ON QUALITATIVE DIFFERENCES IN LEARNING: I—OUTCOME AND PROCESS*

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SUMMARY. This paper describes an attempt to identify different levels of processing of information among groups of Swedish university students who were asked to read substantial passages of prose. Students were asked questions about the meaning of the passages and also about how they set about reading the passages. This approach allows processes and strategies of learning to be examined, as well as the outcomes in terms of what is understood and remembered. The starting point of this research was that learning has to be described in terms of its content. From this point differences in what is learned, rather than differences in how much is learned, are described. It was found that in each study a number of categories (levels of outcome) containing basically different conceptions of the content of the learning task could be identified. The corresponding differences in level of processing are described in terms of whether the learner is engaged in surface-level or deep-level processing.

INTRODUCTION

In research on the psychology of learning the outcome of learning is commonly described in quantitative terms as a total number of correct answers to a test. Similarly intra- and inter-individual differences and differences which result from experimental manipulation are normally merely referred to as variations in the number of correct answers obtained. In a recently completed research project concerning learning at university level we found a great deal of evidence of the inadequacy of the traditional method of describing the outcomes of learning. Both for instructional purposes and for the understanding of 'what it takes to learn,' a description of what the students learn is preferable to the description of how much they learn. We have repeatedly found examples of distinctive qualitative differences in how students grasped or comprehended ideas and principles, which were presented in their set books or in texts of a similar kind used as material for learning in experimental settings.

In our view a prerequisite for an analysis of what is learned is that one must take into account the content of the learning task or the discourse. This is necessary since our main interest is to describe how this same learning material (content) is comprehended by different subjects, that is, the individual meanings which students assign to a particular text, principle, idea and so on.

QUALITATIVE DIFFERENCES IN THE OUTCOME OF LEARNING

This paper is intended to provide an outline of the experimental procedure adopted in a series of studies reported in more detail elsewhere (Marton, 1975a, 1975b; Säljö, 1975; Dahlgren, 1975). In essence, groups of students were asked to act as paid volunteers. Each student, individually, was asked to read one or more passages of prose within suggested time limits, and was subsequently asked specific questions about the passage and, in some experiments, was also asked to explain to the experimenter what the passage was about. The conversation,

*This article is based on a paper delivered at the 1975 Annual Meeting of the American Educational Research Association.
which was recorded, allowed the experimenter subsequently to study the whole pattern of the response, including hesitations and various attempts at recalling different aspects of the passage which had been read. The student was then given a series of open questions to elicit how he had tackled the process of reading, and asked to answer a series of specific questions designed to assess what had been understood.

In one of our experiments we asked 40 female first-termers to read three incomplete chapters from Coombs: *The World Educational Crisis: A Systems Analysis* (1971, Swedish edition). The basic aim of the third of these chapters is to give the reader a thorough understanding of the effects of education on individuals and society—the output of educational systems. The point which the author wants to make in this connection can be seen from the following quotation:

"It is impossible to measure with any presently known gauge the full output and eventual impact of an educational system. Some sense of what is involved can be grasped if we imagine a school whose whole output consists of a single student. On the day he graduates, what kind of an output does he embody? The answer is that he embodies a multiplicity of outputs—represented, for instance, in the facts and concepts he has learned, the style of thinking he has acquired, and also such changes as may have occurred in his outlook, values, ambitions, and personal conduct. If one then asks how all this will affect the future life of this student, his family and society, the difficulty is several times compounded. Such cause and effect relationships are often as indistinct as a line drawn through water. But if these matters are hard to get at in the case of a single student, they are infinitely more elusive when the matter to be judged is the output represented by multiple streams of individuals, flowing through different educational channels for different lengths of time" (Coombs, 1968, p. 64).

In subsequent pages Coombs argues against the simplified notion of output of educational systems as being equal to the number of people who pass their exams. He stresses the need for a large number of criteria in assessing the real influence of education on society.

In order to check whether the students had understood what the author wanted to say with regard to the output of educational systems the following question was posed:

"What is meant by the output of an educational system?" The words used in the answers to this question varied very much, but eventually we saw that students had adopted four basically rather different ways of comprehending what is meant by the output of an educational system. We shall call these four different types of answer *levels of outcome* which are thus concrete examples of qualitative differences in learning. The following classification presents what was understood at each of these levels together with two typical answers to illustrate the explanations given by the students.

**Level A: The Effects of Education on Society and on Individuals Produced by Knowledge and Attitudes Acquired through Schooling.**

"Mm, that's terribly difficult to answer. There was this example about how if you just had one pupil and wanted to work out the output, it would depend on so many things... or factors or whatever facts or concepts it was about... whether he has completed his education, what his own viewpoint is... and everything that is going to influence his life later on and that sort of thing... and his productivity, suitability..."
"Mm, it's the knowledge that... and values... yes, the knowledge and values that students have acquired. That is, whatever it is that influences them and makes them read this or that and do this or that."

**Level B: Those Who Leave the Educational System With or Without A Qualification.**

"Well, those who have been to school and gone right through the course, and even those who've failed, they're a sort of output, too."

"Well, it's those who pass their final exams, that is, well not necessarily pass, but those who take part in the course even if they drop out at some point, you know... those who have taken part and then dropped out."

**Level C: Those Who Leave the Educational System with a Completed Education.**

"It's the pupils who have gone right through the system from start to finish."

"It's the trained work-force that the educational system produces. It's, well, for example... well, simply the trained work-force."

**Level D: What Comes Out of the Educational System.**

"Something to do with... well... you know, the result of."

"The product... I think."

The levels of outcome, i.e., different ways of comprehending what the author meant by 'output of education' can be said to constitute the *outcome space* for this particular question in relation to the present text. Those answers which were categorised (by two independent judges) as belonging to level A are clearly the best since they contain the *intentional content* of the author's argument with evidence which shows that the subjects have grasped the more elaborate way of looking at 'output' that the author wishes to convey to the reader. The B level answers contain a part of the intentional content since they include in 'output' not only those who pass, but also those who drop out somewhere during their education, and the author considers this to be a very important aspect of the output of educational system. On level C we find answers which merely include those who pass through the complete educational system. This is the most common conception of output and is, in fact, precisely the conception which the author wants to argue against, since the real and important aspects of output are of a quite different nature from the mere number of people who pass. In fact, those students who gave a C level answer have given an explanation of output which is the exact opposite of the one the author intends to give the reader. The D level answers, finally, are virtually empty of content and in most cases they merely contain a translation of the term 'output.' The fact that this chapter was an attempt to give the reader a more sophisticated understanding of the concept of 'output' thus seems to have completely escaped these students.

In the experiment from which this example is taken the question was given to the subjects on two occasions, as part of the content of an immediate retention-test given in conjunction with the reading session, and as a part of a delayed retention-test approximately 6½ weeks later. It is interesting to note that exactly the same levels of outcome can be found on the second occasion although in some cases individual students give answers at a different level from the first occasion. When looking at the results obtained on the measurements as illustrated in Table 1, one should bear in mind that subjects who did not give a Level A answer on the first occasion were given this type of explanation by the experimenter. As can be seen from the table, there is a remarkable stability
in the answers given on the two occasions from the qualitative point of view—a point which is discussed more fully elsewhere (Marton and Säljö, 1976; Säljö, 1975).

**TABLE 1**

"What is Meant by the Output of an Educational System?"

** Relationship Between Level of Outcome on First and Second Occasions 6½ Weeks Apart  

<table>
<thead>
<tr>
<th>Level</th>
<th>Second Occasion</th>
<th>Sub-Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>First Occasion</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

* O indicating no answer.
† One subject did not take part on the second occasion.

This example was given in order to illustrate the existence of qualitative differences in the outcome of learning. Different students obviously learn different things from one and the same text and their knowledge about various scientific principles, methods and ideas varies as regards what is learned instead of merely differing as regards how much is learned.

**Qualitative Differences in the Process of Learning**

If there are qualitative differences in the outcome of learning it seems very likely that there are corresponding differences in the process of learning, i.e., in the way different people set about learning. In fact, thinking in terms of qualitative variations has traditionally been more common as regards the process of learning than as regards its outcome. The best known examples are the works of Wertheimer (1945), and his student Katona (1940) who contrasted two methods of instruction in which the subjects either were taught the principle underlying the solution of a problem or were taught the actual solution of the problem. In accordance with commonsense psychology, subjects exposed to the former treatment retained what was learned longer and could with greater ease apply what they had learned to other problems similar to the training task.

In our studies of university students we have found marked inter-individual differences in the types of learning process that students engage in when confronted with learning materials. In fact, we have found basically two different levels of processing to be clearly distinguishable. These two different levels of processing, which we shall call deep-level and surface-level processing, correspond to the different aspects of the learning material on which the learner focuses. In the case of surface-level processing the student directs his attention towards learning the text itself (the sign), i.e., he has a 'reproductive' conception of learning which means that he is more or less forced to keep to a rote-learning strategy. In the case of deep-level processing, on the other hand, the student is directed towards the intentional content of the learning material (what is signified),
i.e., he is directed towards comprehending what the author wants to say about, for instance, a certain scientific problem or principle. The following example illustrates these two different types of processing and the qualitative variations in outcome of learning which may follow.

**RELATIONSHIP BETWEEN PROCESS AND OUTCOME**

In another of our experiments 30 university students of educational psychology were instructed to read a newspaper article dealing with a curriculum reform in the Swedish universities. The analysis of qualitative differences in outcome of learning was in this experiment based on the subject's free recall of the article as well as on the answer to a summary question which read: "Try to summarise the article in one or two sentences. What is the author trying to say, in other words?" In order to be able to study long-term effects of the level of processing on retention, students were once again contacted and asked to recall the article and answer the summary-question after approximately five weeks.

Again, qualitative differences in outcome can only be described in terms of the content of the learning material. The newspaper article was 1,400 words long and included three tables. The article was mainly a critique of the approaching curriculum reform in the Swedish universities (UKAS), which aimed at bringing studies more into line with those at the polytechnic institutes through the introduction of set combinations of subjects and stricter regulations as regards duration of studies (termination in the case of unsatisfactory examination results). The reason for the reform, as explained by the authorities, was that the examination pass rate at the universities was considerably lower than that achieved at the polytechnic institutes. The author of the article had, after examining the underlying statistics, divided university students into subcategories and was thereby able to show that, even though the pass rate was very low for certain categories of students, for other categories it was as high as, if not higher than, that achieved by technical students. The author argued that the blanket approach of the university reform, which would affect all equally, was misguided. If the pass rate was to be raised (and this was not considered self-evident by the author) selective measures should be taken by concentrating on those groups that did have a low pass rate.

Again it was possible to identify four different conceptions of the intentional content of the passage in the students' recall of the text and in their answers to the summary question. There was, of course, considerable variation in the words used by subjects to recall and summarise the article, but the variation in basic conception of what the author wished to say seemed to fall into the following four categories or *levels of outcome*.

**Level A:** *Selective Measures.* (Meaning that measures were to be taken only for those groups of students that did not fulfil the necessary requirements.)

**Level B:** *Differential Measures.* (Measures to be taken which allow for differences between the various groups.)

**Level C:** *Measures.* (Measures to be taken only.)

**Level D:** *Differences.* (Differences between groups only.)

These categories are hierarchically related (level A implies level B, which implies both levels C and D), as far as the amount of information on the intentional content of the article is concerned. The same categories could also be used in describing the retention of the intentional content at re-test, five weeks after the
reading of the text. As Table 2 shows, except for one student, changes (if any) go from more to less deep levels of outcome (i.e., A→B→C). Since depth, in both our examples, is defined in terms of an implicational model, this transition indicates a loss of information.

**TABLE 2**

**ARTICLE ON REFORM OF THE SWEDISH UNIVERSITIES. RELATIONSHIP BETWEEN LEVEL OF OUTCOME ON FIRST AND SECOND OCCASION.**

<table>
<thead>
<tr>
<th>Level</th>
<th>Second Occasion</th>
<th>Sub-Totals</th>
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<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>First Occasion</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

The next step in this study was to analyse the introspective questions, so as to ascertain functional differences in the level of processing which might explain the differences in the outcome of learning. Two different levels of processing were again clearly detectable from the subjects' comments on how they set about learning. In *surface-level processing* the subject focuses on the sign (i.e., the discourse itself or the recall of it). The following comments by students who had this conception of learning show how they described their approach to learning and remembering.

"Well, I just concentrated on trying to remember as much as possible."

"I remembered . . . but, I'd sort of memorised everything I'd read . . . no, not everything, but more or less."

"It would have been more interesting if I'd known that I wasn't going to be tested on it afterwards,'cos in that case I'd've more, you know, thought about what it said instead of all the time trying to think now I must remember this and now I must remember that."

"There were a lot of different lines of thought to follow and to try and memorise."

*Deep-level processing* indicated that students had concentrated on *what is signified* (i.e., what the discourse is about). Again students' comments illustrate their approach to learning.

"... I tried to look for . . . you know, the principal ideas . . ."

"... and what you think about then, well it's you know, what was the point of the article, you know."

*Interviewer*: But when you were going to start, you tried to think: what came at the beginning of the article?

*Subject*: No, I . . . I tried to think what it was all about . . .

"... I thought about how he had built up the whole thing."

Two judges rated students' comments independently in terms of the two levels of processing, although in some cases it was impossible to decide from the interviews what type of processing subjects had used.
Differences in Learning

Table 3 shows the relationship between what subjects said about their learning process and the level of outcome reached. There is a very interesting relationship between subjects' introspective reports and the qualitative nature of the outcome of learning. In some other studies we have been able to show that the level of processing which subjects engage in can be experimentally manipulated and that such manipulations may have very profound effects on both qualitative and quantitative aspects of the outcome of learning (Marton, 1974; Dahlgren, 1975; Säljö, 1975; Marton and Säljö, 1976).

**TABLE 3**

**RELATIONSHIP BETWEEN LEVEL OF PROCESSING AND LEVEL OF OUTCOME.**

<table>
<thead>
<tr>
<th>Level of Outcome</th>
<th>Level of Processing</th>
<th>Sub-Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surface-level</td>
<td>Not clear</td>
</tr>
<tr>
<td>A</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>B</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Sub-Totals</td>
<td>14</td>
<td>7</td>
</tr>
</tbody>
</table>

* Including one subject showing indications of both.

**CONCLUSION**

Our studies have been concerned with meaningful learning in the true sense of this term. The primary aim was to explore qualitative differences in what is learned and to describe the functional differences in the process of learning which give rise to the qualitative differences in outcome. Thus, what we wanted to achieve was a commensurable description of the process and outcome of learning in the sense that the qualitative variation which we discovered in the outcome of learning should have its counterpart in the process of learning, and vice-versa.

The most important conclusion we draw from our research is that learning should be described in terms of its content. A highly significant aspect of learning is, in our opinion, the variation in what is learned, i.e., the diversity of ways in which the same phenomenon, concept or principle is apprehended by different students. By gaining knowledge about how students comprehend, for instance, various scientific principles and ideas, we should obtain information which would undoubtedly prove fruitful for teaching. Consequently, we believe, it worthwhile to describe the outcome space of essential concepts and principles. The various levels of outcome will probably reveal the distinctive features and prerequisites of comprehension in these specific instances. We think, that, apart from what it may tell us about the general properties of cognition, it is of interest in its own right to describe what it takes, from a psychological point of view, to understand, for instance, the concept of scarcity in economics, or the law of diminishing returns (cf. Marton and Dahlgren, 1975).

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REFERENCES


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