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Concept Comprehension Building in Students and the Teaching of Theory of Library Classification

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Stipulative definitions of the concept 'formal concept', 'technical term', 'concept-comprehension', and 'ambiguous concept-comprehension' are given. Since the theory of library classification is mostly concerned with formal concepts, its teaching ought to consider an understanding of the phenomena and concepts as well as grasping of statements about relations between aspects of the phenomena under study. In this regard, primary and secondary concepts are distinguished, the latter are of a lower order and presuppose the understanding of primary concepts. The teaching process has to take into account the mastery of prerequisite concepts and the analytical presentation of concepts for the students re-synthesization. The components of the concept 'Classification' are used as an example for these procedures. (I. C.)

1. Definitions

A few of the specialised terms used in this paper are defined in the following sections. These terms have been given 'Stipulative Definitions'[1] (1).

1.1 Formal concept:

A formal concept is a theoretical construct or organised thought about a phenomen or a set of phenomena combining all of its essential characteristics and is a component of a given field of study or a subject. Formal concept represents an abstractable, public, essential and agreed form of an entitly (concrete or conceptual) and is expressed in the 'formal context' (2) of any discourse. "These formal concepts differ from those a child acquires informally, in that the meanings of the concepts have been generally clarified (by specialists in a given field of knowledge) to some extent, and the meanings are shared and communicable, whereas the concepts the child acquires informally may be highly subjective and personal" (3).

1.2 Technical term:

A technical term is a word or a symbol or group of words or group of symbols in some language representing a formal concept. For example, the word 'zero' or symbol '0' represents the arithmetical concept of absence of quantity.

What at the idea level is a 'concept of something' is represented by a term at the verbal or language level. The specific meaning or definition given to these concept terms (a) provides clarity in communication through elimination of ambiguity and vagueness; and (b) avoids the possible shift of meaning in the course of discussion and argument. These terms always form the common apparatus of thinking and communication among the specialists in a given field of study.

1.3 Concept-comprehension:

Concept-comprehension means:
a) knowing the specific meaning or definition of the term or symbol representing a formal concept;
b) being able to recognise a concept or being able to distinguish it from other formal or informal concepts;
c) being able to think or have an idea of a formal concept;
d) knowing the nature of a formal concept i.e. understanding or grasping the attributes which characterise the concept and make it what it is.

1.4 Ambiguous concept-comprehension:

Ambiguous concept-comprehension means an incomplete, vague, different, wanting, or subjective notion of a concept/term.
For example:
a) The term "digit" in Arithmetic represents any of the Indo-Arabic figures '0' through '9' occurring as primary symbols in a notational system.
b) The term "digit" in the field of Library Classification represents any of the single, isolated, primary symbols (i.e. 'a' through 'z'; '0' through '9'; 'A' through 'Z' etc.) occurring in a notational system of a scheme of Library Classification.

We may say that if a person having in mind the concept or the meaning of the term 'digit' as stated in Arithmetic makes usage of the same in communication or otherwise in the context of Library Classification, then he is having 'Ambiguous-Concept-Comprehension' of the Concept 'digit' in relation to Library Classification.

Further, our knowledge of the properties of a phenomenon or a set of phenomena may undergo a change and so it/their correlativ concept and definition. It can be extended to include new or newly found properties. In logical terms, the extension and definition of a concept may change and develop with the passage of time with the result that our 'Concept-Comprehension' can turn into 'Ambiguous Concept-Comprehension.'

2. Need for the development of "concept-comprehension" in students

When a student is not able to understand a concept, he tries to memorize it. By memorizing the concept by rote he neither improves his understanding of the phenomenon

he studies, nor does he acquire the power of reasoning and judgement, which are the primary functions of his education.

Scientific study of a problem in any discipline or subject of study consists of:

a) understanding a particular phenomenon or the concept of the phenomenon in precise or unambiguous manner; and
b) grasping of a certain statement or explanation about the relations between different aspects of the phenomenon under study.

F.J. McDonald in his book 'Educational psychology' states: "A major task of school is the development of concepts and generalisations that either may not be learned outside of school, or may be learned more efficiently and systematically in school" (4). Hence, it is the responsibility of a teacher to see that students to whom he is imparting instruction or whom he is guiding in the scientific study of a subject clearly comprehend the concepts of the subject.

A teacher should not be satisfied if the student is merely able to repeat the description of a concept. He should see that he is able to acquire a clear comprehension of the concept. The definition of a concept can be memorized by students and repeated back parrot like without any meaning attached to it. This learning by heart is not the best test of mastery of a concept.

3. Development of concept-comprehension in students and teaching theory of library classification

Like Mathematics or Philosophy, the subject 'Theory of Library Classification' is mostly concerned with formal concepts. The theory of Library Classification consists of (a complex) hierarchy of concepts. As such, it is imperative that while teaching this subject emphasis should be laid on making the formal concepts of the subject clear to the students. Besides, the 'Concept-Comprehension' in students should be built up step by step.

Further, in this subject there are many concepts which have been borrowed from other subjects, such as Mathematics and Management Science. In the process of their incorporation in the 'Theory of Library Classification', these concepts have been given slightly broader or different meanings, as can be seen in the example of the concept 'digit' as given (in section 1.4) above. It ist, therefore, essential on the part of a teacher of 'Theory of Library Classification' to see that no 'Ambiguous-Concept-Comprehension' persists in the minds of the students and that they understand the new concept in its proper context.

In order to build up 'Concept-Comprehension' of students systematically and on proper lines, it is essential that teachers should understand:

a) the various forms and modes of formation of concepts; and
b) the various methods by which concepts can be made clear to students or the methods by which concept-comprehension of the students can be built up step by step.

4. Form of concepts

In his article, 'Concept formation and its significance in mathematics' R. Skemp has isolated two types of concepts:

a) Primary concepts; and
b) Secondary concepts (i.e. those formed by other concepts)

Explaining the primary and secondary concepts and modes of formation of secondary concepts he states: "Suppose that our subject now asks, "What is colour?" We cannot convey this by pointing to various coloured objects. Instead we would say red, blue, green, yellow, these are all 'colours'. For the examples from which the concept of colour is formed are themselves concepts. So before the subject could form the new concepts, we would need to have available at least some of these other concepts (red, blue, green, yellow ...).

This introduces a 'distinction' between the kind of concepts formed from sensory experiences of the outside world (such as 'red'), which I call *secondary concepts*. We can also think of the concept of colour as being of a higher order than its contributory concepts red, blue, green, yellow. Similarly, we can form another secondary concept of higher order still, say that of a visual sensation, examples of this being colour, brightness, shape" (5).

5. Modes of formation of concepts

As stated above we find that the new concepts are formed on the foundation of existing concepts. Stated in Ranganathan's terminology the secondary concepts or the concepts of different hierarchical "levels" (6) are built up by Lamination, Loose Assemblage, Fission, Fusion, Agglomeration, Cluster modes (7). For example, the concept of a Human Being or Homo sapiens is of higher order than the concepts of Man and Woman etc., which are among themselves concepts of the same order or co-ordinate concepts. We can also say the former concept is a secondary concept and is constituted by the combination of primary concepts man and woman.

It also implies that a secondary concept or a concept of higher order cannot be understood or explained unless the primary concepts of lower order are understood or explained.

A primary concept or a group of primary co-ordinate concepts can give rise not only to secondary concepts but also to new concept/s of the same order which may be called 'Innovated co-ordinate concept/s'. It is a well known fact that the concept of zero (absence of quantity was added much later than the concepts of 1, 2, 3, 4 etc. The reason could be that the primitive man could conceive the concept of quantity 1, 2, 3 etc. easily and could not conceive the concept of absence of quantity, (which is a more abstract concept). The concept of zero formed or conceived later cannot be said to be a concept of a higher order. It is of the same order als 1,2,3,4 etc. but is an 'Innovated Co-ordinate-Concept/s.' Such an innovated-co-ordinate concept may be formed negatively or conversely or assymmetrically or otherwise: eg.,

a) negatively: the concept of - 1 (one) formed as opposed to the concept of + 1 (one) or
b) as a 'converse-concept': the concept of Non-quantity

formed opposite to the concept of Quantity, or the concept of Antigalaxy formed opposite to the concept of Galaxy.

6. Teaching procedures conducive to building 'concept comprehension' of students

For building up concept-comprehension of students the following procedures have been found helpful:

a) Emphasis on clarity and building one concept upon another i.e. a systematic beginning-to-end presentation of the concepts
b) Relating concepts to the learner's previous experience
c) Incorporating into the presentation an abundance of detail; presenting a framework into which the details must fit and presenting the material from different points of view:
d) Helping the learner to see the concepts in their applicant; and
e) Seeing that no ambigous concept-comprehension persists in the mind of the learner.

7. Illustrations of the concept teaching procedures

According to J. B. Carrol, "the difficulties that learners have in attaining a concept are likely to be due to their inadequate mastery of prerequisite concepts and to errors made by the teacher in presenting in proper sequence the information intrinsic to the definition of the concept" (8).

Hence, the teacher of the Theory of Library Classification while explaining the formal concept of 'Classification' as an act of 'Classifying' should explain step by step all the component ideas which go into the building up of the concept of 'Classification'. Starting his explanation from the primary concept or fundamental concept and then moving to the secondary concept and so on till he reaches the ultimate state where the concept of classification stands as the upper most link in the hierarchy of its contributory concepts.

Further, in order to teach the concept of 'Classification' he must first break it into concepts of lower order. The concepts of lower order can be further analysed and broken into concepts of still lower order and so on till he has reached the primary concept.

In his paper "concept formation and its significance in mathematics teaching and syllabus reform" R. Skemp states: "The result of the teacher's analysis will usually need to be given to the pupils in the reverse order to those in which they were found when taking to pieces the concept. The teacher analyses, the pupil re-synthesizes. It is sometimes necessary to remind oneself of this, for I have on occasion caught myself beginning to explain something to pupils in the same sequence as I have first suceeded in making it clear to myself. I have also found that if they did not understand what I was trying to convey, this was often because what had seemed to me a single concept was really a combination of several ones" (9).

While making the analyses of the concept of Classification we can break it into the following hierarchy of its contributory concepts: (The kernel terms representing the contributory concepts at every lower link of the chain are printed in italics).

Concept:	Definition and contributory concepts:
1. Classification	An act of *classifying.*
2. Classifying	To arrange or organise by *Classes.*
3. Class	*Ranked Group.*
4. Ranking	Arranging in a definite sequence the groups formed by the *division of the entities of a universe,* so as to arrive at an *assortment of them.* Each group then gets a *Rank.*
5. Assortment of a Universe	The process of *division* into groups plus arranging the *group* in definite sequence.
6. Group	Any *sub-aggregate* of entities formed by the *division of the entities* of universe.
7. Division of a Universe	Process of sorting the *entities* of a universe into *sub-aggregates* on the basis of a preferred characteristic or putting *like entities* into the same sub-aggregate and *unlike entities* into different *sub-aggregates.*
8. Characteristic	An *attribute* or any attribute-complex with reference to which the *likeness* or *unlikeness* of *entities* can be determined and at least two of them are unlike.
9. Unlike Entities	*Entities* not sharing a given attribute equally in measure, intensity extent or on any other basis are unlike with reference to that *attribute.*
10. Like Entities	*Entities* sharing a given *attribute* equally in measure, intensity, extent, or on any other basis are Like with reference to that attribute.
11. Universe	An *aggregate* under consideration in a given context.
12. Aggregate	A collection of *entities* without any special arrangement among them.
13. Attribute	Any property or quality or quantitative measure of an *entity.*
14. Entity	Any *existent*, concrete or conceptual that is a thing or an idea.
15. Existent	Undefined assumed term.[2]

The teacher after analysing the concepts of classification as shown above should explain it to the students to build up the concept comprehension of students by explaining step by step all the contributory concepts of the concept of 'Classification' starting from the primary concept 'Existent'.

The teacher should make special efforts to clarify the concepts, terms or symbols used in the classification theory, which are given two different or slightly changed meanings when used in different contexts.

For instance, take the digits 'a' to 'z' of Colon Classification notational system. These digits are used as 'Substantive Digits' and also used as 'Anteriorising Digits' (in the 6th ed). Having grasped the meaning of the concept of 'Substantive digits' the student should naturally take some time to associate the digit 'a' to 'z' with the concept of 'Anteriorising Digits'. (The cause of this am-

biguity has now been removed in CC 7th ed). It is, therefore, necessary that the teacher should see that no ambiguous concept comprehension persists in students' minds in such a case.

The teacher must also give appropriate examples, whereever possible, from different schemes of classification showing the use of the concept in practical application. This method helps the learner to grasp the concept easily.

Notes

1 "When a definition is stipulated, no claim is made that the meaning presented is what the term really means. Instead stipulator simply announces and commits himself to intended usage, and perhaps tells the group involved that should confirm the usage in a given situation".
2 The definitions of the concept 3 to 15 above have been taken from Ranganathan 'Prolegomena to library classification' Ed. 3. 1967, p. 53–60. In his book Ranganathan has explained these concepts exactly in the reverse order, beginning from the term Existent.)

References:

1 Ennis, R. H.: *Logic in teaching.* 1969. p. 129.

2 Langer, S. K.: *Introduction to symbolic logic.* 1953. p. 67.

3 McDonald, F. J.: *Educational psychology.* 1960. p. 133.

4 McDonald, F. J.: *Educational psychology.* 1960. p. 132.

5 Skemp, R.: *Concept formation and it significance in mathematics and syllabus reform.* – In: Stones, E. (Ed.): Readings in educational psychology. Learning and teaching. London: Methuen 1970. p. 233.

6 Bunge, M.: *Levels: a semantical preliminary.* In: Rev. of Metaphysics 13 (1959–60) p. 396–406.

7 Gopinath, M. A.: *Classification research in India: 1968–1973.* Bangalore, India: DRTC 1974. p. 10–4 = FID/CR Report No. 14.

8 Carroll, J. B.: *Words, meaning and concepts.* In: Stones, E. (Ed.): Readings in educational psychology. Learning and teaching. London: Methuen 1970. p. 189.

9 Skemp, R.: *Concept formation and its significance in mathematics and syllabus reform.* – In: Stones, E. (Ed.): Readings in educational psychology. Learning and teaching. London: Methuen 1970. p. 236–7.

10 Ranganathan, S. R.: *Colon Classification*, ed. 6. 1964. p. 1.6.

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Selektionsgerechte Indikation von Sachgebieten und Sachverhalten (Selection-oriented Indication of Subject-fields and Propositions.)

Haendler, H.: **Selektionsgerechte Indikation von Sachgebieten und Sachverhalten.** (Selection-oriented indication of subject-fields and propositions.)
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Discussion of the concepts "documentary informing" and "informeme" and investigation of the cance" and "efficiency of information". Since incontents of documents. The "informeme-theory" of Diemer is supplemented by the concepts "significance" and "efficiency of information". Since informing implies the supply of new, so far unknown propositions, an a-priori-recording of descriptors or classes for specific informemes or complex concepts is impossible. Referring to the creative aspect in the use of language (Humboldt and Chomsky), it is shown how a description based on the principles of concept-synthesis may be successfully applied for the representation of informemes. Recurrent conceptual elements of endlessly changing conceptual structures ought to be identified and their descriptors should be fixed. An indication of subject-fields should follow the same principles of synthesis, since the steady change in the delimitation of scientific disciplines and the formation of new fields of research excludes an a-priori fixation of single codes for each field. The elaboration of a faceted vocabulary for use in international and interdisciplinary areas may be based on the semantic elements which form the concepts of subject-fields, like "objects" and "aspects". (Author)

1. Einleitung

Die Diskussion über Probleme der Indikation von Dokumenteninhalten oder der Inhaltserschließung gelangte durch die notwendigen Bemühungen um Kooperation auf dem Gebiet der Dokumentation und Information in eine neue schwierige Phase. Es sind vor allem zwei Ursachen, die hier eine Diskussion erschweren:

1. Weltweite und fachübergreifende Kooperation erfordert allgemein anwendbare und anerkannte Methoden und Hilfsmittel der Informationsvermittlung.