The Use of Concept Mapping Software in Initial Teacher Education Programs

Esin Tezbaşaran

Mersin University (Turkey)

namedesin@yahoo.com

Abstract

The awareness of concept mapping by the student teachers in ITE programs is of crucial importance, for it enables teachers to monitor the cognitive learning processes of their learners as well as delivering the content knowledge of their teaching branches. This study illustrates the formation of concept mapping in the ITE programs at the Faculty of Education of Mersin University. At the beginning of the course, the instructor draws the theoretical framework of concept mapping by discussing the procedure through the literature. Then, the student teachers are asked to choose a text relevant to their teaching branches, and the instructor discusses the outline of the concept mapping through a few examples by using a concept mapping software program. After receiving the feedback from the peers and the instructor, student teachers revise their products once more. Having created their own concept maps in line with meaningful learning[1], student teachers are directed to evaluate themselves with the tool developed by Novak and Gowin[2], to enable them to understand the process. The feedback from the teachers already working in the field reveal that such a constructivist approach to teacher education assists teachers to have more effective teaching processes.

1. Introduction

Learning represents the potential existence of behavior or the behavior experienced in life According to Bower and Hilgard[3], " learning refers to the change in a subject's behavior or behavior potential to a given situation brought about by the subject's repeated experiences in that situation, provided that the behavior change cannot be explained on the basis of the subject's native response tendencies, maturation, or temporary states (such as fatique, drives, and so on)."

The main objective of instructional programmes is to make individuals have knowledge and skills for the solution to the problems which they can encounter in real life situations. For this reason, the learning at school, that is, instructing is aimed to be potentially permanent. The teacher is the most effective element for reaching this aim. Instructing means arranging the conditions of learning that are external to the learner [4]. When a teacher enters the classroom, s/he meets a group of learners. The teacher's arrangement of the learning conditions in line with the instructional objectives in the classroom time is the key point in the whole education system.

Bloom [5] states that the quality of education is based on four basic elements: Cues or directions provided to the learner, the participation of the learner in learning activity, the reinforcement which the learner secures in some relation to the learning, and feedback/correctives. These four elements are formed with the activities used by the teacher. The teacher is expected to have professional knowledge and skills such as giving comprehensible clues to learners and particularly presenting reinforcement which can activate their cognitive connections, hence supporting their learning. As a whole, a teacher is required to fully understand how learning occurs.

2. Constructivist Approach

Constructivism is developed with the cognitive theories. These abstracted theories should be put into practice in instruction. For this reason, the most crucial studies have been done in the field of meta-learning. The meta-learning explanations answering the question of how we learn have the purpose of how new piece of knowledge is constructed in mind.

It is common that rote learning is used according to Behaviorist stimulus-response association. Ausubel [6] points out that rotely learned materials are discrete and isolated entities which have not been related to established concepts in the learner's cognitive structure. In Cognitive Approach, on the other hand memorizing or rote learning is considered contrary to the nature of learning. It claims that discrete learned entities do not work while perceiving the sum. Crow and Crow [7] mention that Gestalt

loses something when it is broken up into its component parts since every situation or experience is more than the sum of all its parts. Sprinthall and Sprinthall [8] give a smart example to the conflict between Behaviorism and Congnitivism: Fifth graders say "seventy-two" to the stimulus "Nine times eight". In that case a bond has been formed between two elements, a stimulus and a response. According to cognitive theorists, gaining a basic understanding is important. Then a fifth grader suddenly realizes that multiplication is a successive addition. In reality, memorizing the multiplication table is not a meaningful learning Learners' inference of the fact that not only the multiplication but also division and subtraction are practical ways of addition provide meaningful learning of arithmetical problems. The term meaningfulness, refers to the number of links or associations between an idea and other ideas. The more links, the more meaningful the idea [9].

3. Concept Mapping

The world is made up of practically unlimited of discriminably different things. One of the most important things organisms must do is to organize the environment into categories so that objects and events that are not physically identical may yet be treated as equivalent [10]. Novak and Gowin consider events or objects as concepts. Concept maps are intended to represent meaningful relationships between concepts in the form of propositions [2]. According to Gagné [4], the chain between the concepts is called principle. He exemplified principle learning by the acquisition of the idea contained in such propositions as "gases expand when heated."

4. A Practice On Concept Mapping In Initial Teacher Education

The education faculties with four years duration are the responsible bodies for teacher education in Turkey. The education faculty at Mersin University offers education to teacher candidates in the departments of primary school teaching, secondary level mathematics, science and Turkish language teaching. Also there is the department of counseling and guidance.

The candidate teachers who are in their 4th year have the opportunity to take an elective course called Monitoring and Formative Evaluation. In this course they can be asked to prepare concept maps to be able to determine to what extent meaningful learning occurs in their future classrooms. This paper aims to describe the course procedure of concept mapping as a sample.

Course Activity Stage One: According to Novak and Gowin [2], concept mapping is a learner's tool. Hence what is expected from the teacher is to teach learners how to prepare concept maps. Novak and Gowin present different strategies for their target learner groups. Since this practice is done for the candidates who will teach 5, 6, 7, 8 graders in the future they are given the strategies which are suitable for 3-7 graders offered by Novak and Gowin The activities to prepare for concept mapping are listed below[2]:

- Make two lists of words on the blackboard or overhead projector using a list of familiar words for objects and another list for events. Ask the children if they can describe how the two lists differ.
- Ask them to describe what they think of when they hear the words. Help them recognize that even though we use the same words, each of us may think of something a little different. These mental images we have for words are our concepts; introduce the word concept.
- Repeat the activities in step 2, using event words. You may want to suggest at this point that one person may have trouble understanding each other sometimes is that our concepts are never quite identical even though we know the same words. Words are labels for concepts, but each of us must acquire our own meaning of words.
- List words which are linking words such as are, where, the, is, then, with. Help them recognise that these are not concept words. Linking words are used together with concept words to construct sentences that have meaning.
- Proper nouns are not concept words but rather names of specific people, places, events, or objects. Use some examples and help them to see the distinction between labels for regularities in events and objects and those for specific events or objects.
- Using two concept words and linking word(s), construct a few short sentences on the board to illustrate how concept words plus linking words are used by humans to convey meanings.
- Ask the children to give their own sample sentences and to show whether the concepts are objects or events. Also ask them to show the linking words.
- Introduce some short but unfamiliar words to the class. These are words that stand for concepts they already know, but with special meaning. Help them see that meanings of concepts are not rigid and fixed, but can grow and change as we learn more.

- Choose a section of a text book, dublicate copies for children. Then choose a passage that conveys a definite message. As a class, ask them to read the passage and identify key concepts. Also have the children note some linking words and concept words that are less important to the story line.

After the instructions given above, the activity is initiated with no 9 and is carried out by the candidate teachers. Instruction 4 is emphasized as Turkish language has no auxiliaries. The fact that the verbs in Turkish are also used as linking word beside connectors is particularly emphasized.

The candidate teachers have the theoretical background on the learning theories. The aim of this course is to put the theoretical knowledge into practice. The candidates, putting themselves into the learners' shoes and having more advantageous position, start to work on the concept maps of the texts relevant to their teaching branches. The candidates grouping in pairs choose a text suitable for the learning objective they decide on.

Course Activity Stage Two: In this stage, candidate teachers choose a computer based cognitive tool to prepare concept maps. It is known that a lot of concept mapping software programmes are available on the internet. The free and widely used one by the candidate teachers is Cmap. Beside Cmap, Inspiration and Kidspiration from trial versions are told to be more comfortable and enjoyable.

Course Activity Stage Three: The concept maps based on these software programmes and prepared in a week are criticized by the peers and the course instructor. The criticism in general can be listed as follows:

- Is the flow of the concepts suitable for the hierarchy?
- Are the concepts with new knowledge explained with the knowledge their students already know?
- Is the relation between concepts constructed meaningfully?
- Is the existence of cross links or its lack giving meaningful knowledge or making it more complicated?
- Are there sufficient examples? The candidate teachers receive more criticisms if they cannot link the concepts with the concepts their students already know and give examples instead.

Course Activity Stage Four: By taking the critics into consideration, the candidate teachers rearrange the concept maps. According to Novak and Gowin's evaluation criteria, they evaluate their own performance.

The flow of the whole activities for teacher candidates is given below:

Figure 1. The Flowchart of Concept Mapping Activity for Candidate Teachers

3
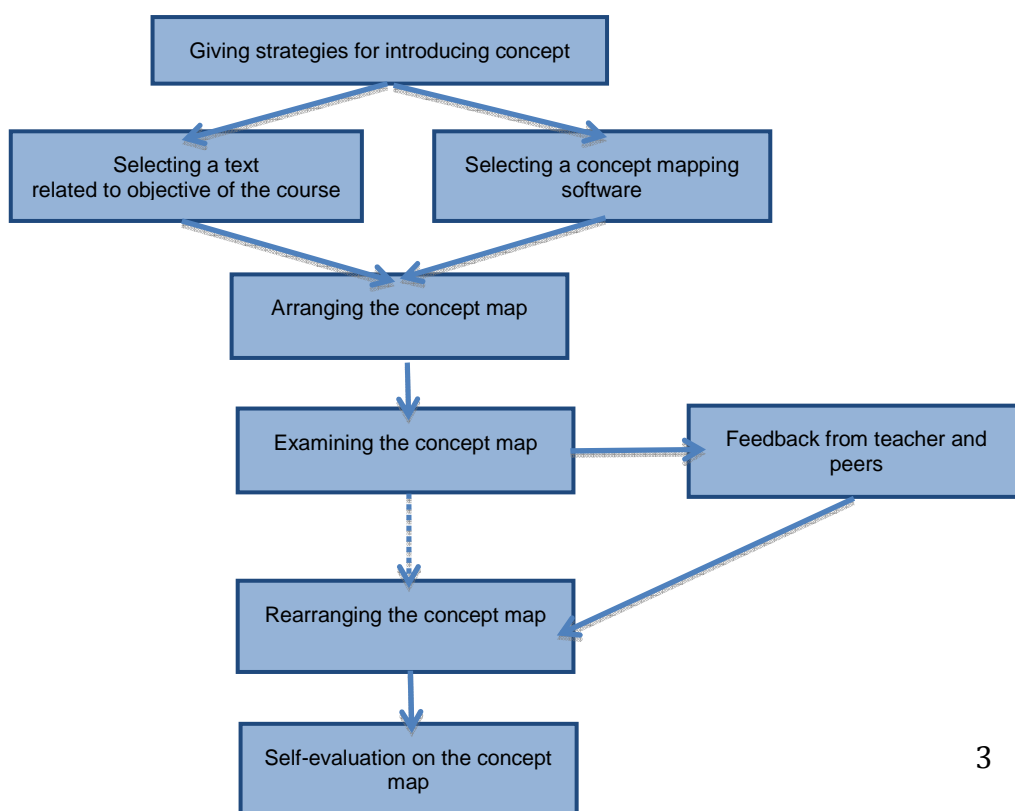
5. Conclusion

The outcomes of concept mapping activity, which lasts for 4 weeks in Monitoring and Formative Evaluation course, can be summarized as follows. First of all, the candidates enjoy the feeling of achievement after their successful performance on concept mapping, and recognize the fact that achievement is under learners' control. Moreover, they notice that the evaluation is not only based on giving marks but on how learning and evaluation become learner centered.

Secondly they recognize that knowledge can be constructed in a different way in mind by discussing their own concept maps with the peers and noticing how the concepts of the peers can be different from theirs. The most important output is that the oral or written instructional materials which present the knowledge with meaningful statements or concepts enhance learning. Thus the candidates gain the strategies to evaluate the instructional materials in terms of meaningful learning.

Thirdly the candidates develop a critical point of view toward concept mapping software programmes since they follow them regularly. Also they can create pressure groups for more improved products of software companies with their feedback as users.

Finally they become capable of putting meaningful learning into practice instead of rote learning.

References

[1] Ausubel, D. P. (1963). *The psychology of meaningful verbal learning.* New York: Grune and Stratton.

[2] Novak, J. D. § Gowin, D. B. (1984). *Learning how to learn.* New York: Cambridge University Press.

[3] Bower, G.H, § Hilgard, E.R. (1981). *Theories of Learning.* London: Prentice -Hall, Inc.

[4] Gagné, R.M. (1965). *The Conditions of Learning.* New York: Holt, Rinehart and Winston, Inc.

[5] Bloom, B.S. (1976). *Human Characteristics and School Learning.* New York: McGraw-Hill Book Company.

[6] Ivie, S.D. (1998). Ausubel's learning theory: An approach to teaching higher order thinking skills. *The High School Journal,* 82(1), 35-42. Retrieved from:http://muse.jhu.edu/journals/hsj/

[7] Crow, L.D. § Crow, A. (1954). *Educational Psychology.* New York: American Book Company.

[8] Sprinthall, N.A. § Sprinthall, R.C. (1990). *Educational Psychology.* New York: McGraw-Hill Publishing Company.

[9] Eggen, P.D. § Kauchak, D.P. (2001*). Strategies for Teachers Teaching Content and Thinking Skills.* Massachusetts: Pearson Education Company.

[10] Hulse, S.H., Egeth, H. § Deese, J. (1980). *The Psychology of Learning.* New York: McGraw-Hill Publishing Company.