USING QUANTITATIVE DATA TO ASSESS IMPACT OF GLOBALORIA ON STUDENT PERFORMANCE

Laura Minnigerode
World Wide Workshop Foundation

Summary

The following report summarizes the pilot year of Globaloria at East Austin College Prep Academy (EACPA). During the year, we assessed student performance in many areas and established a baseline profile for longitudinal study. In this report, we will discuss student performance on the Texas Assessment of Knowledge and Skills (TAKS) Mathematics assessment. We also look at the students' attendance and grade point average using data supplied by the school. **We have found that Globaloria has had a positive impact on student achievement in the math objectives assigned to students for their game design.** GPAs and attendance at EACPA were also found to be higher than the Austin and state averages. We theorize that Globaloria <u>may</u> have played a role in these results.

Quantitative Assessment:

Students at EACPA took a pre-test early in the year to measure their performance on specific Grade 6 math objectives measured by the TAKS test. Each student was assigned to a group in order to design a game that incorporated the math objective in which they had shown to need the most support. The game assignments were determined by the results of the pre-test, using a released version of the TAKS. Using Globaloria's Constructionist approach to learning, the students incorporated math concepts into the content of their game, and in this case, the concepts they were working with were those where they needed most improvement. Thus, looking at the students' performance on their assigned objective on the TAKS gives us one way to examine Globaloria's impact on each student.

The attached Table 1 includes a comparison of each student's performance on TAKS math objective <u>pre-test</u> and the final TAKS score the student received on this objective. The table lists the final score first and then beneath that, the pre-test score for each objective. The student's assigned math objective is indicated in red. The table also shows whether the student met the state standards for passing the Math assessment. Most importantly, the table shows the percent change in the students' math scores, both on their <u>assigned</u> objective and also in their overall change in performance on all objectives from the post-test.

The average improvement for non-special education students on their assigned math objective was 25 percentage points. This is more than double the average improvement

on TAKS math scores for these students, from pre- to post-test overall: 12%. Some of the Globaloria assigned gains were incredibly high—a few students improved by as much as 60%. **One student, JMM, improved his score on the assigned math objective by 86%.** This is a significant success. However, there were a small number of students who did not improve on their assigned TAKS objective. The Discussion section, below, describes some possible reasons for this.

Discussion

Limitations of Standardized Test Scores to Measure Achievement:

Using standardized test scores to measure cognitive growth in students has some limitations. Educational research has established that not all students perform at their best on standardized tests, especially in a high stakes environment. The environment where pre-testing took place was reported by teachers to have been "relaxed." Therefore, some of the pressure and resulting anxiety may have been reduced for students who experience test-taking anxiety. It is possible that their performance may have been better in the less formal setting, while the April administration of the TAKS was significantly more stressful; the students had been preparing and hearing about the tests' importance for many weeks prior to test days. Tension is inevitable in this situation. Some students who teachers describe as 'very sensitive' tested very poorly on the official TAKS test, lower than on their pre-test. (For an example, see student ED). Without a more qualitative examination of the situation, it is difficult to know the exact reasons for any students' unexpected test performance.

Historically, African American and Hispanic students have received lower scores on the TAKS test. There are many reasons, including the design of the test that leads to a distribution of scores, and context that is necessary to understand some of the material. There is some bias built into not only the TAKS test, but all standardized tests, that should be acknowledged. This presents a limitation to using the scores to measure what the students have truly learned about math.

Versions and Format of Tests:

Another limitation to the scores is that the questions in the pre-test administration were from an older version of the TAKS, which may reflect some differences in standards or leveling. Different questions with a test covering the same material can produce different errors, for a variety of reasons. The TAKS test is written with distracters, or wrong choices are written to seem correct, which are particularly difficult for some students. Rachel Penticuff, 09-10 EACPA math teacher, noted in progress report comments that some students had particular difficulty recognizing these tricks, even though they had a good grasp on the material being tested. These students, in many

cases, are students whose performance on the TAKS test did not reflect much progress in math.

Some objectives are tested with as many as 10 while others were tested with as few as 5 questions. For these objectives it is not hard to see how missing 2 can lead to a low score. The questions are designed to provide a distribution of responses, so in cases like this it is easy to see how a low score can result, even if the student has basically mastered that concept. JZ is a good example of this—his score on the pre-test for Pattern Relationships was 100%. On the administration of the TAKS in April, his score was 89%, because he missed one question. Considering the challenge in navigating questions designed to distract in a high stakes testing environment, some variability in performance is not surprising. A student's test-taking ease and skill becomes very important in this environment. In an ideal research situation, we would administer a performance-oriented task in order to establish mastery of mathematical concepts. Since there were only 5 questions for objective 4, the test-taking skill becomes more important.

Team Size:

The group size in this class was a factor in the extent of students' ability to employ math information related their assigned objective during the design process. For example, a group of 6 students who made a game together may have divided tasks up in such a way that only a few of the students were directly interacting with math content. During next year's Globaloria classes, students will work in smaller groups to design and develop their games. and in this way, will have more opportunity to interact with math content during the game design process.

A Few of the Group Assignments Were Not Accurate:

There were 8 students who received lower scores on their assigned math objective on the post-test than on their pre-test. In half of these cases, these students were assigned to a group that did not match their lowest objective. In fact, in more than one case, the students were assigned to a group where they would be designing a game using the math objective they scored highest on in the pre-test. (For example, see LA.) According to communication with EACPA teachers, this was out of necessity because, for example, there were too few students who were weak in a certain objective within that class to create a game design team. The smaller groups approach to team structure next year will make this problem much less likely.

Language Skills:

Some students who speak English as second language may have additional challenge in answering math questions. One student with this challenge, CG, was also assigned to a group with his highest tested objective, rather than lowest. Many students who are

speak English as a second language encounter problems in Math testing, because reading comprehension plays a large role in solving these particular math problems. It is possible that students encountered problems that were more linguistically challenging on the April TAKS, but this is a matter that would require qualitative examination to clarify.

Missing Pre-test Scores:

Pre-test data was not available for 14 students. There were several reasons for this; in a few cases it was because they were new students after the year began and other reasons include that they might have missed school during testing, or were not able to complete the test for behavior reasons.

The pre-test data was supplied by last year's math teacher, but it is also possible that some of the assignments were made based on another administration of the pre-test. Faculty and staffing changes have contributed to some missing information.

Attendance:

Attendance in the Globaloria EACPA classes was higher than the state average at 96.6% versus the Austin ISD district average of about 94.1 %. In Table 2 of this report, the average attendance at several Central and East Austin middle schools is compared using the most current data available from Austin ISD.

Conclusion

The data from this pilot year allows us to conclude that Globaloria has had a significant positive impact on students' achievement on the math objective that was assigned for use in Globaloria game development. More research is needed to come away with substantial data on this. With the recommendations we have made for smaller group size and improved attention to group assignments, we believe there will be continued improvement in student performance.

We theorize that the appeal of Globaloria program may have had an impact on overall attendance at EACPA as well.

This Pilot Year data provides an important base line and will be incorporated into the Globaloria platform database. Then, using this database and other tools, WWW Foundation researchers can continue to follow the progress of the EACPA students throughout their experience in Globaloria classes, which will continue to enhance our base of knowledge about how game design supports learning.