Janet Barker ETEC 530 Lesson Plan

Sine Curve Transformations

Lesson Rationale

This lesson is dramatically different than lessons I have used in the past to teach this concept. I designed the lesson based on a combination of Driver and Oldham's model, as outlined by Matthews (1994) and White and Gunstone's (1992) Predict-Observe-Explain (POE) model. The lesson is intended to be done in class in a blended learning environment, using a variety of the affordances of technology.

In the past, I would have either done this lesson as a lecture, or given the students a few examples to try on their graphing calculators and then quickly discussed the results as a class. The "exploration" on the calculators would have been used more as an introduction than true exploration. I would have referred to previous knowledge and encouraged participation by class discussion and questions, but the overall lesson would have been teacher centered. In contrast to this, the online lesson that I have developed is student centered.

The lesson begins with a reference to the "Unit Problem". Although this problem is not addressed during the lesson, it is clear that the goal of the lesson is to develop the tools necessary to solve the unit problem. The unit problem is followed up with a "mini problem" that is the center of the lesson. These two problems provide the orientation for the students, providing them with a "sense of purpose and motivation" (Matthews, 1994; p. 143) to engage in the lesson.

The lesson moves on to Vocabulary and a section called What Came Before. These two sections represent the elicitation stage. The questions that accompany both sections access prior knowledge and set the stage for connections with new learning. They also set the tone for collaboration by placing the responsibility for the learning of each individual on the group as a whole, promoting positive interdependence (InTime, 2008).

The next two sections of the lesson are Predict and Explore. These two sections restructure student ideas by giving them a chance to predict what the relationship is, evaluate that prediction and then work collaboratively to find a working solution to the mini-problem. This aligns with both Driver and Oldham's restructuring stage (Matthews, 1994) and POE's (White & Gunstone, 1992) predict and observe stages. Clarification and construction of ideas comes through collaboration, discussion, and experimentation, which is achieved through the use of technology. The plan provides an opportunity for multiple representations of the concept by providing the students with different options for technology. With no restrictions on the technology they can use, students are free to use multiple applications or to find a representation that is personally meaningful to them. The technology also gives them an opportunity to evaluate their ideas.

The Revisit section of the lesson solidifies the ideas that the students have conceptualized in the Predict and Explore sections. This section provides the students the opportunity to practice and apply the new concepts by having them create their own problems and working as a group. By challenging each other, the students can see if there are any problems with the model they have developed and have an opportunity to refine it. As there are infinitely many correct solutions to any sine curve, this section also asks the students to discuss the possibility of more than one correct solution and why this might occur, dispelling the mathematical myth that there is "one" right answer for all problems. This section of the lesson exhibits the principles in the application stage of Driver and Oldham's (Matthews, 1994) model and the explain stage in the POE model (White & Gunstone, 1992).

Finally, the What Comes After section brings the students back to the original mini-problem, relates the learning back to prior knowledge and sets the stage for the next day's lesson. This corresponds to the review stage of the Driver and Oldham model (Matthews, 1994). This section also refers to an asynchronous discussion forum that provides the group members an opportunity for individual reflection.

Overall, I feel that this lesson exhibits the principles of constructivism. It is student-centered, based on an over-riding, authentic problem and built on extensive use of collaboration. It affords the students the opportunity to predict, explore and explain the concept using a variety of representations and student choice in technology. It changes my presentation of this lesson from transmission to constructivism enhanced by the purposeful implementation of technology.

References:

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