Phenomenography

Origin

Phenomenography is a research specialisation with its roots in a set of studies of learning among university students carried out at the University of Göteborg, Sweden, in the early 1970s. The point of departure for these studies was one of the simplest observations that can be made about learning, namely that some people are better at learning than others. This straightforward observation led to the first question which was to be investigated empirically:

1. What does it *mean*, that some people are better at learning than others?

Which in its turn led to the second question:

2. *Why* are some people better at learning than others?

There was an ambition from the very start to take as little for granted as possible. Learning was studied under comparatively natural conditions and the aim was to describe it through the eyes of the learner. The studies were conducted by holding individual sessions in which a student was asked to read a text which was either taken from a textbook or had that character. The students were informed that after reading the text they were going to discuss their understanding of it with the experimenter. Thus, after completing their reading, the students were duly interviewed about what they understood the text to have been about. Sometimes more specific details were also taken up. In addition, they were asked to give as full an account of the text as possible. After that, the interview continued with questions about their experience of the situation and they were specifically asked how they had gone about learning the text.

All the interviews were tape-recorded and subsequently transcribed verbatim. On scrutinising the transcripts of the students' accounts of how they had understood and remembered the text as a whole, a limited number of distinctively different ways of understanding what the text was about could be identified. Furthermore, these different ways of understanding the text were seen to be in logical relationship to one another - of inclusion, or exclusion, for instance. Each of the different understandings was described very carefully, to bring out its special characteristics in relation to the others, thus

forming a set of what came to be called categories of description. By drawing on the logical relationships found between the different ways of understanding the text, a hierarchy was established between categories of description. Such an hierarchically ordered set of categories is called the outcome space. The outcome space thus depicted the different ways in which the text had been understood; by referring to this outcome space the categories of description could be compared with one another to judge how appropriate, in relation to specified criteria, was the understanding they represented. This line of reasoning applies, of course, not only to the understanding of the text as a whole but also to the various topics dealt with in the text.

The outcome space provided us with an instrument for characterising - in qualitative terms - how well learners succeed with their learning task. We had thus arrived at a way of answering the question, "What does it mean that some people are better at learning than others?" (Marton, Hounsell, Entwistle, 1984).

The characterisation of the qualitative differences in the outcome of learning was based on the students' accounts of their understanding and remembering of the text as a whole or of certain parts of it. When the transcripts of the students' accounts of how they had experienced the situation and of the way in which they had gone about the learning task were analysed, again, some striking differences were found. For some of the students the text they were reading was transparent, in a manner of speaking, in that they were focusing on what the text referred to; they were trying to understand what it was about. Other students - who recounted experiencing the situation such that they were expected to recall the text after reading it - focused on the text as such, trying to move it into their heads, as it were. The former way of relating to the learning situation was called the deep approach and the latter the surface approach. It was found that the deep approach was closely associated with "higher" categories of outcome (i.e. better understanding of the text) while the surface approach was associated with "lower" categories of outcome (i.e. more shallow understanding of the text). There was thus a strong relationship between the way in which the students understood the content of learning (the text) on the one hand and the way in which they experienced the learning situation (and their own act of learning), on the other. The two aspects of learning, the content aspect and the act aspect, are, of course, two aspects of the same whole.

Thus the second question posed at the outset of this research enterprise could be answered, at least in part. "Why are some people better at learning than others?" Because people differ in their approach to learning tasks (Marton et al., 1984).

Further research demonstrated that the relationship between approaches to learning on the one hand and the qualities of the outcomes of learning on the other is invariant across forms of learning other than learning by reading, even if the specific natures of both the approaches and the outcomes vary both with the type of learning activity - for example, essay writing (Hounsell, 1984), listening to lectures (Hodgson, 1984), problem solving (Laurillard, 1984) - and with the specific content.

At the focus of this first set of studies was the set of different understandings of some specific content which learners developed in a certain situation; sense was made of these in terms of differences in the approaches the learners adopted to the specific learning task - i.e. in terms of differences in their way of experiencing the specific situation. The second step in developing the phenomenographic research orientation was to shift the focus of interest away from that which emerges in a specific situation and towards the learners' preconceived ideas about the phenomena dealt with in the specific situations. The way in which children understand numbers, for instance, is of vital importance for the way in which they deal with arithmetic problems (Neuman, 1987; Marton & Neuman, 1990); the way in which students understand matter is of vital importance as far as their understanding of chemical reaction is concerned (Renström et al 1990) and so on. Detailed knowledge of the ways in which learners understand the central phenomena, concepts and principles within a domain prior to study is believed to be critical for developing their understanding of the central phenomena, concepts and principles, and hence for their mastery of the domain (Bowden et al, 1992).

That branch of development of phenomenography dealt with the content aspect of learning. The act aspect of learning was also considered in that, similarly, learners' conceptions of what learning actually is are crucial for the way in which they experience the act of learning, and thus for what approach they adopt in relation to specific learning tasks (Säljö, 1982; Marton, Dall'Alba, Beaty, 1992).

The recurring principle in all the investigations quoted here is: whatever phenomenon or situation people encounter, we can identify a limited number of qualitatively different and logically interrelated ways in which the phenomenon or the situation is experienced or understood. Naturally enough, in subsequent studies this principle was found to be

applicable to phenomena and situations well outside the educational context in which the above initial studies, described above, had been carried out. Theman, (1983) explored conceptions of political power, Wenestam (1984) investigated ideas of death and Marton, Fensham and Chaiklin, (1992) studied Nobel laureates' views of scientific intuition, for instance.

From some empirical studies of learning in higher education phenomenography thus evolved as a research specialisation aimed at "describing conceptions of the world around us" (Marton, 1981). This research specialisation will now be characterised in terms of its object of research on the one hand and in terms of the methods used when studying this research object, on the other.

Object of research Phenomenography is the empirical study of the differing ways in which people experience, perceive, apprehend, understand, conceptualise various phenomena in and aspects of the world around us. The words experience, perceive ... etc., are used interchangeably. The point is not to deny that there are differences in what these terms refer to, but to suggest that the limited number of ways in which a certain phenomenon appears to us can be found, for instance, regardless whether they are embedded in immediate experience of the phenomenon or in reflected thought about the same phenomenon. The different ways in which a phenomenon can be experienced, perceived, apprehended, understood, conceptualised etc., according to our way of describing them, are thus independent of the differences between experience, perception, apprehension, understanding, conceptualisation etc.

This point can be illustrated by an example taken from a piece of phenomenographic research. One of the ways in which young children experience numbers is as what Neuman (1987) calls "finger-numbers". According to her, children frequently "lay" the numbers 1 to 10 on their fingers, calling one of the little fingers (usually on the left hand) "1", the ring-finger "2" and so on. Numbers larger than 5 are then understood as 5+ some fingers. In carrying out simple arithmetic tasks children try to keep "the undivided 5" together. Hence when solving problems like 2+7=? they reverse the addends and transform the problem to 7+2=?, where 7 is "undivided 5"+2, and the problem as a whole becomes (5+2)+2=?

What, then, is a conception of something - or a way of experiencing something? (Here, it is noted, the two expressions are being used interchangeably.) It is not a mental representation or a cognitive structure. It is a way of being aware of something. One

might be aware of 7 when one perceives it as 5+2 when one looks at one's hands (or as 6+1 or 4+3), it might be an immediate experience of the number 7 or it might be the result of reflection, or there are still other possibilities. In all cases, however, 7 is seen as a sum of two parts, 5 and 2 (or 6 and 1, or 4 and 3). Awareness is a relation between subject and object. Furthermore, when something is the object of attention it is always seen, or thought about or whatever, in some way, by somebody. We simply cannot deal with an object without experiencing or conceptualising it in some way. In this sense subject and object are not independent, but they form a unity; there is a relation between them which can be called their internal relation. Subject and object are what they are in relation to each other. Following from this, a way of experiencing or understanding a phenomenon says as much about the experienced, understood phenomenon as it says about the experiencing, understanding subject.

Asplund, Marton & Halász (1992), studying the qualitatively different ways in which secondary school students understood one of Franz Kafka´s short stories, argued that their work not only illuminated how young people make sense of literary texts, but was in fact a contribution to research on the interpretation of Kafka's work. In a similar way Lybeck, Marton, Strömdahl & Tullberg (1988) argued that they have made a contribution to the characterisation of "the mole-concept" in Chemistry through their study of secondary school students' differing understanding of that concept.

The nature of experience

An experience or a conception of a phenomenon - the internal relation between subject and object - is a way of delimiting an object from its context and relating it to the same or other contexts and it is a way of delimiting component parts of the phenomenon and relating them to each other and to the whole (Svensson, 1984). The delimitation from and relating to a context is the external horizon of the phenomenon. The delimitation and relating of parts is the internal horizon of the phenomenon. The external and the internal horizons together make up the structural aspect of the experience. There is a corresponding referential aspect in the meaning inherent in the experience. Let us consider an example taken from Neuman's (1987) work, where the relation between the structural and the referential aspects of two different ways of understanding numbers is illustrated through the description of a change from one to the other. A seven years old,

just started at school, solved the problem "If you have two kronor (crowns) and you get seven more - how much money have you then altogether?" in the following way.

He starts off with a so called counting-on procedure saying "2 ... 3, 4 ...".The idea is of course to add 7 units of which "3" is the first, "4" is the second and so on. As he does not use any keeping track procedure for he could not possibly know when he has uttered exactly seven number words. He simply can not hear "the seven-ness" of seven. Now, what in actual fact happens is that he pauses upon saying "7" and then says "8,9" and declares that the result is 9 (the full sequence reads as follows: "2 ... 3, 4, 5, 6, 7 ... 8, 9). An interpretation - in our view highly reasonable - is that although this little boy is trying to add seven units to two to begin with, when he says "7" he realises all of a sudden that this "7" can be seen as the last unit in the addend "7" if only "7" is placed as the first addend, instead of seeing the same unit as being some way through the second addend.

We can see how the structure of the sum as experienced changes from "1,2... 3,4,5,6,7,8,9" to "1,2,3,4,5,6,7, ... 8,9". Here it is internal structure of the sum that changes. (No obvious change in the external horizon can be noticed. The little boy is probably delimiting this problem from the situation at large and relates it to other number problems). Corresponding to the change in the structural aspect of the experience there is a corresponding change in its referential aspect . The meaning of each number changes, the meaning of "1" and "2" changes from being the first and second unit in 2 to being the first and second unit in 7. The meaning of "3", "4" and so on change from being the first, second and later corresponding units in 7 to being the third, fourth and so on units in 7. The meaning of "8" and "9" changes from being the last two units in 7 to being the two units in 2.

The structural changes cannot come about without the changes in meaning. Nor can changes in meaning come about without changes in structure. The structural and the referential aspects thus dialectically constitute each other. Neither is prior to the other.

Hierarchy of capabilities

The different ways of experiencing a certain phenomenon, characterised by corresponding categories of description, represent different capabilities for dealing with (or understanding) that phenomenon. As some ways of experiencing the phenomenon

are more efficient than others in relation to some given criterion we can establish a hierarchy of categories of description. It is better to have developed the idea of addition's commutativity and realise that 2+7=7+2, as in the above example, than not to have developed it. To see immediately that 2 and 7 are simply two parts of 9, their order being immaterial, is an even more efficient way of understanding numbers and number relations from the point of view of developing arithmetic skills. In this view, then, it is the way of understanding those phenomena which given skills have to handle and knowledge is about, which is the most critical aspect of skills and knowledge.

Awareness

A certain way of understanding something is a way of being aware of it. Awareness is seen as a person's total experience of the world at a given point in time. Following Gurwitsch (1964), awareness is not seen in terms of the dichotomy aware/unaware or conscious/subconscious, but as being characterised by an infinitely differentiated figure-ground structure. Certain things or aspects are in the foreground, they are explicit, thematized. Other things are in the background they are implicit, unthematized. There is, however, no dichotomy between two classes of things or aspects but rather a more or less continuous variation.

When we are dealing with a mathematical problem we are presumably aware of the quantities involved, the relations between them and the operations we may need to carry out. More vaguely, we are presumably aware of different parts of mathematics in general; it is through our previous mathematical experience that we make sense of the problem.

At the same time we are aware of things which are not immediately relevant to the problem but surround it in space and time. There is the experience of the situation of the world outside this situation, of what happened before we embarked upon the problem and of what is going to happen afterwards. The external horizon of the situation extends in space and time indefinitely. In this sense we are aware of everything all the time. But we are surely not aware of everything in the same way. Every situation has its own relevance structure. The world is seen from the point of view of that specific situation. At the same time the situation is seen through all of our experiences of the world. We are aware of everything all the time and we are aware of everything differently all the

time. In a phenomenographic study we are exploring the different ways in which we can be aware of a certain phenomenon or situation. We want to find out the differences in the structure of awareness and the corresponding meaning of the phenomenon or situation.

Methods

Collecting data

It was already mentioned above, in the section on the origin of phenomenography, that the dominant method for collecting data has been the individual interview. How something is experienced can of course be expressed in many different ways. Not least, the way in which a person acts expresses how thing appear to them; in accordance with this, there are phenomenographic studies where group interviews, observations, drawings, written responses, and historical documents have been used as the main source of information. On the collective level, we could also examine artefacts - historically or comparatively, for example - from the point of view of the different ways of understanding the world around us that are embedded in those artefacts (Marton, 1984). A piece of equipment for programmed learning from the late 1960s, for instance, might tell us a great deal about the view of learning embedded in that equipment.

In spite of the variety of ways of collecting data, the preferred method is the individual interview. The reason for this has to do with what has been said about the object of research above, and especially about the structure of awareness. The more we can make things which are unthematized and implicit into objects of reflection, and hence thematized and explicit, the more fully do we explore awareness. There is interesting parallel here to the phenomenological method as described by Edmund Husserl.

Phenomenology too makes human experience its research object. It is however a philosophical method, an enterprise in the first person singular. It is the philosophers themselves who reflect on their way of experiencing the world, or rather specific phenomena in the world. It is not introspection, they are not trying to look into themselves, they are looking at the world, but they are trying to step out of "the natural attitude", in which one's way of experiencing the world is taken for granted. By "bending back" one's awareness - in a manner of speaking - its focus becomes one's way of experiencing something.

It is a similar shift that the phenomenographic interview is trying to bring about in the person who is the subject of the interview. As phenomenography is empirical research, the researcher (interviewer) is not studying his or her own awareness and reflection, but that of their subjects. The interview has to be carried out as a dialogue, it should facilitate the thematization of aspects of the subject's experience not previously thematized. The experiences, understandings, are jointly constituted by interviewer and interviewee. These experiences, understandings, are neither there prior to the interview, ready to be "read off", nor are they only situational social constructions. They are aspects of the subject's awareness that change from being unreflected to being reflected. This type of interview should not have too many questions made up in advance, and nor should there be too many details determined in advance. Most questions follow from what the subject says. The point is to establish the phenomenon as experienced and to explore its different aspects jointly and as fully as possible. The starting question may aim directly at the general phenomenon such as, for instance, when asking the subject after some general discussion, "What do you mean by learning, by the way?" Alternatively, we could ask the subject to come up with instances of the general phenomenon, asking for example, "Can you tell me about something you have learned?" Most often, however, a concrete case makes up the point of departure: a text to be read, a well known situation to be discussed, or a problem to be solved. The experimenter then tries to encourage the subjects to reflect on the text, the situation or the problem, and often also on their way of dealing with it.

The interview thus aims at making that which has been unthematized into the object of focal awareness. This is often an irreversible process. This kind of research interview thus comes very close to a pedagogical situation.

Analysis

As was pointed out above, in the course of the interviews the participants in the research are invited to reflect on their experience of the phenomena dealt with. They are supposed to adopt an attitude which is similar to that of the philosophers who exercise the Husserlian method of phenomenological research. When the interviews have been transcribed verbatim and the analysis has begun it is the researcher who is supposed to bracket preconceived ideas: instead of judging to what extent the responses reflect an understanding of the phenomenon in question which is similar to their own they are

supposed to focus on similarities and differences between the ways in which the phenomenon appears to the participants.

As the same participant may express more than one way of understanding the phenomenon, the individual is not the unit of analysis. The borders between the individuals are temporarily abandoned, as it were. The transcripts originating from the different individual interviews together make up undivided - and usually quite extensive - data to be analysed. The first way of reducing the data is to distinguish between what is immediately relevant from the point of view of expressing a way of experiencing the phenomenon in question and that which is not. (Such decisions may, of course, be reconsidered subsequently in the course of the continued course of analysis). It might sometimes be found that different topics or phenomena have been dealt with in the interviews. In that case the data have to be organised according to topic or phenomenon to begin with and the analysis has to be carried out for each topic or phenomenon, one at a time. The next step is to identify distinct ways of understanding (or experiencing) the phenomenon. There are two mechanisms through which a certain understanding appears. One is based on similarities: when we find that two expressions which are different at the word level reflect the same meaning, we may become aware of a certain way of understanding the phenomenon. When two expressions reflect two different meanings, two ways of understanding the phenomenon may become thematized due to the contrast effect. At this point the analysis boils done to identifying and grouping expressed ways of experiencing the phenomenon (literally or metaphorically making excerpts from the interviews and putting them into piles). In order to do this we have to aim at as deep an understanding as possible of what has been said, or rather, what has been meant. The various statements have to be seen in relation to two contexts. One of the contexts is "the pool of meanings" that derives from what all the participants have said about the same thing. The other context is - and here we have to reintroduce the individual boundaries again- what the same person has said about other things. We have thus to make sense of particular expressions in terms of the collective as well as of the individual context. This is the hermeneutic element of the phenomenographic analysis.

After the relevant quotes have been grouped, the focus of attention is shifted from the relations between the quotes (expressions) to the relations between the groups. We have to establish what are the critical attributes of each group and what are the distinguishing features between the groups. In this way we develop the set of categories of description

in terms of which we can characterise the variation in how a certain phenomenon is experienced, conceptualised, understood. There are logical relations to be found between the categories of description and as they represent different capabilities for seeing the phenomenon in question, in relation to a given criterion, a hierarchy can be established. This ordered complex of categories of descriptions has been referred to above as the outcome space.

The different steps in the phenomenographic analysis have to be taken interactively. As each consecutive step has implications not only for the steps that follow but also for the steps that precede it, the analysis has to go through several runs in which the different steps are considered to some extent simultaneously.

The categories of description and the outcome space are the main results of a phenomenographic study. Once they are found they can be reapplied to the data from which they originate. There will thus be a judgement made in each individual case concerning what category - or categories - of description is (or are) applicable. We are then able to obtain the distribution of the frequencies of the categories of description.

Reliability

The question is often raised, would another researcher examining the same data come up with the same results? Such a question implies a view of the analysis as a kind of measurement procedure. And repeated measurements should yield similar results, of course. The analysis is, however, not a measurement but a discovery procedure. Finding out the different ways in which a phenomenon can be experienced is as much a discovery as the finding of some new plants on a distant island. The discovery does not have to be replicable, but once the outcome space of a phenomenon has been revealed, it should be communicated in such a way that other researchers could recognise instances of the different ways of experiencing the phenomenon in question. After having studied the description of the outcome space another researcher should be able to judge what categories of description apply to each individual case in the material in which the categories of description were found. As far as such a judgement is concerned there should be a reasonable degree of agreement between two independent and competent researchers. We let the expression "reasonable degree of agreement" refer, somewhat arbitrarily, to cases where the two researchers agree in at least 2/3 of the

cases when comparing their judgements and where they reach agreement in 2/3 of the remaining cases after discussion.

Applications of phenomenography

The experience of learning

As was pointed out earlier, phenomenography developed from empirical studies of learning in higher education. Although the interrelated nature of the act and the outcome of learning was emphasised in these early studies, in quite a few investigation the experience of the act of learning, problem solving (Laurillard, 1984) and so on, and the understanding of the phenomenon of learning, understanding and so on (Marton et al, in press; Helmstad & Marton, 1992) have been held in focus.

Different ways of understanding the content learned

In other studies the major focus has been on finding critical differences in which central phenomena, concepts, principles in specific domains are understood (e.g. Linder, 1989; Renström et al., 1990). There is an idea that this may be the most powerful way of finding out how the development of knowledge and skills within these domains can be facilitated.

Describing conceptions of the world around us

There is a pure phenomenographic "knowledge interest" that transcends the educational context. By describing the different ways in which we can experience, or understand, the world around us, we are characterising the world as it appears to us, which is tantamount to characterising the collective mind, encompassing the different ways in which we are capable of making sense of the world (Marton, 1981).

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