Knowing & Learning Final Exam

Principle 1: It is important to incorporate formative assessment in teaching. Chapter eight in How Students Learn uses formative assessment in teaching functions. The students are asked to specifically identify different aspects of functions and analyze how functions work. The teacher leads an open class discussion on the topic, which provides the teacher information about what the students understand. This provides immediate feedback to many, if not all, of the students' answers and understandings. In providing immediate feedback through formative assessments, the students are able to recognize and address any misconceptions they may have. In allowing for this process to occur, the teacher is teaching for conceptual change. The teacher is able to take the results from a formative assessment and use them to either continue the students on their correct path of conceptually understanding the topic, or to help them to identify flaws in what they currently believe to be true. The teacher would then help the students to understand a more plausible idea in order to progress and to ultimately achieve conceptual understanding. By including formative assessment in the classroom, students are able to exhibit traits of metacognition. Through the informal evaluation process, students are able to evaluate and justify their own thoughts. Students need to be able to monitor their progress to reflect on their solutions and strategies. Students can consider what they personally believe to be logically true and detect potential inconsistencies in their knowledge. For the times that formative assessment does not produce tangible feedback, students are still able to answer a question in their head and give themselves immediate feedback by comparing their answer to what the teacher and/or class deems correct. Formative assessment proves to create an assessment-centered environment. This environment allows for multiple opportunities for feedback and revisions (Bransford 200). The feedback helps the students understand what they understand

correctly and where they might have gone wrong. With this information, the teacher can alter the current lesson, allowing it to proceed from the point and at the speed which the student needs.

Principle 2: It is imperative to teach for conceptual change to help insure students will leave the classroom with the proper knowledge. In How Students Learn, chapter seven, there is an example of a lesson teaching rational numbers. To begin, the teacher evaluates what knowledge the student brings to the topic and then makes decisions as to where to begin teaching. The teacher then relates something the student should have a basic understanding of, in this case percents, to the topic, rational numbers and progressing from there. In doing this, the teacher has set the foundation for conceptual change to occur. A learning theory that correlates is conceptual change. The teacher should provide many different conceptions from which students are to choose the ones they believe in. These multiple conceptions can be presented by way of the teacher standing in front of the class listing them, or more preferably, by drawing the ideas from individual students. With many different beliefs displayed, each can then be discussed openly and each student can draw on the information to either capture, restructure or exchange their beliefs (Hewson 1996). In teaching for conceptual change, it is important to watch for repeated surface errors, if a student is continuously coming up with wrong answers without self-correcting, there could be a deeper weakness in the student's conceptual understanding (Donovan 2005). A How People Learn principle which ties into teaching for conceptual change is understanding that students bring preconceived knowledge with them to the classroom which may or may not be correct. When teaching for conceptual change, the teacher is able to assess what the student currently believes to be true and can monitor his/her beliefs as they adjust. This will foster a knowledge-centered classroom, which will expose students' present knowledge while simultaneously drawing out preconceptions. With these likely incorrect preconceptions,

the teacher is to then understand why the students choose to hold on to these beliefs and from there, work to properly adjust the student's knowledge making what they believe to be true, to be accurate.

Principle 3: Teaching by way of multiple representations can prove very effective by providing multiple ways of viewing each topic. Once again, the eighth chapter in How Students Learn teaches students that functions can be represented in multiple ways. Beginning with the basic form of a numerical function, then by plugging in numbers the students can form a table, then by plotting the points from the table they create a graph of the function (Donovan 2005). In doing this the student can follow step by step from one representation to another. Once the student has a strong understanding the type of representation and application of the topic can be altered; possibly including a word problem, or real-life application, such as the walkathon from chapter 8. The learning theory used in this principle is information processing, the teacher will connect one aspect of a topic to another aspect, step by step, forming the links between them. In this process the teacher must be sure that the student is properly understanding and making connections between the different representations. A good example to check whether a student has formed the proper links is to have them work backwards to test whether or not they can retrieve the proper information. If we know the student knows how to fill in a table given a function, can the student also discover the function that corresponds to a filled in table or graph? Using the second principle of How People Learn, it is important to build a strong factual foundation as well as an umbrella of support of conceptual understanding of a concept; therefore granting the ability to have fluency to move from one idea to another. Incorporating multiple representations into a concept generates a community-centered environment. It brings together different examples and representations from both in the classroom as well as from the

community. Like in the lesson from chapter eight, real-world examples can be brought into the classroom, while at the same time, mathematical concepts can be applied in the real-world. In learning a topic in class, such as the walkathon represented as a function, students could then host a walkathon for their school or community. Applying what they learned outside the classroom. Or conversely, asking students to construct an example of a function from outside the classroom, something they encounter in the community and bring those examples into the classroom.

Principle 4: Creating a self-regulated learning environment is effective for classroom instruction because it allows students to make personal discoveries about a topic and decide for themselves information pertaining to the topic. A lesson from How Students Learn, chapter eleven uses open inquiry to promote self-regulated learning among students. The simple task of placing a card over a glass of water and inverting the glass provides much room for explanation (Donovan 2005). Students are able to think of their own reasons why the card is able to hold the water up, what is happening to keep the card there and how the entire system works. The students were allowed freedom to explore these questions and given the opportunity to learn on their own. A self-regulated classroom follows the conceptual change theory in that it allows students to evaluate what they know to be true and compare it to information they are currently presented with. During this comparison, students are able to decide for themselves what information makes sense using their previous knowledge alongside their new knowledge. By implementing a self-regulated learning environment, students are required to depend on their metacognitive skills to help them progress through a situation. When little guidance is given by the teacher, students must rely on what they think should be tested and what they believe to be true to reach a conclusion. A learner-centered environment is likely to develop in a self-

regulated learning classroom, where the teacher understands that each student is likely to construct their own meanings and beliefs (Bransford 2000). Through this learner-centered environment the students will use what they already know and compare it to the new information they are observing. Students will metacognitively think about this new information and either make sense of it, or ask for clarification (Bransford 2000).

Works Cited

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