Using Concept Maps to Gauge Students' Understanding

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Concept maps have often been used as a brainstorming tool. This article provides lessons learnt from using concept maps as a formative, constructivist collaborative learning tool to gauge students' understanding.

Introduction

Teachers are often hard-pressed for time in the classroom. They have to finish the syllabus on time so that students will be prepared to take the respective examinations. It is difficult to have formative assessments on a weekly basis as it would not only add to the students' stress level but also the teacher's marking load. However, it would be very useful if the teacher could have a reflective gauge of the students' understanding of the lessons learnt weekly so that appropriate steps could be taken sooner to address any relevant concerns raised.

Concept Maps

Concept maps are helpful as a tool to gauge students' understanding because they make the knowledge construction process visible (Ligorio, 2002). Hence, students can focus on the task better as there is a common visible object to talk about with their classmates (Hmelo-Silver, 2003). In addition, Cuevas, Fiore and Oser (2002) mentioned that making students' reasoning visible helps them to see the relationship between the concepts in the material and identify any misconceptions or lapse in the relationship between the concepts. They added that concept maps provide an alternative modality to low verbal ability learners. Diagrams repeat the information presented in the text so students get to know the subject they are learning twice, in two different forms: text and graphic.

Sample

This procedure was tried out in a Technical Writing classroom in a university. The teacher met the students once a week for two hours. The students were required to write a technical report to be submitted at the end of the semester for assessment.

Procedure

Students were introduced to concept mapping and did a concept map on the topic "Singapore" before the teacher introduced to them the concept mapping task. The teacher then explained to them that each week, one group of students would be required to present a concept map in class. The benefits of doing this were clearly outlined to the students so as to motivate them to do the concept maps. The benefits are:

- students will have less text to read when they revise for the end of semester examination (a photostated copy of the maps have to be given by the presenters to the other students in the class to keep for reference and revision)
- an easier way to remember what has been learnt in class
- an easier way for the teacher to gauge their understanding without too much work on the students' part as it is done collaboratively and mainly on something that they would need to do anyway, in order to write their report.

After the teacher has finished teaching the week's lesson, a group of students (the students were grouped according to their

report group so that they could relate what they discuss directly to how they will write the report) will be chosen randomly to discuss outside class hours, on the topic "what they have learnt in class". They will then put down the results of their discussion onto a transparency in the form of a concept map. The following week, the group of students will present the concept map to the class in the first fifteen minutes of the class. The oral presentation serves as a summary of last week's lesson. The presenters have to answer any questions from the class after the presentation. After the students' presentation, the teacher would correct any misunderstandings or misconceptions as reflected in the concept maps and then re-teach those points.

Lessons Drawn from Using This Procedure

Form of External Representation

The concept maps must be drawn by the students themselves in order for it to be reflective of the students' understanding. Although students were encouraged to use concept maps, the choice of external representation should be ultimately left to the students. This is because some students can make do with short notes but some students feel strongly that they need to include examples in their maps. Some may also feel that a table, organization chart or a flow chart would be able to bring out what they want to explain more easily. When students are given this freedom, they have a sense of ownership and are more willing to try new things.

For example, in concept map 1, the students came up with their own acronym ("A-V-O-I-D") on how to write the conclusions chapter of their report. Their classmates liked this acronym and found it very refreshing and innovative.

1c.gif (32 Kb)
Figure 1: Concept map 1

Level of Students' Understanding

The concept maps were highly reflective of the students' understanding of the week's lesson. Concept maps which had only one level (no branching) often revealed that students had very superficial understanding of what has been learnt. This is again reflected in their oral presentation where they mainly repeated what was written in the map but could not explain any further or answer any of their classmates' questions. The teacher may need to call these students up to find out further whether they are having real difficulties in their learning or is it because they are not motivated to start on their report yet.

In concept map 2, the students did not have a clear idea about how to write their report. They were presenting on the Literature Review of their report in which there were four information elements: overview, reference to previous research, gaps in research and restatement of the objective. However, what they could understand from the lesson was that the overview had to be easy to comprehend. Their map did not reflect how are they going to write the overview and the examples were unclear and misleading.

2c.gif (28 Kb)
Figure 2: Concept map 2

On the other hand, concept map 3 showed that this group of students was clear about how to approach the task. For example, the way to write the background section in the Introduction chapter of the report is to "identify the specific problem then backtrack to the general idea". This statement is quite insightful and shows that students have internalized what they have learnt.

3a.gif (28 Kb)
Figure 3: Concept map 3

Note-taking

In some instances, the maps became more akin to note-taking. This is usually so when students do not try to relate the maps back to HOW they are going to write their report. Therefore, the teacher has to encourage the students to reflect on the way

that they are going to use the knowledge to write their report. Concept map 4 shows a complex concept map but there is no focus and only a small section is given to how to do the Literature Review.

4c.gif (28 Kb)
Figure 4: Concept map 4

Conclusion

Concept maps are useful tools because they are familiar to the students and do not require much time to learn how to use them. In the study above, the concept maps were very helpful to the teacher in providing an insight into students' level of understanding; and also to the students, as it helped them to integrate what they have discussed into their approach to writing their report.

References

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