Action Oriented Reflection: An Ongoing Student Self-Assessment Strategy to Improve Learning

--Implementation, Results and Conclusion--

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ED 6900 Graduate Capstone

March 2011

Summary of Change in Practice

As detailed in my Literature Review and Change in Practice paper, the change I am instituting for this Graduate Capstone is daily, end-of-class, student reflection and documentation in a running Word or Pages file on student MacBook laptop computers, using an Action Oriented Reflection (AOR) Template that I provide (Figure 1.1). Students will devote the last five minutes each class to complete the template and save their running AOR file in an electronic Algebra 1 folder on their MacBooks. Per the template, students are to document the topics studied that class day, which concepts they feel confident about and what topics they need to work on to gain a deeper understanding. For any areas they feel require additional focus, students then complete the four Plan columns based on their evaluation of what works best for them. In the case where students have a firm grasp of the material learned that day they simply enter 'None' or 'I'm Good' in those columns. On class days when I return graded work students are to reflect on the written feedback I provide and make appropriate entries on the Quiz/Test feedback and Plan sections of the template.

Figure 1.1
Action Oriented Reflection Template

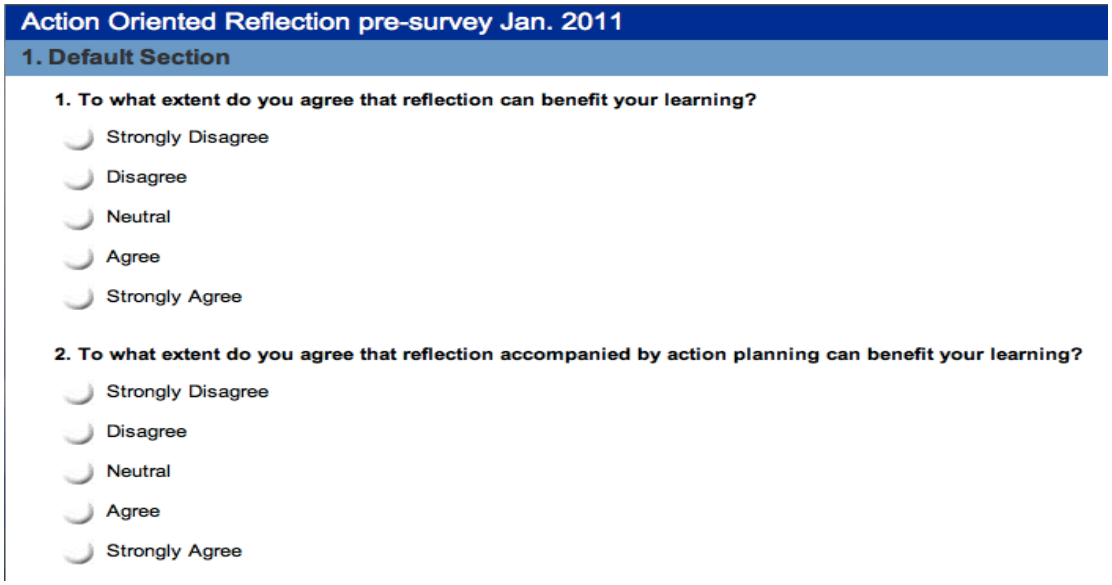
<table>
<tr><td colspan="3">Name:</td><td colspan="3">Date:</td></tr>
<tr><td colspan="6">Topic(s) we studied today:</td></tr>
<tr><td colspan="6">Quiz/Test feedback:</td></tr>
<tr><td colspan="6">I have a strong understanding of:</td></tr>
<tr><td colspan="6">I need a better understanding of:</td></tr>
<tr><td colspan="4">PLAN</td><td colspan="2">RESULT</td></tr>
<tr><td>Specific area of focus:</td><td>What I need to do to get a better under-standing:</td><td>Who I need to get with to get a better under-standing:</td><td>When I am taking action:</td><td>Action I took:</td><td>Where my under-standing is now:</td></tr>
</table>

Implementation

After performing quantitative analysis of both formative and summative test results year-to-date of all four of my Grade 8 Algebra 1 classes it was determined there was no significant difference across our two day rotation. Therefore, the two classes I teach on our Day 1 rotation (D1 and E1) were chosen as the AOR experimental classes and the two classes I teach on Day 2 were chosen as controls. This made record keeping and data analysis more efficient than splitting days.

On January 10, 2011, both classes completed the AOR Class Pre-Survey (Figure 1.2) to establish the baseline attitudinal disposition toward reflection. During the administration of the survey students asked clarification questions about what 'reflection' and 'action planning' mean and I answered in general, unbiased terms without influencing their perspectives.

Figure 1.2
Pre-Survey of Action Oriented Reflection Classes



I then presented an overview of AOR, the template and three exemplars (No issues, Some concerns, and Some quiz concerns), and asked for their cooperation and participation. The class

agreed. Students then downloaded the template from my class blog (Green 2011), where I also posted the three exemplars for their subsequent reference as needed, they created a running Word or Pages file, we held class and they completed their first AOR at the end of class.

Throughout the Systems of Equations and Exponents/Exponential Functions units, a period spanning eight weeks, students completed the template the last five minutes of each class day. When students felt they clearly understood that day's material there was no need to fill out the action planning portion of the template. When students reached the end of class and felt additional reinforcement was necessary to achieve a deep understanding of the material they completed the action planning section accordingly.

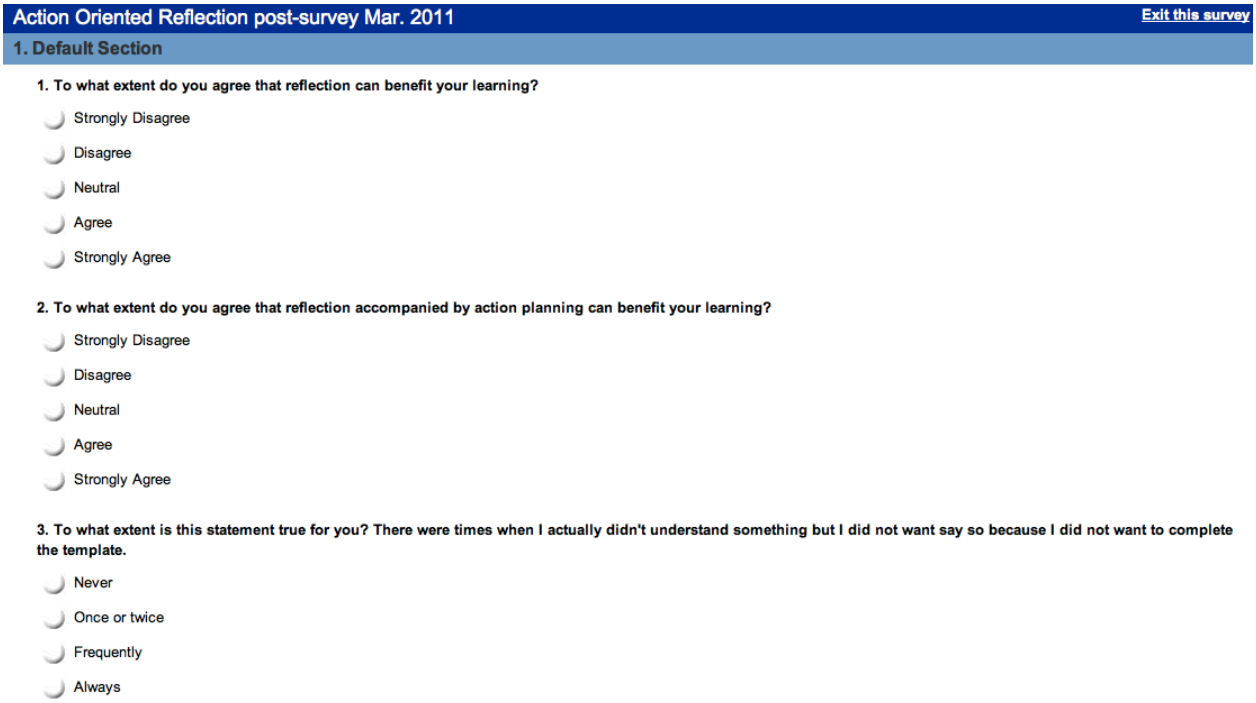
During these eight weeks I reviewed students' running AOR files as a part of homework check and my primary focus was looking for Plan column entries, the steps taken, and most importantly the student's assessment of their understanding after taking the action documented in the Result columns of the template.

Measurement Methodology of AOR Impact

The effect of AOR on student achievement was measured by comparing the gain scores on end-of-unit, summative assessment means achieved during two units of study versus students' Trimester 1 summative assessment means, using experimental class versus control group analysis. Measuring the change in this fashion accounts for the potential for differing current versus previous subject content difficulty to impact the assessment result comparison. The two AOR experimental classes total 40 students (19 girls and 21 boys) and the two control classes total 39 students (21 girls and 18 boys) whom did not participate in AOR. Statistical t-tests were also performed on the data sets to determine the statistical significance of the change in practice.

Changes in student attitude toward reflection were measured by conducting anonymous AOR experimental group pre- and post- surveys. Point values were assigned to the answer options as follows: Strongly Disagree (1 point), Disagree (2 points), Neutral (3 points), Agree (4 points) and Strongly Agree (5 points). A weighted average score was then calculated for each of the two questions by multiplying the number of students assigning each answer option by each assigned point value (1 through 5), summing this data, and then dividing by the number of students in the class. Attitudinal changes were then easily measured by comparing pre- and post-AOR experimental group survey data. Since a foreseeable risk in template use is students potentially desiring to avoid the work of completing an improvement plan, even when they recognize an area of need, a third question was added to the Post-Survey (Figure 1.3) to attempt to quantify this tendency. This survey was administered on March 7, 2011.

Figure 1.3
Post-Survey of Action Oriented Reflection Classes


Action Oriented Reflection post-survey Mar. 2011 Exit this survey

1. Default Section

1. To what extent do you agree that reflection can benefit your learning?

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

2. To what extent do you agree that reflection accompanied by action planning can benefit your learning?

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

3. To what extent is this statement true for you? There were times when I actually didn't understand something but I did not want say so because I did not want to complete the template.

- Never
- Once or twice
- Frequently
- Always

Results

The following sections detail that all student performance goals set forth in my Literature Review and Change in Practice paper were met or exceeded. The previously defined student performance goals were: quantitative (positive gain score on AOR student summative assessment mean results), qualitative (increased student survey responses viewing reflection as beneficial to learning) and gender analysis (determine the extent to which there is a reflection bias in favor of girls).

Student Summative Assessment

Summative assessment results showed a statistically significant improvement for AOR classes compared to the non-AOR control group. The assessment mean for AOR classes increased from a Trimester 1 test mean of 90.82% to 94.83% after AOR while the non-AOR control classes increased from a Trimester 1 test mean of 90.15% to 91.26%. T-tests for the two groups (Appendix 1) revealed a statistically significant p-value of 0.0026 for the paired AOR pre- and post-test mean analysis while the non-AOR control group had a non-statistically significant p-value of 0.546. This indicates that the practice of Action Oriented Reflection had a statistically significant impact on student learning.

Student Attitudes toward Reflection and AOR

Survey results suggest that students believed before AOR that reflection accrues learning benefits, and after AOR they felt even more positively about the practice of reflection. Students also reported positive attitudes toward AOR specifically. The pre-AOR weighted average for Question 1 (To what extent do you believe that reflection can benefit your learning?) was 3.50, and after participating in AOR for eight weeks the post-AOR weighted average increased to 3.58, slightly more positive. The pre-AOR weighted average for Question 2 (To what extent do

you believe reflection accompanied by action planning can benefit your learning?) was 3.48 and after AOR the post weighted average also increased, to 3.63.

Post-AOR Question 3 (To what extent is this statement true for you? There were times when I actually didn't understand something but I did not say so because I did not want to complete the template) showed there was there a small disincentive tendency for students to fill out the template since this requires effort and time on their part. The survey revealed that 93% of students reported they "never" or only "once or twice" chose not to complete an action plan. This indicates that students generally took their reflections seriously.

Supplementary Area of Inquiry: Gender Learning Differences

As detailed in my Literature Review and Change in Practice paper, Gurian & Ballew (2003) suggest that due to neurological and developmental differences girls may be in a position to benefit more than boys from reflection and self-assessment practices. Andrade & Du (2007) studied this hypothesis and reported that they did not find supportive evidence. While the primary focus of this Graduate Capstone is the impact of AOR on student learning, a supplementary inquiry sought to determine to what extent gender differences were evident in both assessment results and attitudinal surveys.

Gender Analysis of Summative Assessment Results

Analysis of assessment results showed that there was not a statistically significant difference between girls' and boys' summative assessment mean gain scores between the AOR experimental and non-AOR control groups. The boys' control group increased +2.4% versus their Trimester 1 mean while the boys' AOR group increased +4.7%, and the girls' control group increased +0.02% compared to the girls' AOR group increase of +3.2%. Therefore, the results

indicate there was not a disproportionate benefit in favor of girls from the practice; rather, the results indicate that both boys and girls benefitted.

Gender Analysis of Student Attitudes toward Reflection and AOR

To measure individual gender perspectives, two identical surveys (Appendices 2 and 3) were administered via different online survey links posted on my blog, one for female students and one for male students. Since students knew there were two different links I informed them that there is conflicting research on gender perspectives about reflection and that I was interested in their thoughts. I made it very clear that both surveys they were answering, girls and boys, were identical. I simply requested, as I always stated, that students answer the survey truthfully from their individual perspectives. Again, I was very careful not to bias their thinking.

Survey results of AOR student attitudes did not reveal a bias in favor of girls. Question 1 (If it were up to you—the teacher didn't ask—would you continue using the template at the end of class?) showed that boys were more in favor of continuing AOR on their own, with a weighted average of 3.05 versus 2.63 for girls. Question 2 did not reveal a significant difference in student opinions as to whether AOR deepened their learning, as 48% of boys felt it did versus 53% for girls. This suggests that neither boys nor girls perceived the statistically significant influence that AOR had on their learning. Question 3 revealed that girls felt more strongly that AOR taught them a new way of learning as 63% felt it did versus 57% for boys. Both boys and girls reported from Question 4 they were glad they participated in AOR with 79% of girls saying so versus 71% of boys. Question 5 (Looking back over the past eight weeks, knowing that at the end of class I would reflect on my learning and complete the AOR template I was more engaged in my learning in class) revealed that 67% of boys said the statement is true for them, versus 58% of girls. These responses suggest that AOR promotes increased student learning

engagement in class for both genders, a potentially promising student motivation and learning finding. The final survey question was in open response format for students to provide me AOR improvement suggestions. They were generally positive about the current template but suggested that a user-friendlier format, larger entry boxes, and more detailed quiz/test feedback reflection would be beneficial.

Conclusion

The daily practice of Action Oriented Reflection resulted in a statistically significant positive impact on student learning results. In addition, surveys of student attitudes indicate that students believe reflection and AOR positively influence their learning and motivates them to be more engaged in class. A supplementary investigation of gender perspectives revealed that both girls and boys benefitted from AOR and that there was not a gender bias in favor of girls, which has been argued in the literature. These findings are consistent with the growing body of research cited in my Literature Review, across the K-university spectrum, that reflection and student self-assessment (SSA) can benefit assessment results as well as student ownership and motivation.

Based on my review of the literature I propose that my investigation differs in one important respect: AOR involves students reflecting on an *every* class day basis. While I found effective use of SSA practices in the literature I did not find a single instance where students employ the *daily* habit of reflecting on their learning, incorporating thoughts on their understanding from the class lesson, contemplating teacher feedback when graded assessments are returned, and developing proactive action plans as appropriate. The findings from this study suggest that the habitual use of SSA can positively influence student learning.

Going forward in my teaching practice, I will incorporate AOR as a standard practice in all of my classes. I will evaluate the improvements that AOR students suggested in their

supplemental AOR post-survey feedback as well as consider how evolving digital tools can make AOR more effective, particularly MacBook applications and Internet use. As my school moves toward student-led conferencing AOR is well suited as a student portfolio component, promoting greater learning ownership and developing positive life-long learning habits.

I will also review the evidence cited in my Literature Review and identify potential strategies for expanding the benefits of AOR including longer duration (Baldwin (2000), Fluckiger (2010), Ross, Hogaboam-Gray & Rolheiser (2002), and Wolcott (1999)), additional exposure to exemplars and up-front SSA training (Orsmond, Merry & Reiling (2002), Ross, Hogaboam-Gray & Rolheiser (2002), and Ross, J., Rolheiser, C., & Hogaboam-Gray, A. (1998)), greater reflection upon the return of graded work (Quinton & Smallbone (2010), Fluckiger (2010) and Taras (2001)), and conducting AOR not in isolation but in a social context (Baldwin (2000)).

Finally, over the course of this investigation I initiated contact with a few leaders in the SSA field. I hope to remain in contact with them as I continue my work on SSA and I would like to establish a collaborative relationship with one or more of them as I go forward, potentially generating outstanding professional development benefits for myself and improved, emerging learning opportunities for my students.

I close with a brief acknowledgement. This Graduate Capstone would not have been possible without the exceptional learning opportunities I received from my professors at Plymouth State University and the steadfast support from my colleagues at Shanghai American School. I am also grateful for the efforts of my wonderful students, particularly my willing D1 and E1 class AOR students, and the work of previous researchers cited in my references. As my

wiki (Green 2011a) seeks to capture I shall strive to continue improving as a professional educator in helping to develop young people.

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Appendix 1

T-Tests comparing test data when students used Action-Oriented Reflection

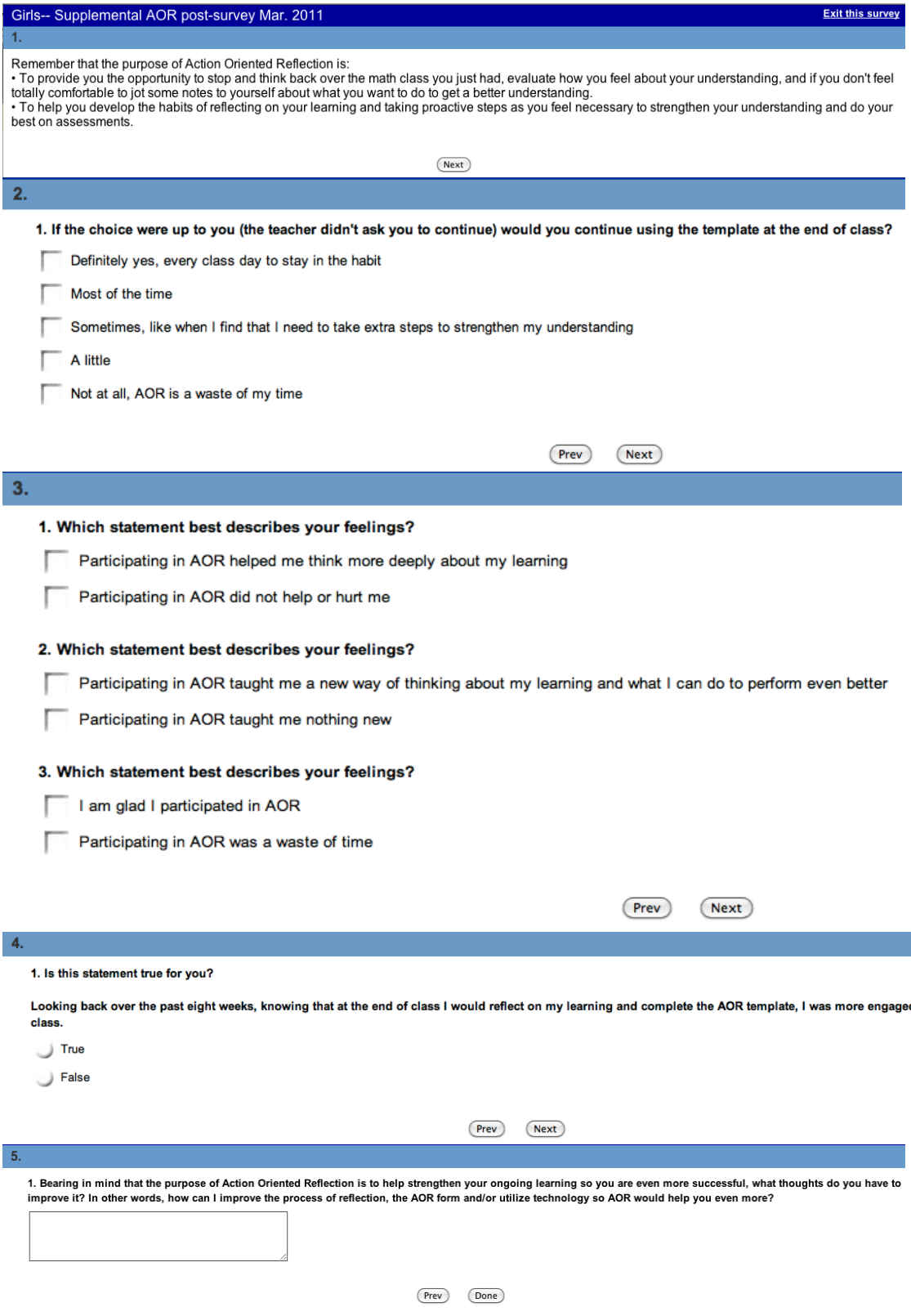
	Control before	Experimental before
Mean test score (%)	90.15	90.82
Standard Deviation	7.37	6.34
number	39	40
t value	-0.434	
p value	0.666	

	Control before	Control after
Mean test score (%)	90.15	91.26
Standard Deviation	7.37	8.83
number	39	39
t value	-0.607	
p value	0.546	

	Experimental before	Experimental after
Mean test score (%)	90.82	94.83
Standard Deviation	6.34	5.09
number	40	40
t value	-3.121	
p value	0.0026	

	Control after	Experimental after
Mean test score (%)	91.26	94.83
Standard Deviation	8.83	5.09
number	39	40
t value	-2.192	
p value	0.0322	

Appendix 2
Girls' Supplemental Post-Survey



Girls-- Supplemental AOR post-survey Mar. 2011 Exit this survey

1.

Remember that the purpose of Action Oriented Reflection is:
• To provide you the opportunity to stop and think back over the math class you just had, evaluate how you feel about your understanding, and if you don't feel totally comfortable to jot some notes to yourself about what you want to do to get a better understanding.
• To help you develop the habits of reflecting on your learning and taking proactive steps as you feel necessary to strengthen your understanding and do your best on assessments.

Next

2.

1. If the choice were up to you (the teacher didn't ask you to continue) would you continue using the template at the end of class?

- Definitely yes, every class day to stay in the habit
- Most of the time
- Sometimes, like when I find that I need to take extra steps to strengthen my understanding
- A little
- Not at all, AOR is a waste of my time

Prev Next

3.

1. Which statement best describes your feelings?

- Participating in AOR helped me think more deeply about my learning
- Participating in AOR did not help or hurt me

2. Which statement best describes your feelings?

- Participating in AOR taught me a new way of thinking about my learning and what I can do to perform even better
- Participating in AOR taught me nothing new

3. Which statement best describes your feelings?

- I am glad I participated in AOR
- Participating in AOR was a waste of time

Prev Next

4.

1. Is this statement true for you?

Looking back over the past eight weeks, knowing that at the end of class I would reflect on my learning and complete the AOR template, I was more engaged in my learning in class.

- True
- False

Prev Next

5.

1. Bearing in mind that the purpose of Action Oriented Reflection is to help strengthen your ongoing learning so you are even more successful, what thoughts do you have to improve it? In other words, how can I improve the process of reflection, the AOR form and/or utilize technology so AOR would help you even more?

Prev Done

Appendix 3
Boys' Supplemental Post-Survey

Boys-- Supplemental AOR post-survey Mar. 2011 Exit this survey

1.

Remember that the purpose of Action Oriented Reflection is:
• To provide you the opportunity to stop and think back over the math class you just had, evaluate how you feel about your understanding, and if you don't feel totally comfortable to jot some notes to yourself about what you want to do to get a better understanding.
• To help you develop the habits of reflecting on your learning and taking proactive steps as you feel necessary to strengthen your understanding and do your best on assessments.

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