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TE 846

Final Project

Topic: Use of flow charts to understand math story problems.

Theory: The cognitive model, purpose is to learn through structuring and restructuring of memory.

1) **Summary**

Theory: Cognitive Model

The cognitive model is based on "learning as a structuring and restructuring of memory.[i]" Everything that the student takes in plays a part in their learning, and the "mental associations[i]" that the student makes is what is important. Information will enter the brain and find a pattern with previously learned material, or it will start a new pattern, or it will be discarded from the brain. The hope is that inputs will find experiences to attach to and increase our understanding of materials. Our brain works like a Möbius strip where we learn material in spirals where we seamlessly overlap our informal educational experiences with our formal educational experiences[ii]. How we take in the formal educational material needs to be formatted to increase the ability for our brains to make connections between materials to enhance understanding. The cognitive model makes use of visual organizers to help organize how our brain takes in material, and these work for all different types of students.

Practice (Value in differentiated instruction: ELL & LD)

English language learners and learning disabled students alike both need direction in their learning. Through the use of visual organizers before, during, and after a lesson students can streamline their thought process and visualize where they are going. "For language learners, they can also enhance their literacy (i.e. reading and writing) skills and study skills.[iii]" Shumin Kang[iii] lists the advantages of using visual organizers as:

- allow users to develop a holistic understanding that words cannot convey

- provides users with tools to make thought and organization processes visible

- clarify complex concepts into a simple, meaningful, display

- assist users in processing and restructuring ideas and information

- promote recall and retention of learning through synthesis and analysis

While English language learners struggle with language proficiency learning disabled students struggle with organizing their learning for proper use. The use of visual organizers (flow charts, venn diagrams, etc.) would allow for students to brainstorm, make use of prior knowledge, and then organize their thoughts. A study done by the University of Washington shows that the use of graphic organizers strongly enhances a student's ability to be able to move through, and be

successful, with classroom material[iv]. In this study they found that not only student's with learning disabilities, but also student's in need of remedial help were greatly influenced by the use of graphic organizers.

Examples specific to your tutoring student or subject

Though my students are neither English language learners, nor legally learning disabled, they struggle with organizing their thinking and it often keeps them from being able to put everything together. I will be making use of different types of visual organizers in the process of working through mathematical story problems.

2) Lesson Plan Using Visual Organizer

Subject: 8th Grade Math

Topic: Consumer Math: Unit prices with unit conversions

Purpose: To allow students to make use of previously learned knowledge in real world context in order to deal with unit conversions.

Materials: Website http://www.ixl.com/math/grade-8/unit-prices-with-unit-conversions

Various examples of graphic organizers

Basic unit conversions (ft to inches, cups to ounces, etc.)

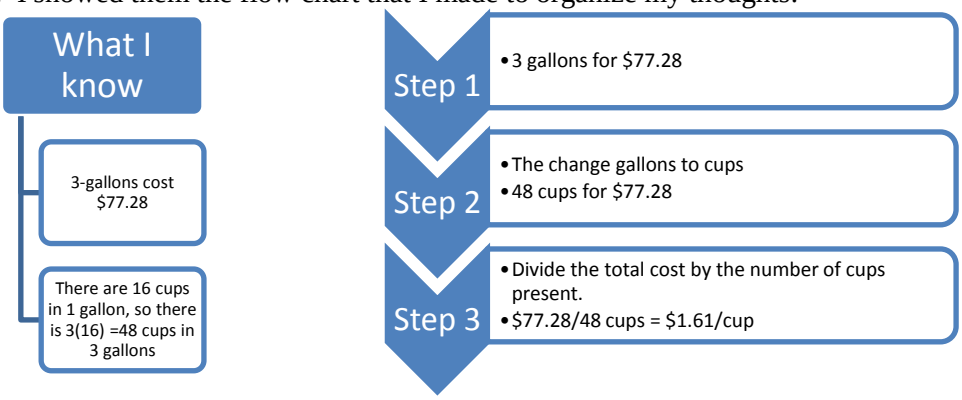
Lesson Plan:

1. This lesson plan follows a day of comparing what it means to have different amounts of items. By working with measuring cups, rulers, and other tools they were able to compare how units could be converted in real life. Students created their own mini conversion chart based on their observations. Also students have learned about various types of graphic organizers continuously throughout the year.

2. At the start of class pass out a unit conversion sheet from their textbook. Talk about yesterdays experience and discuss unfamiliar units on the sheet.

3.Think-Pair-Share. Put a problem up on the board: "A 3-gallon bucket of paint costs $77.28. What is the price per cup?" and ask students to solve the problem showing all work (THINK). After all students have come up with work, and answer, they must then pair up with a neighbor and each must explain what they did (PAIR). Then after a hopefully good debate on how each student went about their set up, each group comes up to the board to share their method(s) (SHARE). At this point it is important to highlight the path that each student takes in their process, and describe it using flow charts. At this point students also get to ask questions about their methods.

4. As a class we discuss how we can make use of graphic organizers to brainstorm and then organize our thinking. I showed them the flow chart that I made to organize my thoughts:



5. After a class discussion on my method we went to the computer lab where the kids were to log onto the website listed at the top of the page. They then had to write out the original question, show all of their work, and then write the correct answer. The website gives instant feedback on their answer along with offering an explanation. They have to work through as many problems as they can in the hour. When finished they will hit "submit and finish" printing off a sheet which tells me how many questions they got correct out of the total number attempted. This will give motivation and satisfaction to those who do well, and for those struggling it will allow me to provide help where needed.

3) Rubric

Points ____ / 10	**Expectations**
Effort	
5	Works hard the entire time at the computer lab, asking questions whenever stuck. Does not wander onto other sites, or find themselves socializing with others in such a manner that it takes them off task.
3	Works hard a good majority of the time at the computer, but does find themselves distracted along the way.
1	Does not put in the effort necessary to complete the task.
Showing Understanding	
5	Works through as many problems as the student can handle in the time frame provided with great effort. Shows all work, and explanations, for each step. Gets a majority of the problems correct, and seeks out explanations for all problems they get wrong providing work/explanations for what they should have done.

3	Works through a good number of problems, but does not provide explanations/work for everything. When they get problems wrong they do not seek out explanation for what they did wrong.
1	Works through very few problems, shows no work, and does not seek out any explanations.

4)Teach lesson / Take Notes

I taught the lesson to my older student who just finished 8th grade. Because we were in a house we were able to expand the playing with measuring items to expand to actually making something, and talking about the conversions of units. Since she loves to help her mom in the kitchen she found that this portion of the lesson was rather rewarding. Then we moved on to talking about conversions and ran through the lesson. Because it was just my one student I was not able to do a full think pair share. I just had her show me her work and walk me through it. Then using her ipad I had her complete the conversions on the website writing out work/explanations for everything that she did. She started out rough but once she got into it she did wonderful. She seemed to really like the flow chart method.

5) Write a reflection about the lesson:

Teaching: What, if anything, did incorporating UDL (for example,concept map/graphic organizers) contribute to the lesson/unit?

The incorporation of graphic organizers, specifically flow charts, to my lesson allowed for me to provide my students with a method of organization to their work. Also it allowed for me to have the ability to better track the path of their work to see where they went wrong. I don't see it as a requirement that students use this all the time, but it is a good way to help them to organize their work.

Learning: Analyze one student's performance: What, if anything, did incorporating alternative formatting like a graphic organizer or other tool contribute to student learning?

My student did her warm-up problem and her paper was a mess of work. There was work written all over the place, and there seemed to be no flow to her work. As a teacher it is very hard to give a student help when you can't figure out their method. Her answer was wrong, but I didn't tell her this yet, so I had her talk me through all of the steps that she took in order to get her answer. What I found is that while her thought process was right she divided the price by 16 instead of 48 in order to get her answer. We had a discussion about this piece, and she seemed to grasp it. While she was talking me through her explanation I was putting it into a flow chart to show how it could organize her thoughts. She really liked how much easier it was to understand her work in a flow chart then when her work was all over the page. I then had her go to the webpage on her

ipad to work through various problems showing all work/explanations. I noticed that while she was working she started out in her old manner of work everywhere, and because of this she was getting lost easily. She got the first problem wrong because she was struggling to follow her own work. She used the explanation available and I reminded her of using the flow chart to show her work. She went back through the problem using the chart and found that she was able to pinpoint her mistake much easier. I then had her work through as many problems as she could finish in the remaining 30 minutes, and found that while she only finished 8 problems she was using the flow chart effectively. She told me that it helped to organize her thoughts and be able to find where she went wrong. This was the intended effect in that it increased her motivation within the problem because she didn't have to search through all of her "mess" of work so she could work without distraction.

6) Useful UDL resources

- http://www.ixl.com/math/grade-8/unit-prices-with-unit-conversions

- Kang, Shumin. Using visual organizers to enhance EFL instruction. ELT Journal Volume 58/1 January 2004. Oxford University Press.

- Steven V. Horton, Thomas C. Lovitt and Donna Bergerud. The Effectiveness of Graphic Organizers for 3 Classifications of Secondary Students in Content Area Classes. *J Learn Disabil* 1990 23: 12

7) Self-evaluation:

- What did you learn from this project?

While this project was tough in the fact that I didn't have a whole class to work through it with I really enjoyed this because the use of graphic organizers really did help my student work through 8th grade level word problems. These are hard tasks for students of all ages but by giving her the ability to organize her she was then able to use the skills she had to solve the problem. By removing the thought process of organization it clears up more room for academic thought.

- Do you anticipate using all/any of this information in the future?

I am going to use graphic organizers as much as possible in my teaching career because I believe they are very useful. I am teaching biology next year and graphic organizers will be very helpful in terms of classification, and other units, for helping students organize themselves.

- Please share your perception of the value of this lesson in your current teaching situation or for the job you hope to have.

In this lesson students gain a sense of self-efficacy because they find that without the worry of organization they are able to focus on their work and be successful. My school

is very focused on creating students with a sense of self-efficacy, but that has to start with how us teachers run our classrooms.

[i] Svinicki, Marilla D. New Directions in Learning and Motivation.
[ii] Bateson, Mary Catherine. Peripheral Visions.
[iii] Kang, Shumin. Using visual organizers to enhance EFL instruction. ELT Journal Volume 58/1 January 2004. Oxford University Press.
[iv] Steven V. Horton, Thomas C. Lovitt and Donna Bergerud. The Effectiveness of Graphic Organizers for 3 Classifications of Secondary Students in Content Area Classes. *J Learn Disabil January 1990 vol. 23 no. 1 12-22*