components with a higher degree of internal organization in relation to the norm, as compared to a less complex way of understanding the task. Each specific way of understanding the task also delimits a certain type of critical thinking, made explicit in the empirical extracts from which the specific understanding was educed. In the case of this study, the preferred norm was found among the 19 students participating and equates to the way of understanding the task that delimits the most elaborate critical thinking in relation to the task within this group of students. It should be noticed that using the participating students as a standard for establishing the norm could mean that there

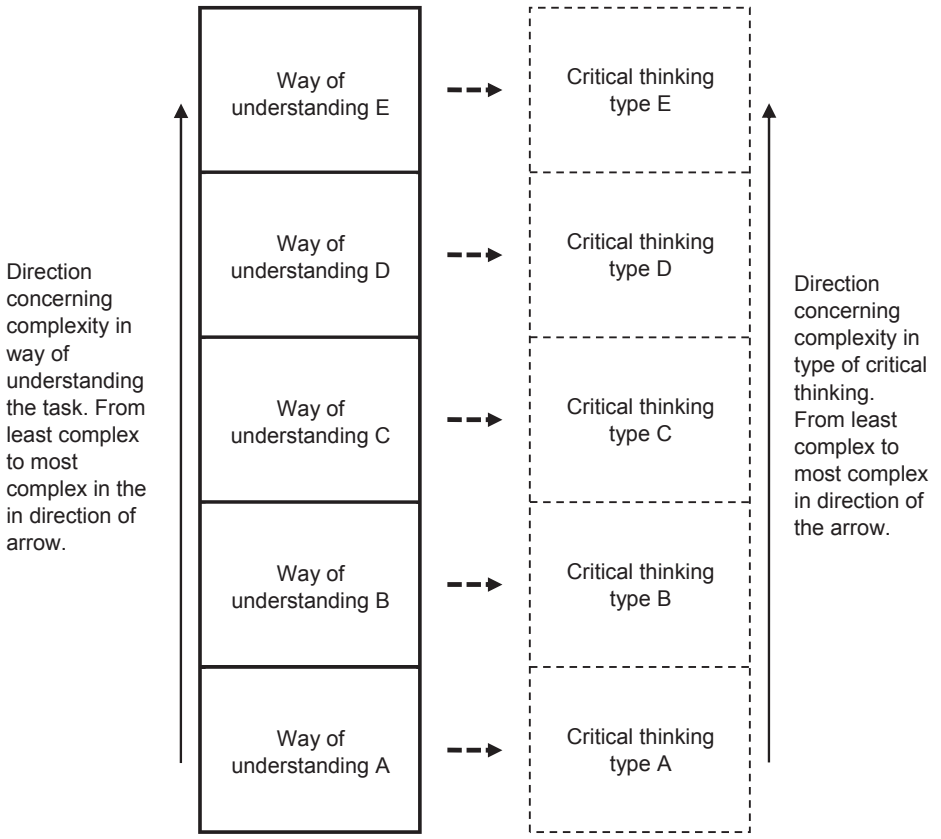

Fig. 1. Illustration of the internal structure of the outcome space concerning the task about Robert Nozick's view on justice. To accentuate that it is the way of understanding the task that delimits the type of critical thinking in relation to the task, the different types of critical thinking are shown in dotted outlines.

might be other more advanced ways of understanding the task (F, G and so on) to be found, for instance, if older age groups had been included in the study. As indicated above, this way of establishing the norm is not the most common one within phenomenography. However, it was used due to the fact that there is no pre-established, undisputed scientific norm regarding how the Nozick task is to be understood.

What now follows is a description of each different way of understanding the task, starting with the least complex way of understanding the task, i.e. Way of understanding A. Each way of understanding is described in terms of its components, and for details on these, see Table 1.

Way of understanding A

In Way of understanding A, the task is understood as one of describing some of Nozick's standpoints on justice. The central components are here limited to the *standpoint* component and the *describing* component. A typical student answer, i.e. the type of critical thinking from which this way of understanding was derived, looked like this:

> "Robert Nozick's argument is that if we don't let all individuals fight for their own welfare, then individuals will not make an effort and live on others instead. According to him, it's not fair if you're not allowed to keep what you worked for (for example, if the state takes your property)." (S4)[1]

Way of understanding B

In way of understanding B, the task is understood as one of scrutinizing one or more of Nozick's standpoints by using one's own values or standpoints.

In comparison to Way of understanding A, this represents a significant shift in the quality of the understanding of the task from simply describing standpoints to in fact scrutinizing them. If it is linked to the definition of critical thinking used in the study, one could even say that this shift in understanding between A and B marks the borderline between a way of understanding the task that allows no actual critical thinking and a way of understanding the task that does allow for some basic kind of critical thinking and not just passive description. The central components in Way of understanding B are limited to the *standpoint* component, the *scrutinizing* component and the *value* component. A typical answer, i.e. the type of critical thinking from which this way of understanding was

[1] This empirical extract, and those presented below, have been translated from Swedish to English by the author. An effort has been made to stay as close to the original texts as possible. For distribution of individuals across categories, see Appendix B.

Table 1
Summarized illustration of the different ways of understanding the task concerning Robert Nozick's view on justice, complemented with derived educationally critical differences (ecds). The different ways of understanding are hierarchically ordered with regard to the internal horizon. "Way of understanding E" is the most complex way of experiencing the task. "Way of understanding A" is the least complex. The italic heading points to the most significant characteristic of the specific way of understanding in relation to the others.

Way of Understanding E *"To scrutinize by drawing attention to an inner contradiction between two of Nozick's standpoints"* The discernment of direct standpoints of Nozick's view in line with the spirit of Nozick's standpoints (*standpoint component*). The discernment of the main objective of the task as one of scrutinizing one/some of Nozick's standpoints (*scrutinizing component*). The discernment of personal values/standpoints in relation to one/some of Nozick's standpoints and offering opinions on it/them based on personal values/standpoints (*value component*). The discernment that a specific standpoint may have broader implications for society/groups/individuals (in addition to those directly treated in the text), if society were organized according to Nozick's standpoints (*broader implication component*). Regarding such a specific broader implication, the discernment that this broader implication can be explained by argument and conclusion (*argument/conclusion component*). The discernment that (at least) two of Nozick's standpoints may be set against one another and that there may therefore be an internal contradiction in Nozick's reasoning (*contradiction component*).
Educationally critical differences (ecds): the contradiction component
Way of Understanding D "*To scrutinize by conclusion and argument regarding a broader implication of some of Nozick's standpoints*" The discernment of direct standpoints of Nozick's view in line with the spirit of Nozick's standpoints (*standpoint component*). The discernment of the main objective of the task as one of scrutinizing one/some of Nozick's standpoints (*scrutinizing component*). The discernment of personal values/standpoints in relation to one/some of Nozick's standpoints and offering opinions on it/them based on personal values/standpoints (*value component*). The discernment that a specific standpoint may have broader implications for society/groups/individuals (in addition to those directly treated in the text), if society were organized according to Nozick's standpoints (*broader implication component*). Regarding such a specific broader implication, the discernment that this broader implication can be explained by argument and conclusion (*argument/conclusion component*).
Educationally critical differences (ecds): the argument/conclusion component
Way of Understanding C "*To scrutinize by paying attention to one broader implication of one of Nozick's standpoints*" The discernment of direct standpoints of Nozick's view in line with the spirit of Nozick's standpoints (*standpoint component*). The discernment of the main objective of the task as one of scrutinizing one/some of Nozick's standpoints (*scrutinizing component*). The discernment of personal values/standpoints in relation to one/some of Nozick's standpoints and offering opinions on it/them based on personal values/standpoints (*value component*). The discernment that a specific standpoint may have broader implications for society/groups/individuals (in addition to those directly treated in the text), if society were organized according to Nozick's standpoints (*broader implication component*).
Educationally critical differences (ecds): the broader implication component
Way of Understanding B "*To scrutinize one/some of Nozicḱs standpoints by using onés own values/standpoints*" The discernment of direct standpoints of Nozick's view in line with the spirit of Nozick's standpoints (*standpoint component*). The discernment of the main objective of the task as one of scrutinizing one/some of Nozick's standpoints (*scrutinizing component*). The discernment of personal values/standpoints in relation to one/some of Nozick's standpoints and offering opinions on it/them based on personal values/standpoints (*value component*).
Educationally critical differences (ecds): the scrutinizing component and the value component
Way of Understanding A *"To describe some of Nozick's standpoints"* The discernment of direct standpoints of Nozick's view in line with the spirit of Nozick's standpoints (*standpoint component*). The discernment of the main objective of the task as one of describing some of Nozick's standpoints (*describing component*).

derived, looked like this:

> "The strength in Robert Nozick's argumentation is the right to own things and the right to life. I think it's a strength because it's important to be able to have a life of your own and the right to own what you legally bought, etc. I think the weakness in his argumentation is that the state must never take taxes from the rich and give to the poor. I think it's a weakness because the rich hardly need as much money as they have so why not help someone who does not have it so good." (S8)

Way of understanding C

Way of understanding C shows the same kind of understanding as the previous one (B) but makes one further distinction within understanding the scrutinizing part of the task. This distinction is characterised by an understanding that opens up for examining one broader implication, other than the ones expressed in the text on Nozick (see Appendix A), of one of Nozick's standpoints. In addition to discerning the same components as Way of understanding B, Way of understanding C then also discerns one additional component delimited as the *broader implication* component. A typical answer from which this way of understanding was derived manifested critical thinking connected to all four components of the understanding. The extract below is a part of such an answer. The underlined segment in the answer shows where the broader implication component was derived from.

> "Nozick's strength is that if you own something then it's yours and nobody can take it away from you, which of course makes it better for those who already have a lot. That he thinks it should be safe for everyone is also good. On the other hand he forgets

everything else – how fair is it to be born rich and be able to live a good life without any effort while others are struggling and never succeed?" (S5)

Way of understanding D

Way of understanding D encompasses the same basic understanding as the previous way of understanding. But, in addition, Way of understanding D makes even more distinctions within understanding the scrutinizing part of the task, adding to the possibility of paying attention to one broader implication of one of Nozick's standpoints, providing an opening for also explaining and drawing conclusions around such an implication. Apart from discerning the same components as Way of understanding C, Way of understanding D then also discerns one additional component delimited as the *argument/conclusion* component. A typical answer from which this way of understanding was derived manifested critical thinking connected to all five components of the understanding. The extract below is a part of such an answer. The underlined segment in the answer shows where the argument/conclusion component was derived from.

"… his idea that the State only exists to give people security so they won't be afraid of someone stealing from them, does not include anything that is related to income support, assistance with standard of living, health-care, or the like/…/However, he forgets something very important – democracy. When people do not have food in their stomachs, they will not cope with engaging in the democratic and political process, and so democracy will fall. When your primary occupation is to take care of your children and find bread for tomorrow, there will be few who have the strength to vote or to get involved in party politics. That's what I find to be the weakest with Robert Nozick's arguments." (S3)

Way of understanding E

Way of understanding E, the most complex way of understanding found within the student group, is characterised by the same understanding as Way of understanding D, but adds yet another distinction within understanding the scrutinizing part of the task. This distinction revolves around opening up for examining (at least two of) Nozick's standpoints in relation to each other by looking for the possibility that there may be a contradiction between them. This distinction also poses a conceivable reorganisation of the way of discerning Nozick's standpoints compared to all the previous ways of understanding the task (D-A). In the previous ways of understanding, there is a linear organization of the standpoints, where each standpoint is discerned as individual and discrete elements. In Way of understanding E, Nozick's standpoints are instead (also) discerned as an integrated whole, where the standpoints can be checked against each other to test their internal congruence. Besides discerning the same components as Way of understanding D, Way of understanding E then also discerns one additional component delimited as the *contradiction* component. A typical answer from which this way of understanding was derived manifested critical thinking connected to all six components of the understanding. The extract below is an example of such an answer showing only the part of the answer from which the contradiction component was derived.

"Robert thinks that it doesn't matter how much each of us owns, it's how they got it, i.e. if they purchased it legally, then it's fair. But he also says that everyone's got a right to life. But a life of extreme poverty is almost considered as no life. I think in this argumentation I can see a weakness in that he contradicts himself." (S10)

3. Using the empirical results together with phenomenographic learning and teaching theory

Next I turn to a discussion on how the above phenomenographic empirical results can be used together with phenomenographic learning and teaching theory in educational situations to, in some respects, improve critical-thinking skills among students.

Phenomenography views learning as a change in a person's way of understanding a specific phenomenon (Marton & Booth, 1997). In an educational setting, this is usually viewed as a change in a person's way of understanding the phenomenon in the direction of, or preferably in accordance with, the educational norm of understanding the phenomenon (Marton & Booth, 1997). *What* is to be learned builds on the hierarchically ordered ways of understanding a specific phenomenon and targets the differences between the various ways of understanding the phenomenon with the aim of obtaining access to what are called educationally critical differences or ecds (Marton & Booth, 1997). Each ecd is equivalent to a certain component and emerges at the intersection points between the different ways of understanding the phenomenon and against the background of the norm. More specifically, this means that an ecd emerges when two successive ways of understanding in the hierarchy are compared with each other. The ecd, or possibly the ecds, are determined and delimited by what is discerned in the more complex way of understanding and is missing in the less complex one and at the same time is a necessary condition to understand the phenomenon in line with the norm. When a deduction is made throughout the category system in order to find the ecds, you finally end up with a set of ecds, i.e. components. These ecds are what it is critical for a person who initially understands the phenomenon in the least complex way to discern in order to understand the phenomenon in accordance with the norm (Marton & Booth, 1997). If we apply this reasoning to the outcome space of the Nozick task, the ecds are: the *scrutinizing* component, the *value* component, the *broader implication* component, the *argument/conclusion* component and the *contradiction* component (see Table 1).

If we now know the phenomenographic view on learning and the notions of educational norm and ecds, how then can a teacher give a person the opportunity to discern the ecds in relation to a norm of a certain phenomenon in an educational setting? According to the phenomenographic viewpoint, this can be done by using a set of different patterns of variation, the most important ones being called contrast and separation (Lo & Marton, 2012; Lo, 2012; Marton et al., 2004). The idea behind the pattern of variation called contrast is that a person will only be able to discern a particular ecd if they can at the same time discern what the ecd is *not*.

Phenomenography says that a dimension of variation must be opened up in the teaching situation where the ecd constitutes one of at least two contrasting values within that dimension. Through a contrasting comparison between the ecd and the other value or values, it becomes possible to discern the specific distinctions of the ecd. Implicitly and simultaneously, it also becomes possible to discern both the distinctions of the other value or values that are brought into the dimension and the dimension in itself (Lo & Marton, 2012; Lo, 2012; Marton & Pang, 2006; Marton et al., 2004). Thus, in cases where several ecds could be said to belong to the same dimension of variation, all of them become possible to discern at the same time in the teaching situation (Lo, 2012). This is because they should all be brought in as contrasting values in the same dimension of variation.

The idea of the pattern of variation separation is built on two basic assumptions. Firstly, if a specific ecd of a phenomenon is to be made discernible in a teaching situation, it must be separated from the phenomenon itself through the pattern of variation contrast. Secondly, when this happens, everything else concerning the phenomenon must be kept invariant or closed. In a teaching situation, this means that the ecds for the particular phenomenon belonging to the same dimension of variation are treated at the same time through the pattern of variation contrast, while ecds belonging to other dimensions of variation are kept invariant by their dimensions of variation being kept closed. As a final remark, it is also important to be aware that although the two patterns − contrast and separation − are analytically separable, they are created and occur simultaneously in an educational situation (Lo & Marton, 2012; Lo, 2012; Marton & Pang, 2006; Marton et al., 2004).

Going back to the Nozick task, let's see how the five ecds could be made possible to discern in an educational setting, i.e. giving the students an opportunity to improve their way of understanding the task, and in doing so, improving their critical thinking in relation to it.

When phenomenography describes a teaching sequence in which the ecds for a phenomenon are made discernible, it normally follows a certain logic, meaning that if one ecd can be assumed to be the base for another, the former is presented before the latter. If this line of reasoning is followed in the case of the task, it could be argued that discerning the scrutinizing component is considered a base for discerning the other four ecds. This is because they are all different discernments of how to scrutinize Nozick's standpoints and if one is to be able to make these different discernments, one first has to discern that the task is about scrutinizing, and not, for example, describing or reading out loud. It follows from this argument that the first ecd to be addressed in the suggested teaching sequence is the scrutinizing component.

So how then do we go about giving the student the opportunity to discern this crucial component? The core of this component can be said to revolve around ways of handling one of Nozick's standpoints, where discernment of the scrutinizing component is characterised by handling the standpoint by scrutinizing it. To give the students the opportunity to discern this component, it could be separated from its original task by opening a dimension of variation concerning [ways of handling one of Nozick's standpoints] with one value consisting of the ecd [to scrutinize one of Nozick's standpoints] and the contrasting value consisting of, for example, [to describe one of Nozick's standpoints]. In an actual teaching situation, the opening of this dimension could be carried out by letting the students experience two different texts, one where a specific standpoint is described and one where the same standpoint is scrutinized. The emphasis in such a teaching situation should be to clarify the differences between scrutinizing a standpoint and describing a standpoint. The object of this is to specify, with the help of contrast, what distinguishes the scrutinizing component so it can be discerned by the students. As supposed above, it is crucial that both the chosen example texts are directed towards the same standpoint, so the separation does not become unclear by opening up a parallel dimension of variation concerning [Nozick's standpoints].

If we now have given the students the opportunity to discern the base-component how do we continue with the other ecds? As indicated above, it is possible to claim that the four remaining ecds all have one common core: they are all different types of scrutinizing one of Nozick's standpoints (or two standpoints, in the case of the contradiction component). One way of offering the students the opportunity to discern all four of these critical differences, in terms of different types of scrutinizing, is for the teacher to open up the dimension of variation [ways to scrutinize one/two of Nozick's standpoints] with the four different scrutinizing types as contrasting values within that dimension. In an actual teaching situation, this could be done in several ways. One way is to let the four different types of scrutinizing contrast with each other by means of comparing four different answers (to the task), each characterised by one of the four types. The emphasis of the comparison should be directed towards the unique distinction for each type of scrutinizing. Further, it is important that the presented answers concerning the value component, the broader implication component and the argument/conclusion component all are directed towards one of the two standpoints that are a part of the presented answer for the contradiction component. This is in order to minimize the risk of blurring the separation opening up a dimension of variation concerning [Nozick's standpoints].

When it comes to these four particular ecds, the opening of the dimension [ways of scrutinizing one/two of Nozick's standpoints] is most likely not enough to allow the students to fully discern them. The teacher also has to address the organizational differences between the contradiction component (standpoint seen as an integrated whole containing the potential for scrutinizing the internal congruence of the standpoints) and the other three components (standpoint seen as linear and separated into parts, limiting the scrutinizing to one standpoint at the time). This could be done by the teacher opening up a dimension of variation in [ways of organizing Nozick's standpoints] with the contrasting values [Nozick's standpoints organized as integrated whole] and [Nozick's standpoint organized as linear separate parts]. In an actual teaching situation, this could be done by choosing, for example, four of Nozick's standpoints and organizing them against each other as an integrated whole. It is crucial that it is made clear that this way of organizing the standpoints is what distinguishes, and is a prerequisite for, the type of scrutiny that characterizes the contradiction component. This can then be contrasted in relation to an example where the same four standpoints are organized as linear and individual parts. As with the example concerning the "integrated whole" way of organizing, it is of equal importance that it is made evident that this way of organizing Nozick's standpoints distinguishes the three other types of scrutinizing, and limits them to being

directed towards just one standpoint at a time. To avoid opening a dimension of variation concerning [Nozick's standpoints], making the separation fuzzy, it is important to underline that the same four standpoints should be used in both of the contrasting examples.

We have now seen an example of a full teaching sequence where all of the ecds for the Nozick task are afforded to the students to discern. In other words, we have seen how phenomenographic results could be used together with phenomenographic learning and teaching theory to make it possible for the students to understand the task in line with the norm, i.e. in this case the most complex way found in the empirical data. As the most complex way of understanding the task delimits the most complex critical thinking in relation to the task, this also means that the students, by this sequence, would be given an opportunity to develop the most complex type of critical thinking in relation to the task.

This being said, this possibility of improving the students' critical thinking has to be seen as quite narrow, as the improvement is only in relation to the Nozick task. Phenomenography, however, does offer an opportunity to go beyond this limitation and use the empirical results from the Nozick task in a wider context of improving the students' critical thinking.

In this regard, let us first take a look at the phenomenographic notion about the possibility of general characteristics in the different content-specific ways of understanding a phenomenon. This notion rests on the assumption that if the content-specific ways of understanding a phenomenon are deprived of its specific content, there could be more general characteristics that might appear as components in ways of understanding another phenomenon of the same kind, or be generalised across several different phenomena of the same kind (Dahlgren, 1997[1984]; Wenestam, 1980). With this notion as a backbone, the scrutinizing component from the Nozick task can be taken as an illustrative example. The core of the content-specific scrutinizing component as it appears in the task could be articulated as 'discerning that one of Nozick's standpoints should be scrutinized'. If it is then content-deprived, losing its "Nozickness", it could be articulated as 'discerning that a standpoint should be scrutinized'. As such, it ought to be generalisable to other similar content consisting of one or more standpoints, preferably within the subject of civics.

If we continue, using this reasoning together with phenomenographic learning and teaching theory, the content-deprived scrutinizing component can be introduced to a new content consisting of one or more standpoints and again be made content-specific and discernible for students in relation to this new content by using the patterns of variation, contrast and separation. This could be done in the same manner as in the example I used above about how the scrutinizing component could be made discernible in relation to its original task. The only difference is that the content would now be something other then Nozick's standpoints, for instance some political party's standpoints on some issue. The dimension of variation that is opened in such a potential teaching situation could then be described in terms of [ways of handling one of the political party X's standpoints on the issue Z] with one value being the, now once more content-specific, scrutinizing component [to scrutinize one of the political party X's standpoints on issue Z] and the contrasting value being [to describe one of the political party X's standpoints on issue Z].

Without going any further, this kind of manoeuvre could be carried out for every ecd from the Nozick task, making each of them discernible in relation to new content consisting of one or more standpoints. In this way, the empirically derived ecds from the Nozick task could be used in an educational situation to give students the opportunity to improve their critical thinking in a wider sense.

4. Concluding remarks

The article has focused on what has been called the theory issue. It has introduced the phenomenographic approach to the critical thinking scene and shown how this approach can be used as a strong theoretical frame both for understanding differences in manifestations of critical thinking and, based on such an understanding, designing learning experiences to develop students' critical-thinking skills. As such, the article provides an alternative to the (scarce) theoretical framing that has been tried so far. In relation to the approaches used by Kuhn and by King and Kitchener, phenomenography offers an alternative to their cognitive developmental tradition, by bringing in the experiential tradition, with roots in phenomenology and hermeneutics. Most importantly, phenomenography offers a teaching theory to go along with the learning theory, something that is more or less absent in Kuhn's, as well as King and Kitchener's, theoretical framing (King & Kitchener, 1994, 2004; Kuhn & Dean, 2004; Kuhn, 1991, 1999). Their perspective focuses on a theoretical description of *the learning,* while not giving any clear-cut and detailed theoretical description of the teaching that makes that learning possible. For example, Kuhn (Kuhn & Dean 2004) does not give any real theoretical description of the teaching in relation to changing students' mental model for causality to a more complex one with regard to the *why* feature. She only describes the learning (in theoretical terms) that needs to take place for such a change, i.e. the shifting of mental models. Phenomenography can, on the other hand, by means of, for instance, the theory about patterns of variation and how they should be used in teaching, present a teaching theory to go along with the learning theory. In this way, phenomenography does not simply provide another approach, but offers a distinctly new theoretical aspect to the field, which has a substantial bearing on what McMillan has asked for, i.e. a "theoretical description of the nature of the learning experience" that would help to develop critical thinking (McMillan, 1987:14). From a more general perspective, the article, through its use of phenomenography, addresses the overall lack of theory within the field and so makes a valuable contribution to the development of this crucial area.

Though the article has shown how phenomenography could act as a solid and cohesive theoretical frame for understanding and teaching critical thinking, it is important to notice that the study the article uses to introduce the phenomenographic approach is just *an example* of how the approach can be used. Should phenomenography be used in relation to other types of contents, subjects or problems, or if another definition of critical thinking is to be used, appropriate adjustments must be made. And, as stated earlier, when it comes to the ecds and the teaching sequences emanating from the Nozick task in the example study, they are, when stripped of their Nozickness, to some extent applicable to other contents and subjects where one or more standpoints are to be scrutinized. However, there is no theoretical ground to go further than that.

In sum, the article confirms that phenomenography seems to provide a feasible way to grapple with the theory issue and gives a

strong foundation for developing the theoretical aspects of understanding and teaching critical thinking. Even so, to more thoroughly examine the feasibility of using phenomenography, further exploration of the approach within this domain of research is necessary. This can be done in several ways. One of the studies which most urgently needs to be conducted is to test the teaching sequences suggested above in real classroom situations and evaluate their success. This would presumably be best carried out with a researcher leading and evaluating the project, and teachers (who would receive instruction in phenomenographic theory) conducting the actual teaching sequences. Other projects to test the feasibility of the phenomenographic approach could aim at finding ecds emanating from other types of contents, subjects and problems, and design, test and evaluate teaching sequences based on these investigations. Such efforts could be made in the action-research inspired learning study practice, which has evolved within the phenomenographic tradition (Pang & Ki 2016; Pang & Lo 2012; Pang & Marton 2003). In this kind of research, one or more researchers work together with a group of teachers to develop a specified skill among a group of students using phenomenographic theory as a base.

As cited at the beginning of the article, Kuhn and Dean described critical thinking as one of the "major unsolved problems of pedagogy" (2004:269). It is not reasonable to think that one single research endeavour or one specific theoretical approach could solve this problem. This article, however, argues that the phenomenographic approach could be one path worth further exploring on such a quest.

Appendix A. Text on Robert Nozick

Robert Nozick

In his book "Anarchy, State and Utopia", the philosopher Robert Nozick writes that we always have the right to keep what we acquired legally. If everybody originally acquired their property in a just way − for example, by inheritance, gift, purchase or exchange − then the distribution that arises in a society is also fair.

According to Nozick, a state may never go in and redistribute by taxing the rich and giving to those who are worse off. It is unfair, even if it were true that a small group owns everything and the majority are starving.

The state should only guarantee that people can live safely and in security, and that they are not subjected to violence or anyone trying to steal their property. Nozick calls such a state the minimal state.

By far the most important rights a man has, according to Nozick, is the right to property and the right to life. The state may never restrict these rights. Then, what the allocation of resources looks like in practice is irrelevant from an equity point of view, that is, as long as everyone has acquired what they own in a just way. On the other hand, if someone acquired their property incorrectly − for example, by threats or theft − it must be corrected, no matter how far back in time the error was made.

(The text is a modified version of a text from the book Hedengren U. (2002). Dilemma − right and wrong, ethics and moral] by Uriel Hedengren. Stockholm: Natur & Kultur, 2002.)

Appendix B. Distribution of individuals across categories

Way of understanding A: S1, S10, S14, S19
Way of understanding B: S3, S6, S7, S11, S13
Way of understanding C: S5
Way of understanding D: S2, S8, S9, S12, S15, S17, S18
Way of understanding E: S4
Not categorised: S16 (due to absence of answer)

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