Action Research Project

Evaluating the Use of Video Review in Developmental Math

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Destinations Summer 2013
**Action Research Project**

**Faculty Learning Outcome #1**
Design, produce and implement an instructional video for Developmental Math II to improve students’ abilities to solve linear equation application problems.

**Essential Competencies and Indicators Addressed:**

1) **Assessment**
   - Give timely feedback on class activities, exams, and papers
   - Align summative evaluations with course outcomes and learning activities (appropriate to level of thinking and performance)

2) **Outcomes-based**
   - Construct measurable learning outcomes
   - Design assessments that demonstrate student growth in the student core competencies (Think, Value, Communicate & Act) and program learning outcomes.
   - Use evidence of student learning to review and improve courses and programs

3) **Professional Commitment**
   - Contribute to discipline/academic field
   - Collaborate with colleagues and dean/director to assure and to demonstrate progression of student learning across courses and programs

4) **Scholarship of Teaching and Learning**
   *(All indicators are required for Scholarship of Teaching and Learning)*
   - Produce professional work (action research or traditional research) that meets the Valencia Standards of Scholarship
   - Build upon the work of others (consult experts, peers, self, students)
   - Be open to constructive critique (by both peers and students)
   - Make work public to college and broader audiences
   - Demonstrate relationship of SoTL to improved teaching and learning processes
   - Demonstrate current teaching and learning theory & practice
Clear Goals

A. Abstract
The purpose of this research was to determine if using an instructor-created review video for hybrid Developmental Math II classes would improve students' abilities to solve linear equation application problems. The video models step-by-step procedures for solving a variety of linear equation application problems.

The research involved four hybrid developmental math courses during Fall 2013. For two classes (experimental group), viewing the new video was required in the students' online work. The other two classes (control group) did not have the review video during the three-week measurement period. In Phase One my students watched the video, completed guided notes, completed online homework, and then completed the Module Two quiz (common college-wide assessment). In Phase Two, at the completion of the linear equations unit, all four classes took the unit exam. Data was collected on four related questions from the exam.

The results of the project showed that for Phase One, the video classes had a slightly higher average on the common assessment. For Phase Two, the classes that did not have the video performed slightly better on the unit exam questions. Statistically, there is no significant difference between the video vs. no video classes. However, a qualitative student survey indicated students felt the video helped improve their abilities to solve linear equation application problems.

B. Research Question
Will using an instructional video for Developmental Math II improve students’ abilities to solve linear equation application problems?

Adequate Preparation

Background from Multiple Perspectives

1. Student Perspective

During class discussions and conversations with individual students, I discovered that students are often confused as to where to begin when asked to complete linear application (word) problems. Then, if they do begin the problem in the methods that are taught, they often confuse the formulas needed to solve the problem. They seem to need more guided practice in the variety of problems. A formative assessment given in May 2013 (May 2013 Dev II hybrid survey) asked for recommendations on how I could improve their learning in our hybrid course. A student cited, “longer class times so we don’t have to cram everything in.” An instructional video would be an extension of class time. Another insightful student stated, “Guided emphasis on completing the modules (common assessments) which tended to be more difficult than anything done in MyMathLab.” My students are asking for more guided learning and an extension
of class-time. The new instructional will meet these needs. The video guides the
students through solving linear word problems and provides them with a new
resource to aid their learning.

2. **Colleague Perspective**
Conversations with colleagues have confirmed that solving linear equation
application problems (Module Two) is the topic and assessment that students
struggle with the most. A faculty survey given in May 2013 (Colleague Survey
May 2013) confirmed these findings with the majority of respondents listing
Module Two as their students’ most difficult assessment. My colleagues believe
that a review video would be a helpful resource; however, some are skeptical
whether students will watch the video. This is a point that I had to consider for
implementing this project.

3. **Expert Perspective**
In preparation for this research project, I consulted literature to confirm that
incorporating an instructional video would be beneficial for student learning. I
found that a study from the *American Journal of Distance Education* researched
the effect of context-based video instruction in learning and motivation in online
courses. They found, “There was a significant difference in learners’ motivation
in terms of attention between the video-based instruction and traditional text-
based instruction. In addition, the learners reported that the video-based
instruction was more memorable than the traditional text-based instruction”
(Choi 2005).

Experts agree that giving students the ability to pause and rewind their teachers
is revolutionary. Having control of the remote during an online lecture aids both
slow and fast learners, and reaches the visual and auditory learners.

In my research, particularly from *Flip Your Classroom* (Bergmann 2012) and
others, I have learned what makes a good instructional video. A few qualities of a
good video are: keep it short, keep it simple, keep to your topic, and work out the
math problems on the screen.

Sources
Bergmann, Jonathan, and Aaron Sams. *Flip your classroom: reach every student in
every class every day*. Eugene, Or.: International Society for Technology in

Cennamo, Katherine. “Increasing Educational Videos’ Effectiveness.” *USA Today

Choi, Hee. and Johnson, Scott. “The Effect of Context-Based Video Instruction on
Learning and Motivation in Online Courses.” *American Journal of Distance


4. **Self Perspective**
   
   It is my personal experience that my students struggle on the solving linear equation word problems concepts and on the common assessment of these skills (Module Two). Currently, we do not have an instructional video that reviews the different application problems that the students need to know. I believe that my students need to watch a review of the different problems to help them sort out how each variety is solved. A video will give the students a resource to use, as the hybrid course has limited face-to-face time, and limited time for review.

**Appropriate Methods – Methods & Assessment Plan**

**A. Methods**

1. **Student Learning Outcome**

   1. The student will be able to solve algebraically a word problem involving perimeter.

   2. The student will be able to solve algebraically a word problem involving area.

   3. The student will be able to solve multi-step problems involving fractions or percentages.
2. Performance Indictors of Student Learning Outcomes

1. The student will be able to solve algebraically a word problem involving perimeter.
   - The student will identify the problem as perimeter.
   - The student will identify the unknown quantity.
   - The student will recall the perimeter formula.

2. The student will be able to solve algebraically a word problem involving area.
   - The student will identify the problem as involving area.
   - The student will identify the unknown quantity.
   - The student will recall the appropriate area formula.

3. The student will be able to solve multi-step problems involving fractions or percentages.
   - The student will identify the unknown quantity.
   - The student will translate the word problem into mathematical quantities.
   - The student will recall the appropriate formula.

3. Teaching Strategies of Student Learning Outcomes

   Background:
   In the hybrid Development Math II course, the students learn by doing through working on math problems in the online platform, MyMathLab. For each online homework problem there are ancillary 'help' features such as “help me solve this”, “textbook”, and “short video clips.” The students receive instant feedback on whether the problem is correct or not. Besides the MyMathLab ancillaries, the students watch Valencia-created, instructional videos of the major concepts in the course; class time is limited to 75 minutes per week. During this face-to-face class time, the instructor goes over questions that the students have, facilitates group work, and/or provides a “mini” lecture on highlights of the upcoming material. The students then spend an additional 75 minutes in a computer lab where they can receive one-on-one help from the professor or math tutors. All exams are taken in the testing center.

   This course has a common final exam procedure that involves the students completing seven common assessments for specific math topics. If all seven assessments (modules) are passed at 100%, the student does not have a “cut-off” score on the final exam. My research question is directed at finding out whether an instructional video for Developmental Math II improves students’ abilities to solve linear equation application problems, as measured by the common assessment.
My instructional video shows examples of a variety of problems with steps on how to solve them. This video resource allows my students to pause and replay to aid their different learning styles. The video was placed on their course as a required assignment, before the common summative assessment on linear applications (Module Two).

I provided the new instructional review video for two of my Dev. Math II classes (experimental group) in September to October, and during the specified time period, I did not implement the video in my other two Dev. Math II hybrid classes. However, the two classes in which I did not implement (control group), now have been given full access to the new video for end of the semester final exam preparation. During this end of the semester time, students rework the modules for unlimited attempts. In this manner, I am not withholding something that may prove to be helpful to all my students.

**Teaching Strategies**

This project took approximately three-weeks to implement. The students performed most of the work outside of the classroom. This was a hybrid course that had limited face-to-face time.

Step 1. Teach the linear equation (word problem) unit through mini-lecture in face-to-face time, then assign online homework with ancillaries and the required hybrid math lab time.

Step 2. Assign the new instructional video to help them review the variety of word problems for the Module Two quiz.

- Artifact 1 – Instructional video [http://tinyurl.com/owyxcal](http://tinyurl.com/owyxcal)

Step 3. Students watch the video outside of class and take notes using guided note sheets as a prerequisite to taking the Module Two quiz.

- Artifact 2 – Sample of a student’s completed guided note sheets.

Step 4. Students take the Module Two quiz online at home and then turn in their written work.

- Artifact 3a, 3b, 3c – Sample of a student’s written work.
- Artifact 4 – The Module Two quiz.

Step 5. Students take a survey using Qualtrics to explore their perceptions of the new video.

- Artifact 5 – Survey
Step 6. Students take a Unit Exam covering linear equation application problems and other related topics.

- Artifact 6a, 6b – Unit Exam linear equation application questions with students’ work.

B. Assessment Strategies

1. Formative Assessment
   - Walking around coaching individuals during class work
   - Survey of student perceptions of the instructional video

2. Summative Assessment
   - Results of Module Two Quiz
   - Results of linear equation application questions on Unit Exam (4 questions)

C. Action Research Methodological Design

The sample used for this study consisted of four hybrid Developmental Math II (MAT0028C) courses over a 16-week Fall 2013 semester at Valencia College. Two classes of 27 students were provided with an instructional review video prior to a summative quiz. The other two classes of 28 students were not provided with the review video during the timeframe of data collection. Instead, the video was provided at the end of this measurement period in preparation for their final exam and module completion process. The assessment of this research is separated into three phases.

Phase 1 – Compare the Module Two results of my experimental group with my control group. The results will be measured at a specific deadline, since students are allowed unlimited tries.

- Statistical comparison of the Module Two assessment results.

Phase 2 - Compare the results of four problems on the Unit Exam of my experimental group with my control group.

- Statistical comparison on the four Unit Exam questions related to linear equation application problems.

Phase 3 – Discuss the formative qualitative survey results.
Significant Results

Project Results:

My research question was, “Will using an instructional video for Developmental Math II improve students’ abilities to solve linear equation application problems?” I analyzed my data in three phases.

Phase 1 evaluates the experimental group’s (two classes with the review video) performance on the Module Two linear equation application problem quiz, and compares this with the control group (two classes that did not have the review video during this assessment). It is important to note that the Module Two quiz was completed outside of class, in a non-proctored environment where students may have received outside help. The students had unlimited attempts during the two-week measurement period.

Module Two Quiz

<table>
<thead>
<tr>
<th></th>
<th>Experimental Group (Video)</th>
<th>Control Group (No Video)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>13.4</td>
<td>12.8</td>
</tr>
<tr>
<td>Median</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.52</td>
<td>3.34</td>
</tr>
<tr>
<td>Sample size (n)</td>
<td>27</td>
<td>28</td>
</tr>
</tbody>
</table>

![Module Two Quiz Grades](image)
Comparing the mean Module Two scores gave an initial indication that the video group had a higher mean. The mean of the experimental group was 13.4, compared to 12.8 mean of the control group. A histogram of my data shows that my sample population is not normally distributed. After exploring alternative nonparametric statistics tests, I decided to use the Mann-Whitney Test for significance, which looks at the medians of the populations.

Null Hypothesis $H_0: M_E = M_C$ versus Alternative Hypothesis $H_1: M_E \neq M_C$ 1-tailed test

Where $M_E$ is the median of experimental (video) group and $M_C$ is the median of control (no video) group, independent samples of size N> 20, significance level 0.05, one-tailed, and the p-value is 0.50286. The result is not significant at $p \leq 0.05$.

The test conclusion is that no significant difference exists between medians of my experimental group and my control group.

**My response:** The video group had a higher mean on the Module Two assessment. This is what I was hoping for, but next I needed to determine whether the scores were high enough to indicate that it was more than a random occurrence. Because my groups did not fit a normal distribution pattern, I had to consider a nonparametric hypotheses test. The statistical hypothesis test (Mann-Whitney Test) determined that the medians of the two groups were not significantly different. So I cannot conclude that the video improved the scores. It may have been a random chance.

**Phase 2** evaluates the results of four questions from the Unit Exam that cover linear equation application problems from the students in the experimental and control groups. The Unit Exam was proctored in a testing center environment. Simply looking at the data it appears that the experimental group performed slightly lower on the four exam questions, when compared to the control group. Again, my data was not normally distributed. I analyzed this set of data using the Mann-Whitney test for significance. Below is my data summary and a frequency distribution graph on the 4 related questions.

**Linear Equation Application Questions from Unit Exam**

<table>
<thead>
<tr>
<th></th>
<th>Experimental Group (Video)</th>
<th>Control Group (No Video)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>3.18</td>
<td>3.27</td>
</tr>
<tr>
<td>Median</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.82</td>
<td>0.75</td>
</tr>
<tr>
<td>Sample size (n)</td>
<td>29</td>
<td>28</td>
</tr>
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</table>
Mann-Whitney test results

\( H_0: M_E = M_C \) versus \( H_1: M_E > M_C \) 1-tailed test

Independent samples of \( N > 20 \), with significance level of 0.05 gave a \( p \)-value = 0.72786. The result is not significant at \( p \leq 0.05 \).

The test conclusion is that there is not a significant difference between the medians of my experimental group and my control group.

My response: I was surprised to see that the control group did slightly better on the Unit Exam questions than the experimental group (3.27 out of 4 for the control group and a 3.18 out of 4 for the experimental group). The hypothesis testing suggests that this was a random chance. I hadn’t anticipated this result.

Phase 3 evaluates the results of my qualitative measurement of whether students perceived that the video was helpful. I surveyed the experimental group to collect their feedback on using my instructional review video. Overall, the students’ views were very positive. The survey finds students’ felt they benefited from watching the review video; 18 out of 19 agreed that having the instructional review video helped improve their ability to solve linear equation application problems.

The survey asked, “What did you find helpful about the Module Two review video?”
Student responses:
- “Learning the equations to use in order to find the length of a rectangle, when no width or length is given specifically. Also, I found this video helped me understand how to break down word problems, and only focus on the important and key words of the word problem.”
- “You went step-by-step and explained how to do the problem.”
- “How the notes were pre-made and I just filled in the work.”
- “Brief but clear and helpful explanations, diagrams and pictures.”
- “Everything was explained slowly, making it easier to comprehend.”

The survey asked, “Are there any comments you would like to share about having an instructional video to review before taking a module quiz?”

Student responses:
- “It really helped in gaining confidence in knowing what I was doing. I would really like for there [sic] to be a module review video for each module quiz. It is a good refresher, and a great way to practice and review.”
- “I enjoyed this video; [sic] it helped me understand the material better.”

Please answer the following.

<table>
<thead>
<tr>
<th>#</th>
<th>Question</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neither Agree nor Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Total Responses</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
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<td>1</td>
<td>The types of problems used in the video helped me understand linear word problems.</td>
<td>8</td>
<td>10</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>19</td>
<td>1.63</td>
</tr>
<tr>
<td>2</td>
<td>The presentation of the video was clear.</td>
<td>14</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>19</td>
<td>1.26</td>
</tr>
<tr>
<td>3</td>
<td>I would watch other review videos on the other six module topics.</td>
<td>10</td>
<td>8</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>19</td>
<td>1.53</td>
</tr>
<tr>
<td>4</td>
<td>Watching the Module 2 instructional video improved my ability to solve linear application word problems.</td>
<td>9</td>
<td>9</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>19</td>
<td>1.58</td>
</tr>
<tr>
<td>5</td>
<td>It would be helpful to have similar instructional review videos for the other six modules.</td>
<td>11</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>19</td>
<td>1.53</td>
</tr>
</tbody>
</table>
The types of problems used in the video helped me understand linear word problems. The presentation of the video was clear. I would watch other review videos on the other six module topics. Watching the Module 2 Instructional video improved my ability to solve linear application word problems. It would be helpful to have similar instructional review videos for the other six modules.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>The types of problems used in the video helped me understand linear word problems.</th>
<th>The presentation of the video was clear.</th>
<th>I would watch other review videos on the other six module topics.</th>
<th>Watching the Module 2 Instructional video improved my ability to solve linear application word problems.</th>
<th>It would be helpful to have similar instructional review videos for the other six modules.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min Value</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Max Value</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Mean</td>
<td>1.63</td>
<td>1.26</td>
<td>1.53</td>
<td>1.58</td>
<td>1.53</td>
</tr>
<tr>
<td>Variance</td>
<td>0.36</td>
<td>0.20</td>
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<tr>
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<td>0.45</td>
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<td>0.61</td>
<td>0.70</td>
</tr>
<tr>
<td>Total Responses</td>
<td>19</td>
<td>19</td>
<td>19</td>
<td>19</td>
<td>19</td>
</tr>
</tbody>
</table>

**My response:** I was encouraged to hear my students’ feedback. I was glad that they felt that the video helped improve their abilities. One thing to note, I was glad that in the survey I asked specific questions regarding the video. These questions are beyond the scope of my research, but informative to my practice. For example, I received feedback: the length of the video was about right and the presentation was clear. One of my mentor colleagues suggested that I research self-efficacy and how it relates to surveys. From her research she cautioned me that surveys are not always a valid measurement as some students that like their teacher tend to answer the survey questions the way they think the teacher would like them to answer. This was a new idea to me and one that requires further consideration.

**Conclusion:** My research question was: Will using an instructional video for Developmental Math II improve students’ abilities to solve linear equation application problems? My answer: Students believe that the video helped improve their abilities on linear equation application problems; yet, the summative data does not statistically indicate this. I will continue to use instructor-created videos, realizing that they may not be the most effective method of instruction.

**Reflective Critique**

**A. General Reflection**

I was excited to begin this project as I felt that having a review video would help students improve their abilities in linear application problem solving. Because a hybrid course has limited face-to-face time, I knew that it would be a challenge to implement all phases of the research in a controlled manner. However, I figured that a hybrid course lends itself more naturally to video use. Having an instructor created review video would give my students a resource they could watch multiple times on one of their most challenging topics. Although my quantitative data did not show a significant difference in improvement, the qualitative data did. I was encouraged that 18 out of 19 student felt that having an instructional review video helped improve their abilities in solving linear equation application problems.
I enjoyed learning how to use Camtasia Studios for my video creation. I am glad that I completed the PowerPoint slides and video the summer before my implementation, because creating the video and then editing the video took longer than I expected. I plan to use Camtasia to create future instructional videos. I was thankful that my past experience using MyMathLab helped me to figure out how to add the video assignment and set up prerequisites for the Module Two quiz. This way the online program controlled the order of assignment events. I’m glad that I spent several weeks researching instructional videos and reading articles on how best to create a video. My student survey reflected that the video was clear and useful.

Introducing the project went smoothly; the students were interested in the fact that I was trying something new and that I was doing research. They appreciated me giving them the guided note-sheets to use when viewing the video. In the future, I am going to use more guided note-sheets to go along with instructional videos that I create. At our next class, I was disappointed that only about half of the Tuesday class had their completed guided note-sheets and about a third of the class had not completed the Module Two assessment as they should have. My Thursday class had better participation. I decided that I needed to give all the classes another week to complete the work. In the future, I would allow more time for a special project. The first class was my pilot run, so I probably improved my delivery of the project requirements for the second class.

My Phase One data (Module Two results after watching the video) was as I had hoped. The video classes had higher averages on the Module Two assessment. However, performing a statistical hypothesis test showed that the results were not significant. This conclusion prompts me to want to test a larger data set. I would like to create review videos for all seven modules and implement and measure if this would have a statistical significance on students overall course performance.

Phase two data was surprising and unexpected. I did not expect the video classes to perform at a lower level on the Unit Exam than classes that did not have the video during this implementation phase. Why didn’t they perform better? Perhaps the students did not retain their abilities or because the assessment conditions were different? The Module Two assessment was not proctored and had unlimited tries during the two-week measurement; the Unit Exam was proctored and students had only up to three attempts. In light of these results, if implementing this again I would make the conditions of each assessment the same. I would explore the issue of video retention.
B. Critical Evaluation of Each Essential Competency in this FLO

1. Assessment

   Reflection:

   • Give timely feedback on class activities, exams, and papers.

   For this project, I used the online MyMathLab site for almost all of the assignments. This program grades a student’s work immediately after it is submitted. If he missed a homework problem, the student could reattempt the same problem up to three times, or choose to start over with a new similar problem. Using MyMathLab allowed me to set a prerequisite that required students to watch my new video before they could access the link to complete their Module Two quiz. I like the immediate assessment feedback and feel that it is an important learning tool.

   This project also used the college-wide online iMathAS website for the Module assessment. Students were allowed to rework the quiz problems an unlimited number of times by the deadline. Each time they submitted their answers, they received instant feedback on the results. In this manner, learning occurred anytime and anywhere.

   Information in my TLA seminar on Assessment encouraged my use of student-active breaks and giving timely feedback on class activities. For this project, I first introduced the steps to solving word problems and we discussed the important formulas and applications. Next, I had my students work on linear application problems, while I wandered through the class providing timely feedback and encouragement. In this way, I formatively assessed them and used my findings to bring up key points when we went over the problems that were giving them the most difficulty. Using these student-active breaks helped me to improve my teaching.

   One thing that I could do differently in a future implementation is to spread the linear applications lesson over two class periods. This would have given me more time to assess progress formatively; however, our hybrid course only meets once per week. It would have been hard to spread out this lesson without sacrificing other content. I think students would grasp the concepts better if they had additional time with the material. To answer my research question, I strove to run the hybrid course the way I would normally, so that I could truly measure if the review video would help in a hybrid course. In the future, it would be good to implement this project in a traditional class so that I could measure whether the class modality made a difference.

   In reflecting on my project, in the future I will return my students’ video guided note-sheets and written module work sooner. I held on to the work for a while as
I knew that it was valuable evidence for my project. However, this did not impact my students, as I didn’t collect their work until after the Unit Exam, so they didn’t need it until the final exam. I did return it before they began reviewing for their final exam. In the future on a research project, I will copy and scan student work right away so that I can return it faster. I think that this is one of those lessons that you learn when you do a research project for the first time.

- **Align summative evaluations with course outcomes and learning activities (appropriate to level of thinking and performance).**

My summative Module Two assessment is well aligned with the Dev. Math II course outcomes. The module is part of a college-wide summative process for this course. My student learning outcomes for this project came directly from the state-required course outcomes. I reworded the state outcomes to fit the learning outcomes that I wanted to address in my instructional review video. This close link models how summative assessments should align.

I think that my learning activities also aligned well, building on one another as they led toward my summative assessments. My first learning activity occurred as students worked through linear application problems in class with me coaching. Next, they were assigned online homework with instant feedback and helpful ancillaries. Then the students received personal one-on-one help, as needed, when they completed their required 75 minute hybrid lab time. The experimental group then had the new instructional video with guided notes to aid their learning. At the completion of these activities they took the Module Two summative assessment. During this assessment period, they had unlimited attempts on the Module Two quiz for one week. Reflecting back on all these learning activities, I’m realizing that perhaps the video helped more in the short term, because the Module Two averages were higher, but when it came to the overall unit the video instruction didn’t stick. I’m not sure if this was related to the fact that the Unit Exam was given in a proctored environment with only two attempts and the Module Two assessment was online take-home. In a future implementation, I will figure out how to implement both assessments in the same environment.

In regard to the qualitative assessment, I am thankful that I collected feedback on the video itself. It informed my practice to know that the video was about the right length (18/19 students felt this way, 1 thought it was too long), clear (19 out of 19 students), and the guided-note sheets were well received. I will keep these attributes in mind as I make future instructional videos.
2. **Outcome Based Practice**

**Reflection:**

- **Construct measurable learning outcomes.**

I first learned what an outcomes-based practice involves in October 2012 during my first year TLA seminar series. During the seminar, our facilitator had us write measurable learning outcomes for ourselves (Faculty Learning Outcomes) and for our students (Student Learning Outcomes). A good measurable learning outcome included describing a learning result, being specific, action-oriented, cognitively appropriate, and clearly stated. This seminar gave me the background for writing my research project FLO, “Design an instructional video of Developmental Math II to improve students’ abilities to solve linear equation application problems.” Now that I had constructed one of my measurable learning outcomes, I had to consider what I did want my students to learn in relation to my learning.

As I worked on my project, during the summer of 2013, I continued to learn about outcomes-based practices as I participated in the Destinations Action Research Project track. In July, we were required to write up the Student Learning Outcomes for our project. I learned how to use appropriate verbs to describe a level of learning referring to Bloom’s cognitive levels. It was during this seminar that I began to realize how student learning outcomes are aligned with student core competencies, program outcomes, and course outcomes. When I wrote my SLOs I looked back at what the state requirements were for my specific topic. I figured that the state math requirements are my course outcomes. I reworded the state competency (ID MDECU12 and MDECU15) into my three SLOs (see details of ARP).

Next, it took me several days to ponder, “How will I know that they can do these?” And following the outcomes-based practice cycle, “What learning opportunities should I implement?”, “How will I assess their progress?” My answers to these questions gave me the performance learning outcomes in my ARP. The teaching strategies describe how I would take the class from beginning to end answering my research question. During my research I discovered a Bloom’s Taxonomy for Mathematics ([http://www4.uwm.edu/org/mmp/ACM201213-files/ACM-March15-BloomRevisedMath.pdf](http://www4.uwm.edu/org/mmp/ACM201213-files/ACM-March15-BloomRevisedMath.pdf)). Referring to this helped me write my performance indicators. My performance indicators helped move my students from lower-level thinking (identify, recall) to higher-level thinking (solve).
Design assessments that demonstrate student growth in the student core competencies (Think, Value, Communicate & Act) and program learning outcomes.

During this project I was able to watch my students grow in the core competencies. Students were encouraged to think about what the word problems were asking them to find. The students were required to act by applying the facts, formulas, and procedures to solve the problems while completing class work, homework and when taking their common assessments. The students were required to communicate their knowledge by writing out their work and turning it in. My video survey revealed that students found value in having the instructional review video. The survey indicated 18 out of 19 students reported that the instructional video improved their ability to solve linear equation application problems. The one student left over chose to neither agree nor disagree. No students disagreed.

To improve my project TVCA indicators, next time I would design an online communicate requirement. I could set the course up in Blackboard and require students to discuss whether a given problem with solution steps was solved correctly. They would benefit from seeing and discussing mistakes to avoid when solving linear application problems.

Overall, reflecting back on the outcome-based practice competency, I feel that both my faculty learning outcome and my student learning outcomes were measureable. My outcomes related directly to my quest to answer whether an instructional review video would improve students' abilities with linear equation application problems. My teaching strategies and assessments demonstrated student growth in TVCA.

3. Professional Commitment

- Contribute to discipline/academic field.
- Collaborate with colleagues and dean/director to assure and demonstrate progression of student learning across courses and programs.

Reflection:

I will use my project results to help improve my practice and help those in any discipline. I have already had an opportunity to collaborate with colleagues on my project through my summer college-wide destinations team. During the summer, I was able to apply what I had learned about writing a good research question to help out my colleagues. Many of my peers attending the program had little or no past experience in action research. My team gave me feedback on how to implement and measure my video's effectiveness in order to demonstrate student learning. They cautioned me that it would be important to insure that the experimental group did indeed watch the video. This I was able to
handle using MyMathLab and requiring them to bring to class their video notes as evidence of their participation.

I feel that having completed the rigor of working through my action research project I have demonstrated professional commitment. I am willing to try out new methods and measure their effectiveness. In the near future, I will be able to share my experiences from TLA seminars and this ARP to assist mathematics colleagues that are currently in the five-year tenure process.

In developing my project, I learned how to create videos using Camtasia Studios 8. I plan to use Camtasia in future course development. I plan to put my new instructional video on the Mathematics Department’s Math Help 24/7 website (http://valenciacollege.edu/math/livescribe.cfm). I have recently been collaborating with a colleague who created a new MAT0022C hybrid course for Spring. We added my video to this course for the Spring pilot. I feel this demonstrates my willingness to contribute to the math discipline and assure progression of student learning across programs.

4. Scholarship of Teaching and Learning

- Produce professional work (action research or traditional research) that meets the Valencia Standards of Scholarship
- Build upon the work of others (consult experts, peers, self, students)
- Be open to constructive critique (by both peers and students)
- Make work public to college and broader audiences
- Demonstrate relationship of SoTL to improved teaching and learning processes
- Demonstrate current teaching and learning theory and practice

Reflection:

Performing this project allowed me to examine my teaching practice as I created and used my own instructional video. This was an activity that I have always wanted to do: to build upon the work of others, I collected background viewpoints from students, colleagues, myself, and experts. I performed a literature search on effectiveness of instructional videos. I learned that effective videos are short, simple, stay on topic, and use procedural steps. I modeled my video with these goals; my students provided critique through their survey. Choosing to research the effects of a video and implementing in a hybrid course demonstrate using current teaching technology and practice.
Although my project results were not statistically significant, I was encouraged that 18 out of 19 students felt that the video helped improve their abilities. I gained experience in the structure, process, and discipline of completing a professional action research project. I enjoyed the process of formulating a research question, collecting data, measuring results, and introspection. Now that I have completed a project, I know how valuable and formative the results are to my practice. Having been through the process once, the next time will be easier, I now understand the process of scholarship. Reflecting on my results inspires me to try out new ideas using action research methodology to improve my scholarship of teaching and learning.

Sharing my video project with Valencia colleagues during the summer Destinations ARP track resulted in constructive critiques that I channeled into project improvements. Each meeting, we were accountable to bring our required project “homework” and to share and discuss our progress. The insight that my college-wide team provided was valuable, as they helped me refine my scholarship and improve my learning.

C. Plan for Dissemination
   In December 2013, I posted my project on the Valencia Action Research Builder in Atlas (Project 383: Evaluating the Use of Video Review in Developmental Mathematics). I presented my results to my college-wide Summer Destinations ARP team on December 6th, 2013. I will present my project to my ILP/Portfolio review panel in Spring 2014. I am sharing my project experiences with my mathematics colleagues.

D. Supporting Artifacts for FLO#1

   Preparation Artifacts
   
   A. May 2013 Dev II hybrid survey
   B. Colleague survey May 2013

   Project Artifacts
   
   1. Instructional video http://tinyurl.com/owyxcal
   2. Sample of a student’s completed guided note sheets.
   3. Samples of three student’s module two work
   4. Module Two quiz with answers
   5. Module Two survey without results
   6. Unit Exam linear equation application questions with students’ work.
1. What do you wish you had known about the hybrid course before you signed up for it?

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</tr>
<tr>
<td>I wish I knew it was required that I had to be at school for the online part, the emporium that is.</td>
</tr>
<tr>
<td>That it would take up just as much time as a normal, &quot;in person&quot; class.</td>
</tr>
<tr>
<td>That the book was online instead of me spending $300 for a text book that I didn't even crack open but maybe once but that was to get the access code.</td>
</tr>
<tr>
<td>I was quite aware that this class needed time management skills. I just need to be able to approve those skills a little more before taking another hybrid/online class.</td>
</tr>
<tr>
<td>The course description described it well.</td>
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<tr>
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<td>Kindve..</td>
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<td>How beneficial it would be towards my education.</td>
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Page 23
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4. How would you rate your experience in the Hybrid Math Lab (1-377)

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5. How would you rate the course content

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6. How helpful did you find the weekly class items:

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<th>Question and Answer time</th>
<th>Practice Exams</th>
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<tr>
<td>Mean</td>
<td>1.22</td>
<td>1.22</td>
<td>1.26</td>
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</tr>
<tr>
<td>Variance</td>
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<td>0.26</td>
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<tr>
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<td>0.53</td>
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<td>Total Responses</td>
<td>27</td>
<td>27</td>
<td>27</td>
<td>27</td>
</tr>
</tbody>
</table>
7. Do you have any helpful ideas on how we could improve your learning experience in the hybrid course:

<table>
<thead>
<tr>
<th>Text Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longer class times so we don't have to cram everything in, otherwise we are basically teaching ourselves how to do everything.</td>
</tr>
<tr>
<td>Did well for me, I have no issues with how the course is set up. The blackboard modules are just very annoying. Mathlab is good.</td>
</tr>
<tr>
<td>Centralize everything in mymathlab.com. No need to go to blackboard every other week. Plus, the quizzes are way harder and different in the blackboard modules than in mymathlab.</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Just keep doing what you are doing. The hybrid course is good, it helps a lot</td>
</tr>
<tr>
<td>No this course is perfectly fine to me</td>
</tr>
<tr>
<td>No.</td>
</tr>
<tr>
<td>Guided emphasis on completing the modules, which tended to be more difficult than anything done in MyMathLab.</td>
</tr>
<tr>
<td>Nope</td>
</tr>
<tr>
<td>Even out your grade outline into more value instead of exams being 70% make them 50% and make the hw more valuable</td>
</tr>
<tr>
<td>I think the &quot;MyMathLab&quot; instruction and the Professor's class time is a great combination and was very helpful in being able to learn all the right steps needed to complete the problem.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Responses</td>
<td>15</td>
</tr>
</tbody>
</table>
8. **What advice would you give a new incoming hybrid Developmental Math II student?**

<table>
<thead>
<tr>
<th>Text Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>go to the math lab more than 75 minutes a week. doing all your homework and quizzes in there almost guarantees a good grade with the help you get.</td>
</tr>
<tr>
<td>If you don't need that much teaching on something, one hour should be fine.</td>
</tr>
<tr>
<td>procrastinate in english or history, not here.</td>
</tr>
<tr>
<td>Prepare for it to take most of your time.</td>
</tr>
<tr>
<td>i would say that should really study for the exams</td>
</tr>
<tr>
<td>don't buy the text book just buy the access code b/c the book is online</td>
</tr>
<tr>
<td>my advice is to actually have time management and focus a lot and don't procrastinate</td>
</tr>
<tr>
<td>To complete all of your modules and ask for help from the teachers and tutors if you need it.</td>
</tr>
<tr>
<td>Take advantage of the 75-min in the math lab too.</td>
</tr>
<tr>
<td>.</td>
</tr>
<tr>
<td>Make sure you have great time management skills!</td>
</tr>
<tr>
<td>.</td>
</tr>
<tr>
<td>Keep up with the work and it's a breeze. Don't put it off.</td>
</tr>
<tr>
<td>To space things out and don't rush, pay attention, use your resources and you'll be fine</td>
</tr>
<tr>
<td>Be prepared to work!</td>
</tr>
<tr>
<td>Be prepared to do work outside of the class as well as in class!</td>
</tr>
<tr>
<td>Complete the modules on time, and don't be afraid to ask for help.</td>
</tr>
<tr>
<td>Study Study Study</td>
</tr>
<tr>
<td>get good grades on your exams</td>
</tr>
<tr>
<td>Make sure to go to the lab every week, not only to help your grade but to give you extra practice as well.</td>
</tr>
<tr>
<td>Do all the necessary work: both videos (homework and chapter contents) and try to master the study guide. The study guide under chapter contents helped me the most to understand fully how to solve the problem/equation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Responses</td>
<td>20</td>
</tr>
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</table>
### 1. Please rate these in the order of difficulty for your Dev II MAT0028C students.

<table>
<thead>
<tr>
<th>#</th>
<th>Question</th>
<th>Difficult</th>
<th>Somewhat Difficult</th>
<th>Somewhat Easy</th>
<th>Easy</th>
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<tr>
<td>1</td>
<td>Module 1 Linear Equations &amp; Inequalities</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>2.17</td>
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<tr>
<td>2</td>
<td>Module 2 Applications (perimeter, area, percentages, other)</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>0</td>
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<td>1.33</td>
</tr>
<tr>
<td>3</td>
<td>Module 3 Graphs and graph information</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>6</td>
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</tr>
<tr>
<td>4</td>
<td>Module 4 Exponents and Polynomials</td>
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<td>2</td>
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<td>0</td>
<td>6</td>
<td>2.00</td>
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<tr>
<td>5</td>
<td>Module 5 Factoring</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>6</td>
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<tr>
<td>6</td>
<td>Module 6 Rational expressions</td>
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<td>3</td>
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<tr>
<td>7</td>
<td>Module 7 Radicals</td>
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<td>3</td>
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### Statistic

<table>
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<tr>
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<th>Module 1 Linear Equations &amp; Inequalities</th>
<th>Module 2 Applications (perimeter, area, percentages, other)</th>
<th>Module 3 Graphs and graph information</th>
<th>Module 4 Exponents and Polynomials</th>
<th>Module 5 Factoring</th>
<th>Module 6 Rational expressions</th>
<th>Module 7 Radicals</th>
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<td>2.00</td>
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<td>0.75</td>
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<td>6</td>
<td>6</td>
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<td>6</td>
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</table>
### 2. Which module would you say your students have the most trouble with? Choose their hardest module.

<table>
<thead>
<tr>
<th>#</th>
<th>Answer</th>
<th>Response</th>
<th>%</th>
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<tbody>
<tr>
<td>1</td>
<td>Module 1 Linear Equations &amp; Inequalities</td>
<td>0</td>
<td>0%</td>
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<tr>
<td>2</td>
<td>Module 2 Applications (perimeter, area, percentages, other)</td>
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<td>67%</td>
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<td>Module 3 Graphs and graph information</td>
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<td>4</td>
<td>Module 4 Exponents and Polynomials</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>5</td>
<td>Module 5 Factoring</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>6</td>
<td>Module 6 Rational expressions</td>
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<td>17%</td>
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<td>7</td>
<td>Module 7 Radicals</td>
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<tr>
<td></td>
<td>Total</td>
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<td>100%</td>
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<tbody>
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<td>Mean</td>
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<td>Variance</td>
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<tr>
<td>Standard Deviation</td>
<td>2.35</td>
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<tr>
<td>Total Responses</td>
<td>6</td>
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### 3. Do you think having a short content review video for each module posted on our Math 24/7 website would be helpful for your students?

<table>
<thead>
<tr>
<th>Text Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>yes</td>
</tr>
<tr>
<td>No. I think students understand the content enough to recognize the problems and work them out.</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>I think any resource is helpful to our students but only if they use the resource.</td>
</tr>
<tr>
<td>Yes!</td>
</tr>
<tr>
<td>I don't think my students would use it. They should, but watching a video takes time and I haven't heard of them being used.</td>
</tr>
</tbody>
</table>
4. Please share any comments that your students have made regarding the modules?

**Text Response**

- too many geometry problems on module 2; some questions are ambiguous
- Students are getting frustrated when they do the module, get one or two wrong, and then have to do it all over again. Some students have to do this multiple times to earn 100%. They feel defeated after a certain point and give up.
- 100 percent on each module I feel is unrealistic from these type of students. Questions that have 9 part or more multiple choice is completely unfair.
- Though exponents and polynomials are paired together within the module, I think polynomials in general are easy to them and exponents are difficult because there's a lot to remember. I don't like the fact that the modules make it possible for students with lower averages to pass while students with a higher overall average (that don't do the modules and don't break 70%) aren't supposed to pass according to the rules. That is, a student with a B average that doesn't break 70% is supposed to get a D while a student with a C average in the course gets their C. I liked the format this summer during the testing where the students only had to go back and redo the questions they got wrong. The students were much more likely to complete the modules with this format than the previous format.
Project Artifact 1

Instructional video http://tinyurl.com/owyxcal
Project Artifact 2 Sample of Student’s completed guided video note sheets

Linear Equation Application Problems
Module 2 review
w/ Alison Hammack

1. Find the length if the perimeter is 48 units.

\[ P = 2L + 2w \]
\[ 48 = 2L + 2w \]
\[ 48 = 2L + 16 \]
\[ -16 \]
\[ L = 16 \text{ units} \]

The length is 16 units.

2. A rectangular room is three times as long as it is wide, and its perimeter is 64 meters. Find the width of the room.

\[ P = 2L + 2w \]
\[ 64 = 2(3w) + 2w \]
\[ 64 = 6w + 2w \]
\[ 64 = 8w \]
\[ w = 8 \text{ meters} \]

The width is 8 meters.

3. The length of a rectangular garden is 10 feet longer than its width. The garden’s perimeter is 80 feet. Find the length of the garden.

\[ P = 2L + 2w \]
\[ 80 = 2(w+10) + 2w \]
\[ 80 = 2w + 20 + 2w \]
\[ 80 = 4w + 20 \]
\[ 60 = 4w \]
\[ w = 15 \text{ feet} \]

The length is 25 feet.
4. Carpet sells for $6.00 per square foot and will cost you $792 to recarpet your room. If your room is 12 feet long, how many feet wide is it?

\[ \frac{12 \text{ ft}}{12 \text{ ft}} = \frac{120 \text{ sq ft}}{100 \text{ sq ft}} = \frac{792 \text{ sq ft}}{10 \text{ sq ft}} = \frac{792}{10} = 79 \frac{2}{10} \text{ sq ft} \]

Area = 79.2 sq ft = L \times W

\[ \frac{132}{12} = \frac{12 \times W}{12} \]

W = 11 ft

5. Julie's living room is 15 feet wide. If the length is 5 feet less than twice the width, what is the area of her living room?

Area = L \times W

\[ \frac{25}{15} \times \frac{15}{15} = \frac{375}{675} \text{ sq ft} \]

\[ L = 2W - 5 \\
L = 2(15) - 5 \\
L = 30 - 5 \\
L = 25 \text{ ft} \]
6. Jody categorized her spending on her two dogs for the month of May. What percent of her total spending did she spend on grooming?
Round answer to nearest whole number.

7. Irina saved $85 on an item that was 20% off. What was the original price?

8. A laptop has a price of $499. The sales tax rate for the county is 7%. How much sales tax will be due?
1) Circle, Square, Rectangle, Triangle
   a. $P = a + b + c$
   b. $C = 2\pi r$
   c. $P = 2L + 2W$
   d. $P = 4s$

2) Find the perimeter
   \[ P = 72 \]
   
   \[ 2(26) + 2W \
   52 + 2W \
   P = 72 \]

3) If your yard is 5 ft. wide and requires 85 pieces of sod that are cut into 4 ft. how long is it.
   \[ 85 = 5 \cdot L \]
   \[ 85 = 5L \]
   \[ L = 17 \]

4) A rectangular room is 3 times as long as it is wide, perimeter is 48 meters, find the length
   \[ P = 48 \]
   \[ L = 3W \]
   \[ 48 = 6W + 2L \]
   \[ L = 18 \]
   \[ 48 = 2L + 2W \]
   \[ W = 6 \]
   \[ 48 = 2W + 36 \]
   \[ W = 6 \]
   \[ L = 18 \]

5) The length of a rectangle garden is 10 feet longer than it is wide. $P = 212$ ft. What is the area of the room
   \[ L = 10 + W \]
   \[ W = 2 \]
   \[ P = 212 \]
   \[ 212 = 2(10 + W) + 2W \]
   \[ 212 = 20 + 2W + 2W \]
   \[ 212 = 2W + 9W \]
   \[ 212 = 2W = 4W \]
   \[ W = 18 \]
   \[ a = \frac{1}{2}(18)(18) \]
   \[ a = 178.2 \]

6) Lader paint sells for $28 per gallon and will cost you $252 to paint your room. If each gallon will cover 330 sq ft. how many sq ft. is your room
   \[ \frac{252}{28} = 9 \]
   \[ 330 \times 9 = 2970 \]

7) Find the area of a square with sides 3 meters long
   \[ a = 5.5 \]
   \[ a = 25 \]

8) Find the area of the rectangle
   \[ L = 4 \]
   \[ W = 6 \]
   \[ a = \frac{1}{2}(3)(6) \]
   \[ a = 9 \]

9) Find the area of the triangle
   \[ a = \frac{1}{2}(4)(10) \]
   \[ a = 20 \]
10) A living room is 17 ft wide. If the length is 14 ft less than twice the width, what is the area of her living room?

Width = 17
Length = 2 * 17 - 14
Length = 34 - 14
Length = 20
Area = 17 * 20
Area = 340

11) The U.S. Department of Agriculture reports that 14% of Americans are now on food stamps. If there are 280,000,000 Americans, how many are on food stamps?

14% = 0.14
280,000,000 * 0.14 = 39,200,000

12) \( R + 250 = \text{Tim} \)

107

13) $2900 spent this month.
24% on food. How much was spent on food?

\[ \frac{24}{100} = \frac{x}{2900} \]

\[ x = \frac{2900 * 24}{100} \]

\[ x = 696 \]

14) \( x \cdot 150 \)

\[ \frac{150}{100} = \frac{0.35}{x} \]

\[ 150 * x = 0.35 * 100 \]

\[ x = \frac{35}{150} \]

15) 3000 down payment.
Uncles loans 3000 with 4.4% interest payment rate. What is the limit for interest payment? How many years does he have to pay back the loan?

\[ \frac{4.4}{100} = \frac{3000 \cdot x}{4.4} \]

\[ 100 * x = 3000 \]

\[ x = 9.4 \]
Module 2 Quiz

1) Match formula for each area to figure

a) Square = \( A = s^2 \)

b) Rectangle = \( A = lw \)

c) Circle = \( A = \pi r^2 \)

d) Triangle = \( A = \frac{1}{2}bh \)

2) \( P = 2L + 2W \)
\( P = 2(5) + 2(4) \)
\( = 10 + 8 \)
\( = 18 \)

3) Your yard is 6 feet wide and requires 90 pieces of sod that are cut into 1 foot squares. How long is it?

\[ \frac{90}{6} = 15 \]

4) A rectangular room is twice as long as its width and perimeter is 60 meters. Find width.

\[ P = 2L + 2W \]
\[ 60 = 2(w + 2) + 2w \]
\[ 60 = 2w + 4 + 2w \]
\[ 60 = 4w + 4 \]
\[ 4w = 56 \]
\[ w = 14 \]
56 = 4w
w = 14

\[ \frac{14}{4} = \frac{14}{4} \]

\[ \frac{56}{4} = 14 \]

\[ \frac{4}{4} = \frac{16}{16} \]

Find length now
\[ L = w + 2 \]
\[ 14 + 2 \]
\[ L = 16 \text{ ft} \]

6. The length of a rectangular garden is 9 ft longer than its width. Perimeter is 190 ft.
Find width

\[ P = 2L + 2W \]
\[ 190 = 2(w + 9) + 2w \]
\[ 190 = 2w + 18 + 2w \]
\[ 190 = 4w + 18 \]
\[ 172 = 4w \]
\[ \frac{172}{4} = \frac{172}{4} \]

43 ft wide

7. Latex paint sells for $2.50 per gallon and will cost you $125 to paint room. If each gallon covers 310 sq feet, how many square feet of wall space
7. Find the area of a square with sides 25 centimeters long.

\[ A = s^2 \]

\[
\begin{array}{c}
25 \\
\hline
25 \\
4125
\end{array}
\]

8. \[ A = l \cdot w \text{ (rectangle)} \]

\[ A = 6.5 \]

\[ B = A \]

9. Area of a triangle

\[ A = \frac{1}{2}bh \]

\[
\begin{array}{c}
12 \\
\times 14 \\
148 \\
12 \\
268 \\
\hline
13.4
\end{array}
\]

\[ A = 13.4 \text{ m} \]

10. Living Room 25 feet W

If length is 7 feet less than twice the width,

\[ L = 2W - 7 = 2(25) - 7 = 43 \text{ ft} \]

\[ A = l \cdot w \]

\[
\begin{array}{c}
59 \\
\hline
7 \\
A = 43 \cdot 25 = 1,075 \text{ ft}^2
\end{array}
\]
1. **STUDENT**

2. Rent: $477
   
   Other: $250
   
   Total: $727

3. Joyce saved $150 on an item that was 25% off. What was original price?
   
   \[ 150 / 0.25 = 6 \]

4. Bill comes to $85. Leave a 11% tip. How much tip did you leave for tip?
   
   \[ \frac{85}{x \cdot 0.11} = 11 \]
   
   \[ \frac{85}{0.935} = \text{TIP} \]
SAVE ANSWERS if you want to finish this module at a later date - SUBMIT for grading if you have finished working on this module.
After submitting, tutors will assist you with missed questions. Keep a neat worksheet! You will have one attempt on each question.
If you do NOT get 100% upon submitting, you may reattempt module as many times as necessary.
Work towards getting 100% on all modules so your Final Exam will NOT be a course Pass/Fail exam.

#1 Points possible: 1. Total attempts: unlimited
Match the formula for each area to the figure to which it applies.

<table>
<thead>
<tr>
<th>Figure</th>
<th>Perimeter/Circumference</th>
</tr>
</thead>
<tbody>
<tr>
<td>b □ Square</td>
<td>( C = 2\pi r )</td>
</tr>
<tr>
<td>a ○ Circle</td>
<td>( P = a + b + c )</td>
</tr>
<tr>
<td>d □ Rectangle</td>
<td>( P = 4s )</td>
</tr>
<tr>
<td>c □ Triangle</td>
<td>( P = 2l + 2w )</td>
</tr>
</tbody>
</table>

#2 Points possible: 1. Total attempts: unlimited
A rectangular piece of cardboard measures 20 cm by 7 cm. What is the perimeter of the piece of cardboard?

50 centimeters

#3 Points possible: 1. Total attempts: unlimited
Find the length of the rectangle pictured above, if the perimeter is 94 units.

29 units
#4 Points possible: 1. Total attempts: unlimited
A rectangular room is three times as long as it is wide, and its perimeter is 80 meters. Find the width of the room.

8 _____ meters

#5 Points possible: 1. Total attempts: unlimited
The length of a rectangular garden is 8 feet longer than its width. The garden's perimeter is 200 feet. Find the width of the garden.

45 _____ feet

#6 Points possible: 1. Total attempts: unlimited
Driveway pavers are 6 inches by 9 inches. If your driveway is 17982 square inches, how many pavers do you need for your driveway?

321 _____ pavers

#7 Points possible: 1. Total attempts: unlimited
Find the area of a square with sides 18 centimeters long.

81 _____ square centimeters

#8 Points possible: 1. Total attempts: unlimited
Find the area of the rectangle pictured above.

8 _____ square units

#9 Points possible: 1. Total attempts: unlimited
Find the area of the triangle pictured below, where the measurements are given in meters (m)
27 _____ square meters

#10 Points possible: 1. Total attempts: unlimited

Lisa's living room is 19 feet wide. If the length is 4 feet less than twice the width, what is the area of her living room?

175 _____ square feet

#11 Points possible: 1. Total attempts: unlimited

Alberto received an inheritance of $10,000 that he decided to put into a savings account and collect the interest. He has a choice of investing in one of two plans. The Gold savings account will allow him to invest his inheritance at 3% simple interest for 4 years. The Student savings account will allow him to invest his inheritance at 2.75% simple interest for 4 years. As part of a limited time promotion, the bank will give Alberto $1000 to be added to his principal if he opens a Student savings account. Which plan will earn Alberto the most money after 4 years.

Enter either Gold or Student for your answer.

12000 _____

#12 Points possible: 1. Total attempts: unlimited

After dinner, Amanda, Trey, and John received the check for their meal. Trey is paying \( \frac{1}{4} \) of the check and leaving no tip. Amanda is paying the remainder of the check. John is leaving \( 20\% \) of the check as a tip. Using "C" as the amount of the check, match each person with an appropriate algebraic expression.

- b \( \checkmark \) 0.75C
- c \( \checkmark \) 0.25C
- b \( \checkmark \) C+0.2C
- d \( \checkmark \) 0.2C

- a. John's payment
- b. Amanda's payment
- c. Trey's payment
- d. No match

*Figure 3 - page 3 of 4*
#13 Points possible: 1. Total attempts: unlimited

Tatiana categorized her spending for this month into four categories: Rent, Food, Fun, and Other. The percents she spent in each category are pictured here.

If Tatiana spent a total of $2100 this month, how much did she spend on Food?

- $24
- $483
- $504

#14 Points possible: 1. Total attempts: unlimited

At a restaurant, the bill comes to $60. You decide to leave a 15% tip. How much did you leave for the tip?

$12

#15 Points possible: 1. Total attempts: unlimited

An antique has a price tag of $71. The sales tax rate for the county is 8.6%. How much sales tax will be due?

$8

Write answer to the nearest cent.
This is my
'options:

- First hybrid math course at Valencia (1)
- Second or more hybrid math course at Valencia (2)

The Module 2 review video was
'options:

- Too long (1)
- Too short (2)
- the right length (3)

What did you find helpful about the Module 2 review video?

What do you think could improve the Module 2 review video?

Please answer the following.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree (1)</th>
<th>Agree (2)</th>
<th>Neither Agree nor Disagree (3)</th>
<th>Disagree (4)</th>
<th>Strongly Disagree (5)</th>
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<tbody>
<tr>
<td>The types of problems used in the video helped me understand linear word problems. (1)</td>
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<td>The presentation of the video was clear. (2)</td>
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<td>I would watch other review videos on the other six module topics. (3)</td>
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<tr>
<td>Watching the Module 2 Instructional video improved my ability to solve linear application word problems. (4)</td>
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<tr>
<td>It would be helpful to have similar instructional review videos for the other six modules. (5)</td>
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</tbody>
</table>

Are there any comments you would like to share about having an instructional video to review before taking a module quiz?
Sample Student work from scratch paper on Unit Exam Linear equation application problems #10 and #11.

10. A part-time instructor is receiving $1500 per credit taught. If the instructor receives a 4% increase, how much will the new per credit compensation be? (The underline numbers vary.)

11. Find the area of the region shown. (A picture of a rectangle is shown with length and width.
Sample of student work on Unit Exam questions 19 and 20.

19. Use the formula \( d = rt \) to find the value of the missing variable. (Numbers of \( d, \) \( r, \) are randomly generated whole numbers.)

20. The perimeter of a rectangle equals the sum of the lengths of its four sides. If the width of a rectangle is 9 inches and its perimeter is 44 inches, find the length of the rectangle. (Underlined numbers are randomly generated whole numbers.)