

2010

IXL Math Evaluation Prepared for MUSD by West Coast Research



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EdTech 505-4172

12/7/2010

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Learning Reflection

Education in the United States has changed dramatically since the beginning of American education in a one-room schoolhouse. Currently, students do not learn in a single classroom. Their classroom is open for the world to see as well as to see the world. The Internet and computers have torn down the walls of schools allowing students to learn in student-centered environments while personalizing their education and enabling their access to outside resources. Students can now receive help in class and at home with resources on the Internet. In addition, students are challenged, can learn using unique methods and learn subjects that were not available to them before the creation of the open classroom. Online learning is relatively new, but is expanding at a rapid pace with new and innovative programs and services for students to access. Online programs must also be accountable for the results that they claim to provide, just as traditional book vendors. It is imperative that educators, administrators, stakeholders and parents have access to data collected about the program, student scores, and how the program fares compared to traditional books. Web based learning environments should be evaluated determining if a site should be utilized or not. Evaluations are imperative in the adoption of Internet based products to determine if the product is as effective as claimed.

Throughout the process of this course, I became enlightened by discoveries that I have not pondered or considered previously. I now understand why it is necessary to evaluate products and assessments prior to their use. I was aware that not all products were fully understood prior to its integration into our teaching practices within the school district. I find myself questioning the validity of vendor claims about their products, and the specific objectives of particular products.

When I first thought about my final evaluation topic, I chose an educational product that I believed would be a great tool for teaching. As this semester progressed, I discovered why I really needed to remain with my initial choice in evaluating IXL Math. I questioned the validity of claims about the success of students that have used this program. I began to question not only this product, but also all of the WBLE's that I have been using for homework and centers. In the past, I would simply choose a site, because it was appealing and educational, as well as entertaining. Because of learning about the evaluation of WBLEs, preparation of my homework and center activities are taking far more time to select.

After completing the evaluation of IXL Math, I found that there were so many more facets to explore within this particular product. By personally speaking with parents in the class after their completion of the survey, I was able to gain additional clarification on their responses. I found value in speaking to the parents face to face about the evaluation results. The parents felt empowered to be part of the process of the recommendation of this product for the stakeholders of the school district. They are looking forward to further evaluating this particular product for the remainder of the school year. I will never look at an educational product again in the same manner, regardless if it is traditional or computer based.

Executive Summary

Second Grade Students Use of the [IXL Math](#) Program

The foundation of a math program is its subject matter. The problems that are presented to students can be quite challenging if the student lacks practice and reinforcement. For the past several months, a second grade teacher and parents at Walnut Canyon School in Moorpark, California reviewed the IXL Math program. Drawing from the teacher and parent surveys, Walnut Canyon second grade student performance data, current research in mathematics, and consultation with math experts, several key points about the IXL Math program are identified in this report by West Coast Research. Overall, the teachers that evaluated the program agreed that IXL Math is suitable for all students, especially students with learning disabilities and language concerns. IXL Math.com (from "*I excel*") is a subscription based math practice website for elementary and middle school students. The goal of this program is to help students gain a concrete understanding of a concept, resulting in long-term math skill retention. IXL Math has unlimited questions concerning hundreds of math topics as well as a comprehensive reporting system. The program identifies itself as "The Web's #1 Math Practice Site." This evaluation team has examined many of the math practice sites on the web, and recommends IXL as an excellent starting point for students in grades K-8. This site is of value in providing extra practice in order to gain grade-appropriate math skills. The kindergartners start with counting and learning shapes. Later grades delve into addition, subtraction, fractions, probabilities, and decimals. In addition, IXL keeps track of student progress and generates reports that demonstrate student's strengths and weaknesses. As students find success, they receive medals and ribbons. The price is reasonable when compared to other products. Based on data collected for this report, students enjoyed using this site while reinforcing their math skills. IXL's impact on the range and structure is represented by the varied content. IXL's SmartScore assessment system was built on the premise that the most effective form of assessment is ongoing assessment. The SmartScore feature enables the program to record students' retention level and provides educators an assessment tool that provides viable data. Additionally, the program sets a high bar for the achievement of mastery (based on a SmartScore of 100). Students are encouraged to strive to do their best resulting in intrinsically motivated students. The long-term effect results in a higher level of math standards mastered, as well as enhanced retention of new material. Compiling student performance data of math benchmark scores from September 2010 to November 2010 reveal there was consistent improvement over time. There were no negative findings other than logging on was problematic at times. Math IXL is not a curriculum and does not have lessons or tutorials. It provides numerous practice questions to supplement curriculum. The site delivers what it claims, and the questions are standards appropriate. There were no problems noted with the program's structure and organization.

The following steps still need to be performed:

1. Present this formative evaluation to the administrators and stakeholders of the school district.
2. Identify a group of teachers to pilot IXL Math as a supplement to the Scott Foresman math program.
3. Convene the pilot group in March 2011 to share data on the piloted program.
4. Decision to be made whether to recommend purchasing the Math IXL program for Moorpark Unified School District's K-8 schools.

Purpose(s) of the Evaluation

Purpose

Walnut Canyon School in Moorpark, California is currently in the School Improvement Program due to not meeting its [API goal](#) two years consecutively. The API goal is the minimum score schools need to reach in each year's testing. Schools that are already at 800 or above, the state's goal, do not receive a target, but must stay in the 800 range. Schools find out in August whether they achieved their targets, based on tests students recently took. Walnut Canyon School's score did not increase between [2008](#) and [2009](#) in order for its AYP goal to be met. These scores are represented in Appendix A. The School Improvement Program is a program for elementary, intermediate, and secondary schools to improve instruction, services, school environment and organization at school sites according to plans developed by School Site Councils. In order to improve California State Test scores in the area of math, a supplementation program for the purpose of additional practice is deemed necessary. During the beginning of the academic school year of 2010-11, West Coast Research engaged in an evaluation of the IXL Math program. Student data, a teacher survey, a parent satisfaction survey, as well as other research was used to determine if IXL Math should be piloted by a sampling of teachers to determine the feasibility of using the program for math supplementation. This evaluation presents some comprehensive recommendations concerning mathematical proficiency at Walnut Canyon School.

Central Questions

The primary purpose of the evaluation was to:

1. To determine the level of commitment in teaching the IXL Math program within the school district.
2. To provide the Moorpark Unified educators and the community an opportunity to evaluate the effectiveness of the IXL Math program and its impact on students.
3. To determine if students were motivated to extend their learning using this particular product.

Impact

The predominant factor supporting the decision to further explore IXL Math is that students learn best from integrating technologies with traditional methods of teaching. Students appear to be fully engaged while having an enjoyable time while they are working on technology based math programs. The attitude of the students toward their math homework was noted as positive as opposed to how they approach their traditional math homework. The immediate feedback that students receive while engaging in Internet based math programs was the most motivating factor noted by students and parents in their interviews. Additionally, teachers were able to give immediate feedback on the progress of the individual students. The vendor can also update or modify the program based on current needs without an additional purchase of materials by the school.



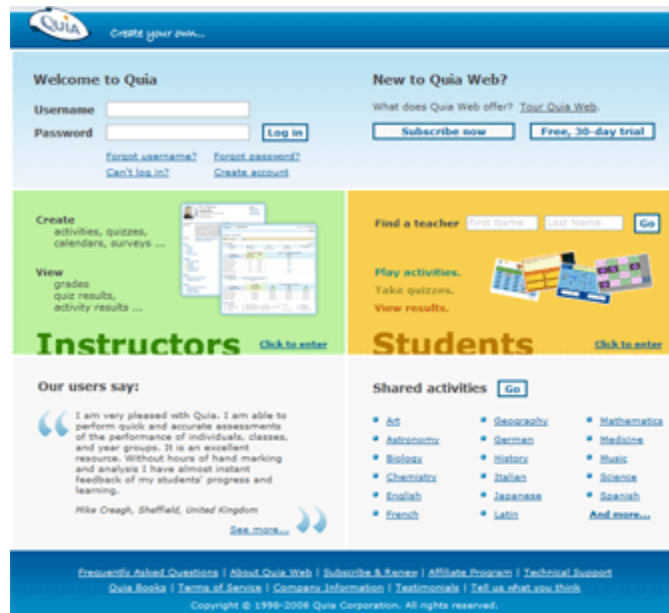
Background Information

Rationale

History of IXL and Quia Corporation

IXL Math is a product of Quia Corporation, which is a Web-based educational software solution for more than a decade. IXL Math was developed in 2005 and was researched, discussed, designed and re-designed up until its launch in 2008. Quia's goal was to revolutionize education through Web technology. IXL's fundamental mission is to improve and invigorate the learning experience for students, parents, and teachers. Quia Corporation was founded in 1998 to improve education through Web-based technologies. Their approach is straightforward. Quia thinks about what will make an educator's job easier, as well as save time. They focus on helping instructors motivate as well as engage students. They develop software programs that assist in expediting lessons for students. They address these issues not with a theoretical world in mind, but fully aware of the realities of K-12 and higher education, as they exist today. They receive positive feedback from their customers regarding the ease of use of their products.





Quia Web (located at <http://www.quia.com/web>) claim that they are one of the world's most popular educational technology websites. It pioneered the "create-your-own" concept, giving instructors the ability to create customized educational software online, built around their own course materials and made available to students over the Web. The idea proved so popular that more than a million educators have registered to use the service. All features are intuitive and learn-as-you-go — no special training is ever required.

Quia Books (found at <http://www.quia.com/books>) are Web-based versions of workbooks and textbooks, and are produced in partnership with the world's leading publishers. According to Quia, their books engage students and make the learning process more satisfying through interactive exercises replete with vibrant color, sound, and images. They claim that educators reap the timesaving benefits of computer-based grading and tracking and can fully customize

Standards

Appendix B contains an outline of how the California State Math Second Grade Standards are addressed with the use of Math IXL. Throughout the year, each standard could be addressed and assigned to students accordingly.

Design and Development of the Program

IXL Math (located at <http://www.ixl.com>) is an engaging, individualized math learning experience for students. Based on the content of popular textbooks and state standards, IXL generates unlimited practice questions covering every topic in pre-kindergarten through eighth-grade mathematics. The website is complete with features to keep students absorbed in practicing, inclusive of colorful images, awards for improvement, and varied problem types. Saving teachers time, IXL charts student growth routinely, with detailed progress graphs and data. IXL provides schools with motivating, and engaging methods of teaching students.

Characteristics of the Program

IXL Math provides educators a technology tool that is in meeting the standards along with existing curriculum. The expense for this product is low, and it provides individualized learning experiences. Students can learn at their own pace, and the program provides helpful reports that target trouble spots, record time spent on the program, and improvement.

IXL Math is aligned to the California State Standards. IXL's math skills are aligned to the 2008 California Preschool Learning Foundations and the 1997 California Content Standards, providing comprehensive preparation for the Standardized Testing and Reporting (STAR) program. Teachers are able to find unlimited practice problems specific-to-specific standards.

Description of Evaluation Design

West Coast Research is evaluating IXL Math in order to determine its effectiveness as a supplemental program to assist in Walnut Canyon School with meeting their AYP goals. Accountability of students continues to be enforced, as budgets to assist in meeting these goals significantly reduced. Moorpark Unified School District has requested that West Coast Research examine the feasibility of purchasing IXL Math for the school district. The evaluation was focused on one sample elementary school in the district, and the results will determine if the program should be recommended for a full pilot within the school district. The effectiveness as well as the cost will determine if this program should be further evaluated. The Goal-based Model was used to identify data collection instances and opportunities that arose during the evaluation. Objectives of IXL Math were found on their website. The objectives are coordinated with the California State Standards in the area of mathematics. Accomplishments and shortcomings are noted in the results section of this evaluation. This evaluation team looked at the class goals, class improvement, and the usage impact reports to measure specified outcome variables using quantitative and qualitative methods. The data record reports of IXL Math provided the quantitative results necessary for evaluations. The qualitative results were derived from the survey sent to the parents, and parent and student interviews. The results are noted in the results section of this evaluation. A range of different data sources and evaluation strategies were utilized in this evaluation in order to evaluate the IXL Math software program.

1. Existing Data from the IXL Math program as well as competitor programs were collected.
2. An attitude survey of the parents in the focus group was assessed.
3. Personal interviews of students and parents were administered by use of a structured interview using Likert scale questions formulated by the evaluation team.
4. An evaluation of the software was completed. The intent was to evaluate if the content and instructional design materials were adequate for instruction that resulted in mastery of math skills over a given period.

Collecting data is always an ongoing process. The comparison data collected provided information to the evaluation team to determine if IXL Math would be an effective tool for MUSD educators to acquire.

Our sources were:

- ✚ [NCTM's Focal Points](#) This site provided information of about the national standards, and focal points of math.
- ✚ [Adding it Up – Helping Children Learn Mathematics](#) This site discussed how learning math is no longer mastered through rote work alone, but by infusing new technologies along with traditional methodology is of value. In addition, there were
- ✚ [California Mathematics and Science Partnership](#) This is a resource for assistance in meeting math and science standards in California.
- ✚ [California Math Standards](#) These content standards establish what every student in California can and needs to learn in mathematics.
- ✚ [iNACOL](#) The International Association for K-12 Online Learning
- ✚ [Math Score](#) This is a comparison site to IXL Math. It is not engaging or attractive, but priced the same as IXL Math. See the [WBLE Evaluation Form](#) in Appendix D.
- ✚ [Sheppard Software](#) This is another comparison site to IXL Math.
- ✚ [BigIQKids](#) This site is an interactive multiple subject program to enhance learning.
- ✚ [Ten Marks](#) This is a site for 3rd grade on up for math reinforcement skills. The skills are taught through asynchronous direct video lessons.

The following is a summation of the research:

Varied instruction that integrates technologies use tools like visual and interactive instruction of math concepts, computer programs can give students new viewpoint on math, which ultimately leads to better understanding of concepts. All of the math programs reviewed for this evaluation cost \$10 or less per month per class if purchased individually. The programs varied across the board in usability, content criterion, educational value, and vividness. The easiest for primary students to manage independently was IXL Math. This program also had the most comprehensive standard based program out of those evaluated. The following graphs demonstrate the WBLE evaluation conducted on IXL Math and its competitors.

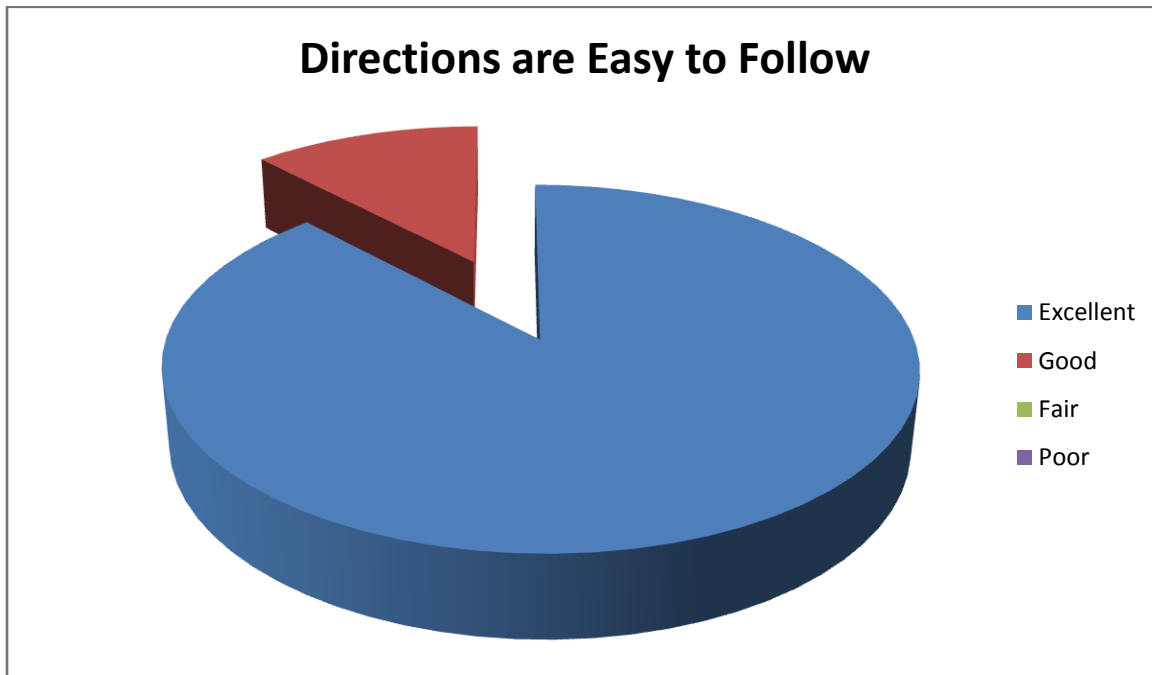
Results

Parent Survey and Interviews

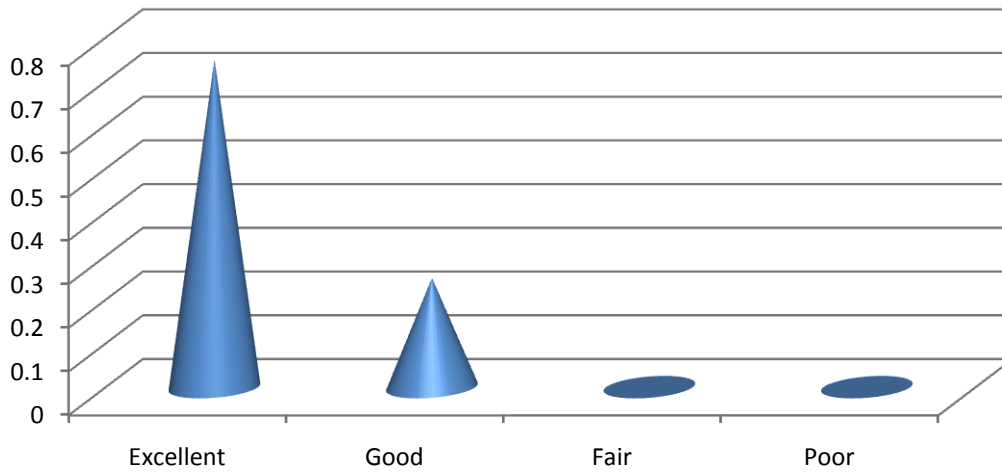
An evaluation of the program survey was sent out to parents in the class evaluated. Parents in the class evaluated IXL Math to determine their value of the program. Prior to the decision to send out the survey, there was interest by the teacher evaluating IXL Math to find a program that could be used as a supplement to the existing math program as Internet homework. The parent survey can be viewed at the link below.

<https://spreadsheets.google.com/a/u.boisestate.edu/viewform?formkey=dHZNTVNpOXpuRHR3LUhvLXJGd3IOcFE6MQ>

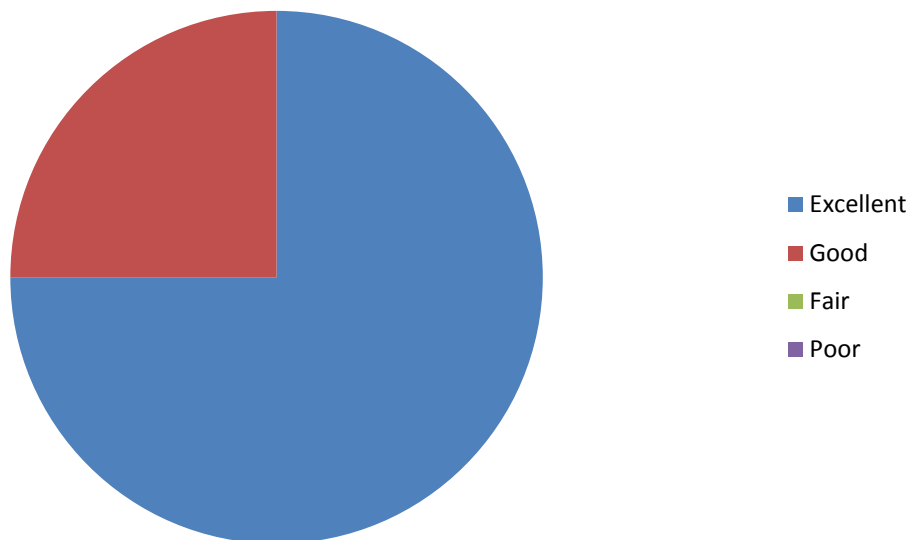
Some of the results are note in the graphs below.

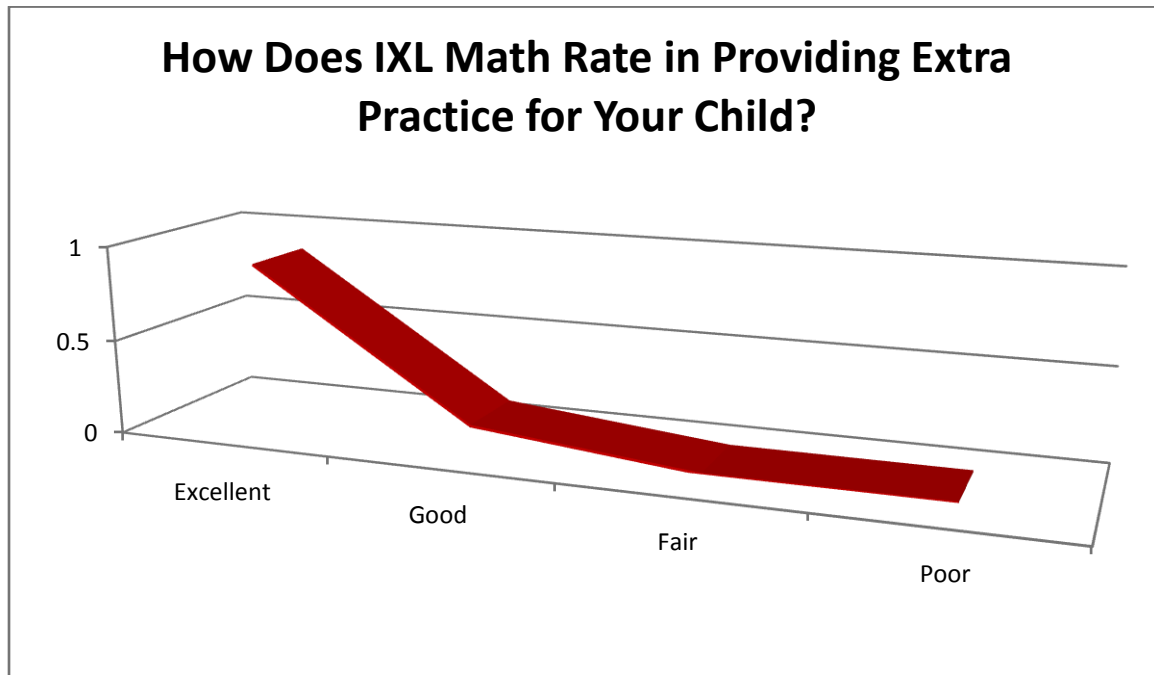


How Does Your Child Feel About Internet Homework?



How Would You Rate the Positive Feedback?





Student Interviews

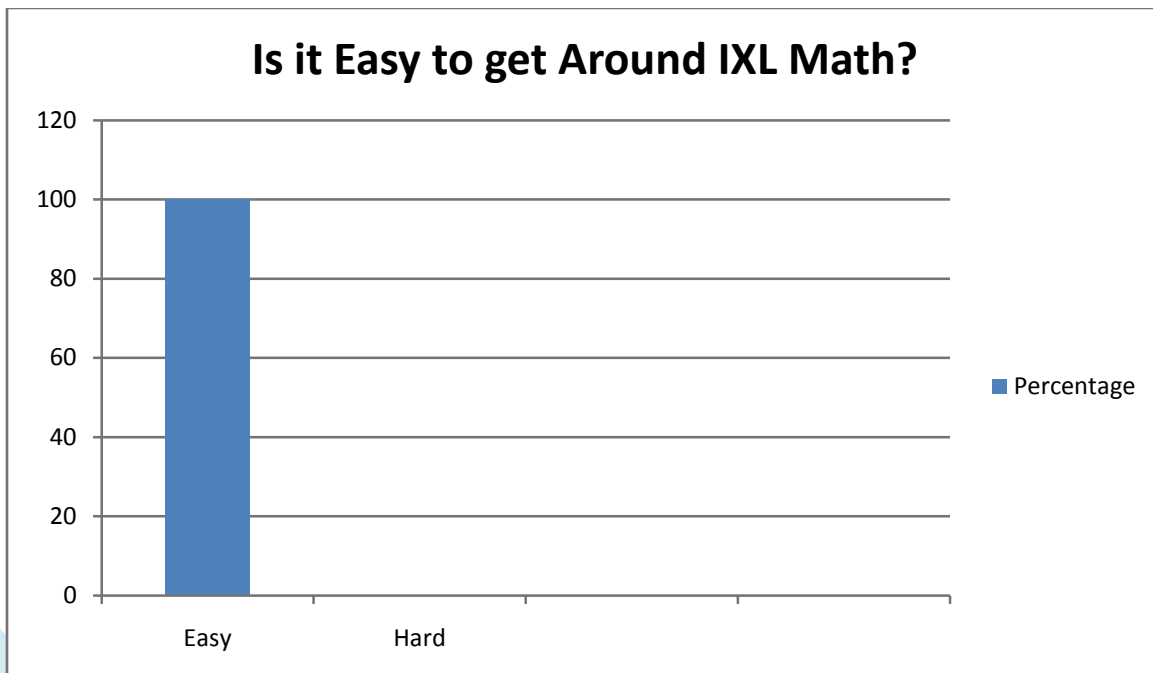
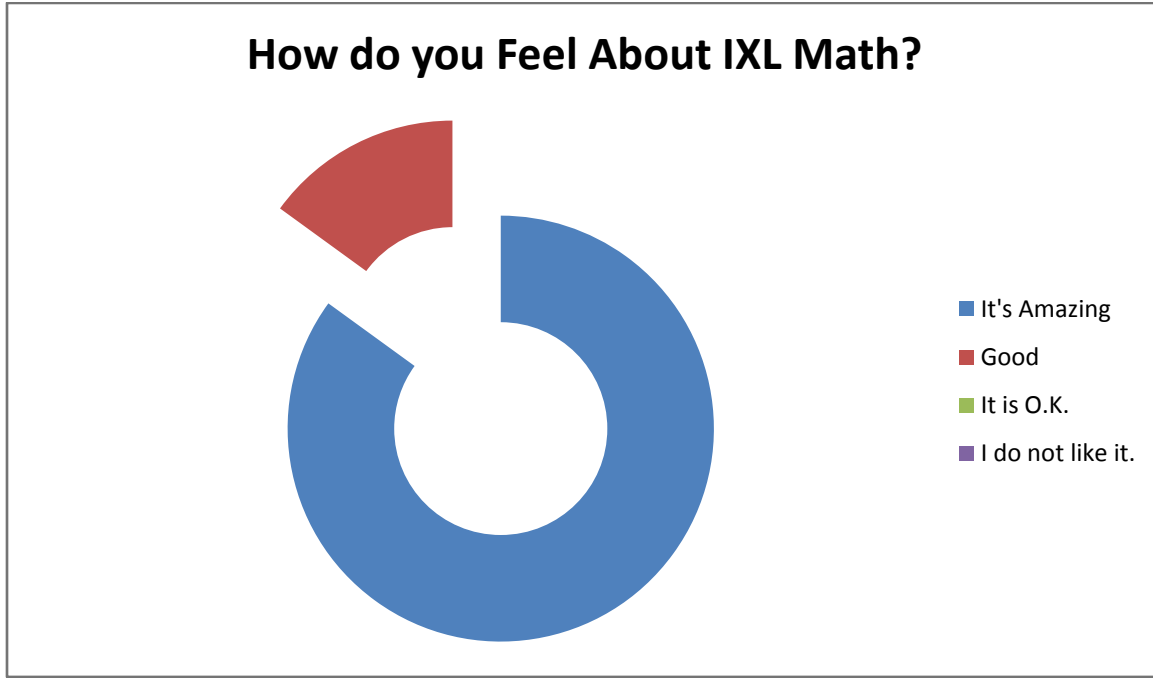
Student's attitude interviews were conducted as an informal form of data collection for participants to verbalize their personal opinions of IXL Math. Responses in most of the categories were positive. The informal interview format was chosen due to the young age of students involved in the evaluation. Their main criticism was that they were tired after school, and sometimes did not feel like working on homework. One of the problems that the students found was that once they received a mastery score it could be reduced if they marked an incorrect response. They did not like the negative feedback. The most common response in favor of the program was the medals received for mastering concepts.

Below is the link to the student survey.

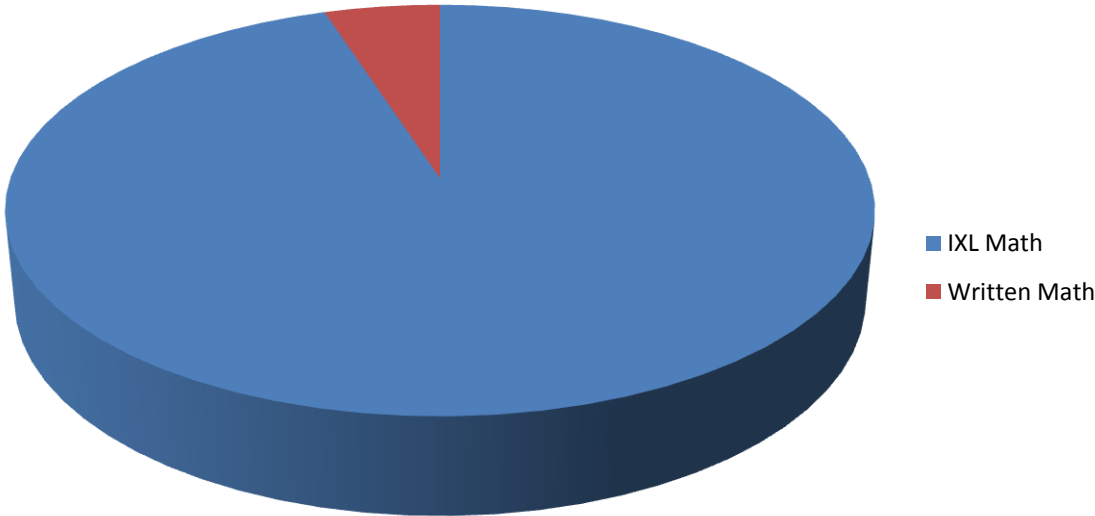
Student Interview link is below:

<https://spreadsheets.google.com/a/u.boisestate.edu/viewform?formkey=dFVOMTVPQ3djTy1rb3h1dG5NUkNuTnc6MQ>

The following are some of the graphs of results of the student survey:



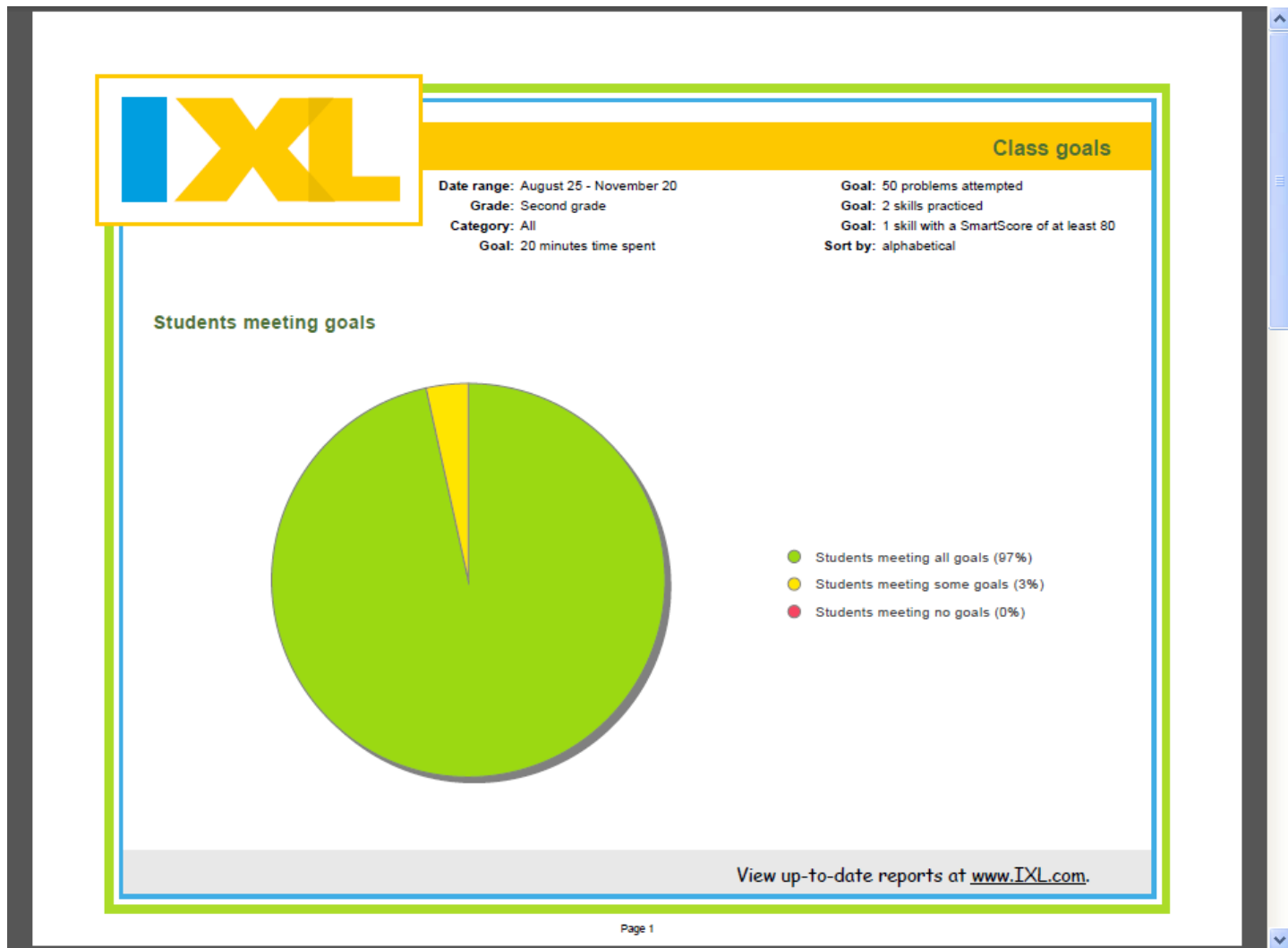
Do You Like Internet or Written Math Homework Better?



Class Goals Report

Students worked on goals created by the teacher. As time progressed and the students became more familiar with the program, their goals were being met on a more consistent basis.

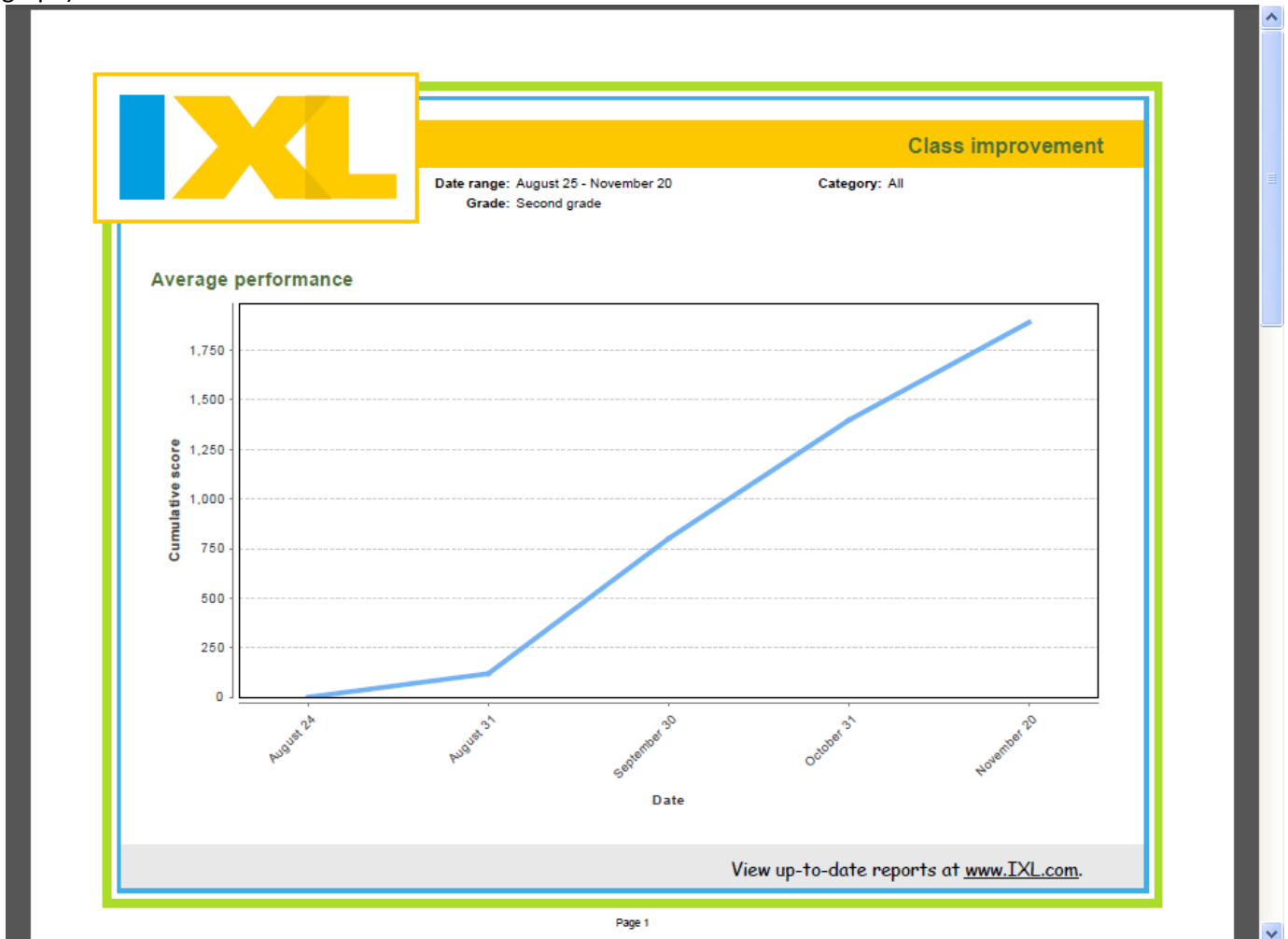
[..\..\Class Info\Class Data\Class goals 11 20 2010.pdf](#) (Additional information of this graph)



Class Improvement Report

The performance statistics improved with additional use of the program. Familiarity as well as knowledge of navigation of the site improved with time as well.

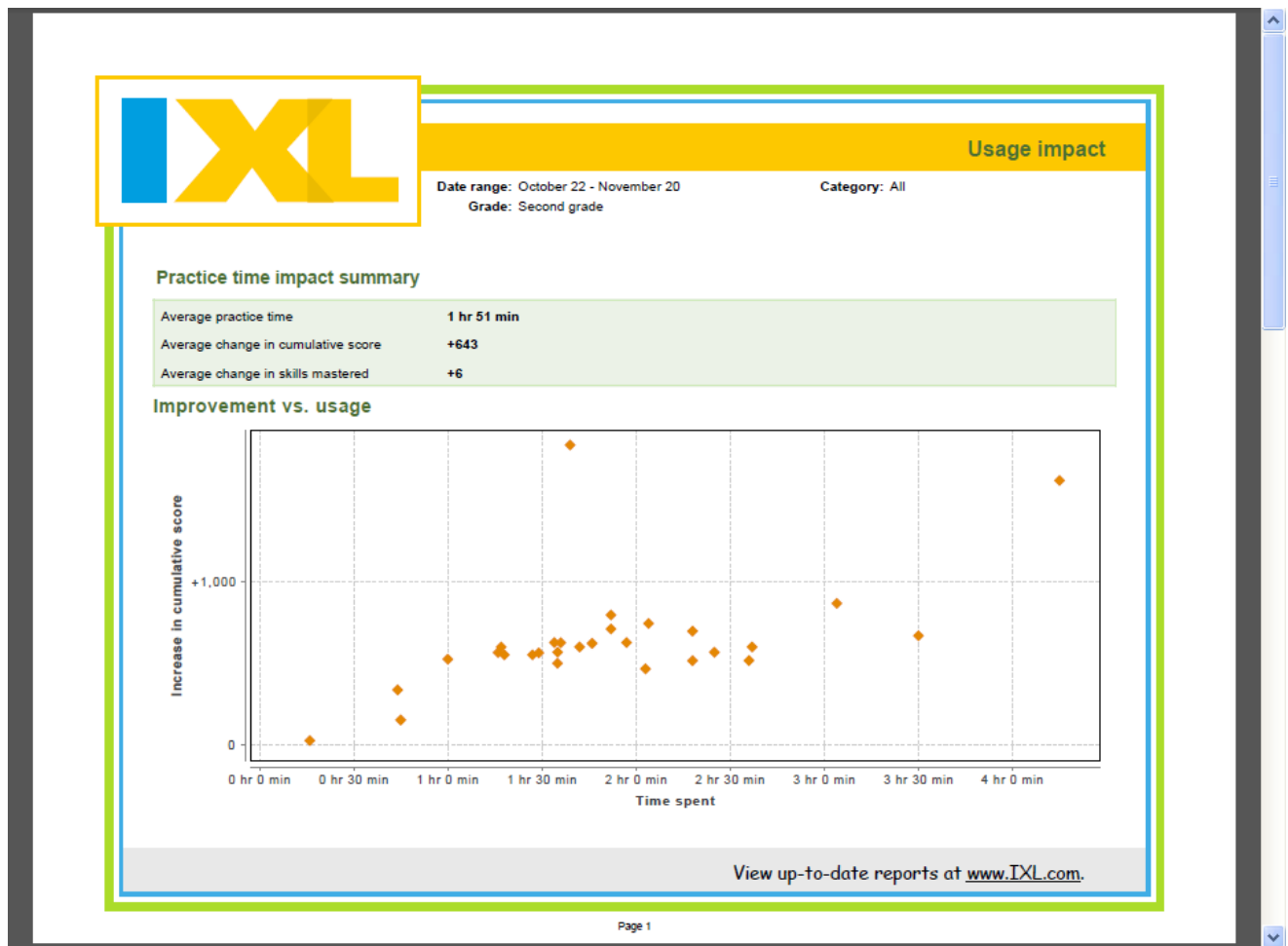
[..\..\Class Info\Class Data\Class improveaaament 11 20 2010.pdf](#) (additional information for this graph)



Usage Impact

As students increased their practice time, their performance increased as well. All students showed good growth through the evaluation period. The following chart represents the data of the impact of increased time of the student on the program. The average change in cumulative score was +643. The increase in skills mastered was +6. The average practice time was one hour fifty-one minutes.

..\Class Info\Class Data\Usage_impact_11_20_2010.pdf (Additional information for this graph)



Recent skills are noted in the following graph listed below. Most students were able to access a computer for their homework and showed 100% mastery of skills assigned. When students were not able to master the skill while completing the assigned skill as homework, they were given additional time during the school day to work on mastery of skills.

..\Class Info\Class Data\Recent_skills_12_01_2010.pdf

Discussion of Results

This evaluation team believes that Math IXL is an excellent math practice website. It has a variety of problem types, fine reporting, and is user friendly. It can be used as a supplement to any type of math curriculum. It is primarily useful as review and reinforcement as well as summer enrichment.

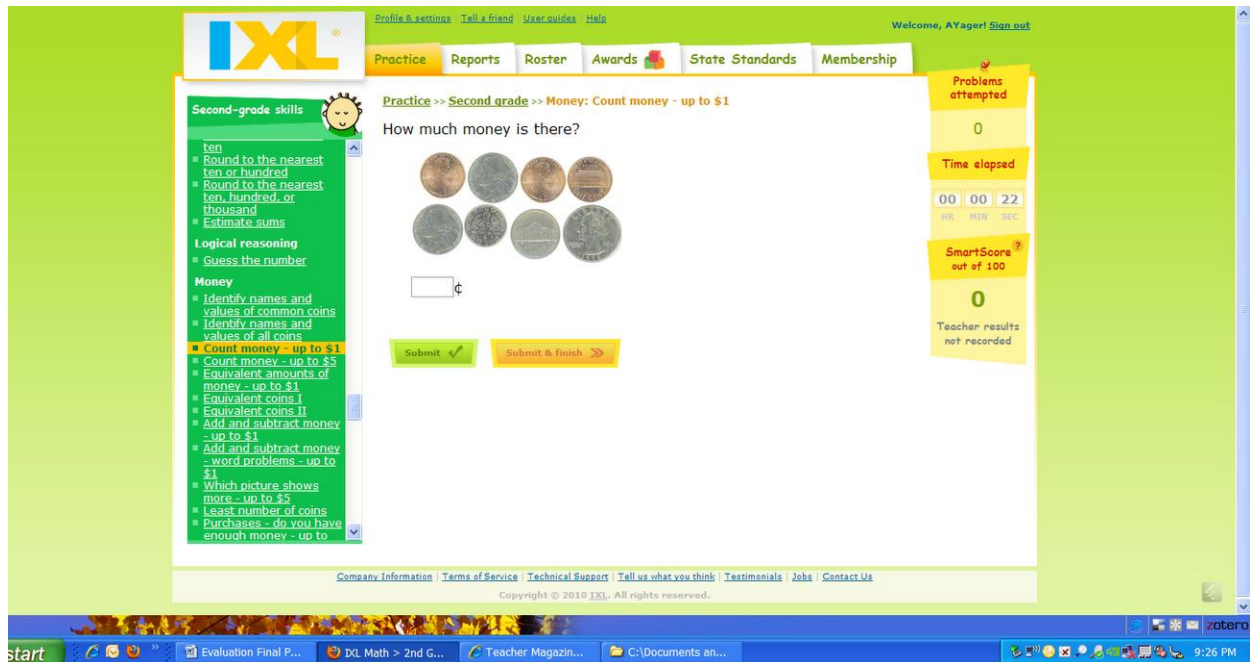
The following are points to be noted as positive results of using the program:

- ✚ It is user-friendly; the skills are grouped by grade level and broken down by standard. Before assigning a skill, an educator could hover over the skill in order to preview it.. As students progress towards a score of 100 (completion) for each activity, three ribbons can be earned. The ribbons are displayed under their score. After completing each activity, the student is notified if awards have been earned, which are given for meeting certain criteria for time practiced, skills mastered, questions answered, etc. The "reward" is turning over a piece on the game board to claim a virtual prize. The program is easy to navigate and self-guided. Teachers and parents have a great deal of flexibility in assigning the tasks. Timing of the lesson is open, and can be resumed later. It avails itself to be worked on longer for challenging problems, or shorter for easier problems.
- ✚ When a membership is purchased, and parent e-mails inputted, IXL Math e-mails periodic updates to the parents. Parents are notified how long students have worked on the program, mastery, and rewards earned. Reports are available to teachers as they wish to view them. There are many reports available for teachers to use for future planning.

IXL Math claims that it is “The Web’s #1 Math Practice Site.” There are a few sites as noted earlier for comparison purposes, but this evaluation team believes that this is truly the best site for the value. IXL is an excellent starting point for grades K-5 in order to get that extra practice that they need. If a class purchases this product, alone it is \$199 per year. If a parent purchases it on their own, it is \$79.00. When broken down the class that was evaluated charged each student \$10 to cover the cost for the year. Considering all of the benefits that are included with the membership, it considered a good value. Students can use the site and work on twenty problems per day without a membership, but their progress will not be tracked. A site license or a district license cost would need to be requested directly from the vendor.

The site is easy to use with an appealing contrast of colors with illustrations of smiling kids. It is inviting as well as friendly. Navigating the site is simple, and the students within this evaluation had no difficulties working on the site. Each grade level (K-8) has over a hundred skills listed at this time.

This is screenshot of a second grade page:



Summary of advantages of the IXL Math Program:

- ✚ Many topics to choose from
- ✚ Problem solving is engaging.
- ✚ Logical reasoning uses games.
- ✚ There are separate sections for Kindergarten and Preschool with age appropriate skills for each. Parental assistance would be necessary for these aged children with this program.
- ✚ The breadth of skills is vast including challenging skills for those that need an extra challenge.
- ✚ The questions adapt to the children's ability increasing as they progress.
- ✚ The program measures the time that a child works on a given problem, but it is not timed.
- ✚ Reports are detailed and comprehensive.

Conclusions & Recommendations

Immediate Conclusions

According to the authors [Robert J. Marzano](#), [Debra J. Pickering](#), and [Jane E. Pollock](#) in their book, *[Classroom Instruction that Works: Research-Based Strategies for Increasing Student Achievement](#)*, formative assessments are an ongoing process that are used to determine prior knowledge and are used throughout the lessons to realign best teaching practices. As he further notes in his [YouTube presentation](#) about his second book about formative assessments, if material is taught as well as assessed in a variety of methods its impact is to be more notable. Marzano states that generative assessments are a formative assessment in which a student can tell you where they are at in their own learning. IXL Math promotes this, and gives even young students the tools to demonstrate where they are in their mathematical learning. The conclusion is that even though there is doubt in some that a computer program could not assist learning and retaining math skills, it was proven through this evaluation that it is possible. IXL Math is a potential product to be further investigated to supplement the existing math curriculum within Moorpark Unified School District.

- ✚ Use formative assessments to assess prior mathematical knowledge.
- ✚ Teaching math is an ongoing process as well as formative assessments.
- ✚ Use generative assessments to assess students.
- ✚ Teach students to assess their own learning.

Long-Range Planning

Practice makes perfect is what we heard when we were growing up. The concept has not changed, but how the students practice is vastly different today. While working on anything challenging requires a bit of frustration and hard work. Math is a fine example of this, in which learning new concepts builds on previous ones. The steps involved in everything draws on previous knowledge and the IXL Math program is one that is a prime example of this

Long Term Plan for IXL Math:

- ✚ Practice math skills often, and keep practicing until the skills are mastered.
- ✚ Do not give up and work through frustrations.
- ✚ Math skills build on previously learned knowledge.
- ✚ Reports could be used for planning for the following school year's math lessons.
- ✚ Teacher's could tweak how they teach a lesson based on how the mastery of the students in the current school year.

Evaluation Insights

According to Cossondra George, in her article [Teaching Secrets: Making Math Meaningful for All](#), in the August 18th issue of Edweek.org, she suggests that many websites offer interactive math activities that organizes the activities by topic and grade levels and offers engaging tools to use to explore concepts. One of the products noted is [Cool Math](#). This is an excellent source to supplement math as well, but is not as friendly as IXL Math. The community of teachers, parents and stakeholders involved in mathematics education should continue to monitor new programs in offered in math, and should continually evaluate the available data. This evaluation team has observed that the use of technology in the classroom assists with student learning of additional math concepts in less time. It also helps level the playing field with special needs students and English Language Learners. In the future, this evaluation team would strongly suggest contacting the vendor to discuss and review data previously collected. The team will continue this evaluation through the remainder of the school year to determine if the pilot was successful, and collect the data from the piloting teachers in order to make recommendations to Moorpark Unified School District administrators and stakeholders.

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Appendices

Appendix A

School Accountability Progress Report 2007-2008 [2010-12-04 1653.png](#)

[DataQuest home](#) > [API home](#) > [Reports](#) > [Select School](#) > [School Reports](#) > Current Page

2007-08 Accountability Progress Reporting (APR)



School Report - PI Status
 2008 Adequate Yearly Progress (AYP) Report

California Department of Education
 Policy and Evaluation Division
 3/26/2010

School: Walnut Canyon Elementary
 LEA: Moorpark Unified
 County: Ventura
 CDS Code: 56-73940-6115430
 School Type: Elementary

2008 AYP and PI Links:

- [School Overview](#)
- [School Chart](#)
- [School Report](#)
- [LEA List of schools](#)
- [County List of Schools](#)

Direct Funded Charter School: No

(An LEA is a school district or county office of education.)

2007-08 APR		2007-08 State API				2008 Federal AYP and PI		
Summary	Glossary	2007 Base	Guide	2008 Growth	Guide	AYP	PI	Guide

Federal Accountability: Adequate Yearly Progress (AYP)

PI Status: Not in PI

2008-09 PI Placement:

Prior PI Placement:

First Year of PI Implementation:

Made 2008 Adequate Yearly Progress (AYP):

No

School Accountability Progress Report 2008-2009

[2008 2009 APR Report.png](#)

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2008-09 Accountability Progress Reporting (APR)



School Report - PI Status
 2009 Adequate Yearly Progress (AYP) Report

California Department of Education
 Academic Accountability and Awards Division
 8/2/2010

School: Walnut Canyon Elementary
 LEA: Moorpark Unified
 County: Ventura
 CDS Code: 56-73940-6115430
 School Type: Elementary

2009 AYP and PI Links:

- [School Overview](#)
- [School Chart](#)
- [School Report](#)
- [LEA List of schools](#)
- [County List of Schools](#)

Direct Funded Charter School: No

(An LEA is a school district or county office of education.)

2008-09 APR		2008-09 State API			2009 Federal AYP and PI		
Summary	Glossary	2008 Base	Guide	Growth	AYP	PI	Guide

Federal Accountability: Adequate Yearly Progress (AYP)

PI Status: In PI

2009-10 PI Placement: Year 1
 Prior PI Placement:
 First Year of PI Implementation: 2009-2010
 Made 2009 Adequate Yearly Progress (AYP): No

Appendix B

Skills available for California second-grade math standards

Standards are in black and IXL math skills are in blue. Hold your mouse over the name of a skill to view a sample problem. Click on the name of a skill to practice that skill.

2.NS Number Sense

- **2.NS.1.0 Students understand the relationship between numbers, quantities, and place value in whole numbers up to 1,000:**
- **2. NS.1.1 Count, read, and writes whole numbers to 1,000 and identify the place value for each digit.**
 - [Counting and number patterns: Number lines - up to 100 \(Second grade - A.4\)](#)
 - [Counting and number patterns: Number lines - up to 1,000 \(Second grade - A.11\)](#)
 - [Names of numbers: Writing numbers up to 100 in words \(Second grade - C.3\)](#)
 - [Names of numbers: Writing numbers up to 1,000 in words \(Second grade - C.4\)](#)
 - [Place values: Value of underlined digit - tens and ones \(Second grade - M.4\)](#)
 - [Place values: Value of underlined digit - up to hundreds \(Second grade - M.5\)](#)
 - [Place values: Identify the digit in the ones, tens, hundreds, or thousands place \(Second grade - M.15\)](#)
- **2.NS.1.2 Use words, models, and expanded forms (e.g., $45 = 4 \text{ tens} + 5$) to represent numbers (to 1,000).**
 - [Place values: Place-value models - tens and ones \(Second grade - M.1\)](#)
 - [Place values: Place-value models - up to hundreds \(Second grade - M.2\)](#)
 - [Place values: Regrouping tens and ones I \(Second grade - M.7\)](#)
 - [Place values: Regrouping tens and ones II \(Second grade - M.8\)](#)
 - [Place values: Convert to/from a number - tens and ones \(Second grade - M.9\)](#)
 - [Place values: Convert to/from a number - up to hundreds \(Second grade - M.10\)](#)
 - [Place values: Convert from expanded form - up to hundreds \(Second grade - M.13\)](#)
- **2.NS.1.3 Order and compare whole numbers to 1,000 by using the symbols $<$, $=$, $>$.**
 - [Comparing and ordering: Comparing numbers up to 100 \(Second grade - B.1\)](#)
 - [Comparing and ordering: Comparing numbers up to 1,000 \(Second grade - B.3\)](#)
 - [Comparing and ordering: Put numbers up to 100 in order \(Second grade - B.4\)](#)
 - [Comparing and ordering: Put numbers up to 1,000 in order \(Second grade - B.5\)](#)
- **2.NS.2.0 Students estimate, calculate, and solve problems involving addition and subtraction of two- and three-digit numbers:**
 - [Estimation and rounding: Estimate sums \(Second grade - N.5\)](#)
- **2.NS.2.1 Understand and use the inverse relationship between addition and subtraction (e.g., an opposite number sentence for $8 + 6 = 14$ is $14 - 6 = 8$) to solve problems and check solutions.**
 - [Addition - one digit: Complete the addition sentence \(Second grade - E.10\)](#)
 - [Addition - one digit: Balance equations \(Second grade - E.12\)](#)

- [Subtraction - one digit: Complete the subtraction sentence \(Second grade - F.10\)](#)
- [Subtraction - one digit: Balance equations \(Second grade - F.12\)](#)
- [Addition - two digits: Complete the addition sentence \(Second grade - G.10\)](#)
- [Addition - two digits: Balance equations \(Second grade - G.12\)](#)
- [Subtraction - two digits: Complete the subtraction sentence \(Second grade - H.10\)](#)
- [Subtraction - two digits: Balance equations \(Second grade - H.12\)](#)
- [Addition - three digits: Complete the addition sentence \(Second grade - I.5\)](#)
- [Addition - three digits: Balance equations \(Second grade - I.7\)](#)
- [Subtraction - three digits: Complete the subtraction sentence \(Second grade - J.5\)](#)
- [Subtraction - three digits: Balance equations \(Second grade - J.7\)](#)
- [Properties: Related addition facts \(Second grade - K.1\)](#)
- [Properties: Related subtraction facts \(Second grade - K.2\)](#)
- [Properties: Fact families \(Second grade - K.3\)](#)
- [Mixed operations: Addition and subtraction - balance equations - up to 20 \(Second grade - L.4\)](#)
- [Mixed operations: Input/output tables - write the rule - up to 20 \(Second grade - L.5\)](#)
- [Mixed operations: Addition and subtraction - balance equations - up to 100 \(Second grade - L.9\)](#)
- [Mixed operations: Input/output tables - write the rule - up to 100 \(Second grade - L.10\)](#)
- [Mixed operations: Which sign \(+ or -\) makes the number sentence true? \(Second grade - L.11\)](#)
- **2.NS.2.2 Find the sum or difference of two whole numbers up to three digits long.**
 - [Addition - two digits: Add a two-digit and a one-digit number - with regrouping \(Second grade - G.3\)](#)
 - [Addition - two digits: Add two two-digit numbers - with regrouping \(Second grade - G.5\)](#)
 - [Subtraction - two digits: Subtract a one-digit number from a two-digit number - with regrouping \(Second grade - H.3\)](#)
 - [Subtraction - two digits: Subtract two two-digit numbers - with regrouping \(Second grade - H.5\)](#)
 - [Addition - three digits: Add multiples of 100 \(Second grade - I.1\)](#)
 - [Addition - three digits: Add two three-digit numbers \(Second grade - I.2\)](#)
 - [Addition - three digits: Input/output tables \(Second grade - I.3\)](#)
 - [Subtraction - three digits: Subtract multiples of 100 \(Second grade - J.1\)](#)
 - [Subtraction - three digits: Subtract three-digit numbers \(Second grade - J.2\)](#)
 - [Subtraction - three digits: Input/output tables \(Second grade - J.3\)](#)
 - [Mixed operations: Add and subtract numbers up to 20 \(Second grade - L.1\)](#)
 - [Mixed operations: Add and subtract numbers up to 100 \(Second grade - L.6\)](#)
- **2.NS.2.3 Use mental arithmetic to find the sum or difference of two two-digit numbers.**
 - [Addition - one digit: Review - ways to make a number - sums to 10 \(Second grade - E.2\)](#)

- [Addition - one digit: Add one-digit numbers \(Second grade - E.4\)](#)
- [Addition - one digit: Input/output tables - sums to 20 \(Second grade - E.7\)](#)
- [Addition - one digit: Add zero \(Second grade - E.8\)](#)
- [Subtraction - one digit: Review - ways to subtract - up to 10 \(Second grade - F.2\)](#)
- [Subtraction - one digit: Subtract a one-digit number from a two-digit number up to 18 \(Second grade - F.4\)](#)
- [Subtraction - one digit: Input/output tables \(Second grade - F.7\)](#)
- [Subtraction - one digit: Subtract zero/all \(Second grade - F.8\)](#)
- [Addition - two digits: Add multiples of 10 \(Second grade - G.1\)](#)
- [Addition - two digits: Add a two-digit and a one-digit number - without regrouping \(Second grade - G.2\)](#)
- [Addition - two digits: Add two two-digit numbers - without regrouping \(Second grade - G.4\)](#)
- [Addition - two digits: Input/output tables \(Second grade - G.7\)](#)
- [Addition - two digits: Ways to make a number \(Second grade - G.8\)](#)
- [Subtraction - two digits: Subtract multiples of 10 \(Second grade - H.1\)](#)
- [Subtraction - two digits: Subtract a one-digit number from a two-digit number - without regrouping \(Second grade - H.2\)](#)
- [Subtraction - two digits: Subtract two two-digit numbers - without regrouping \(Second grade - H.4\)](#)
- [Subtraction - two digits: Input/output tables \(Second grade - H.7\)](#)
- [Subtraction - two digits: Ways to make a number \(Second grade - H.8\)](#)
- [Mixed operations: Addition and subtraction - ways to make a number - up to 20 \(Second grade - L.2\)](#)
- [Mixed operations: Addition and subtraction - ways to make a number - up to 100 \(Second grade - L.7\)](#)
- **2.NS.3.0 Students model and solve simple problems involving multiplication and division:**
- **2.NS.3.1 Use repeated addition, arrays, and counting by multiples to do multiplication.**
 - [Multiplication: Multiplication sentences \(Second grade - W.1\)](#)
- **2.NS.3.2 Use repeated subtraction, equal sharing, and forming equal groups with remainders to do division.**
 - [Division: Divisors and quotients up to 5 \(Second grade - X.1\)](#)
 - [Division: Divisors and quotients up to 10 \(Second grade - X.2\)](#)
- **2.NS.3.3 Know the multiplication tables of 2s, 5s, and 10s (to "times 10") and commit them to memory.**
 - [Multiplication: Multiplication tables up to 5 \(Second grade - W.2\)](#)
 - [Multiplication: Multiplication tables up to 10 \(Second grade - W.3\)](#)
- **2.NS.4.0 Students understand that fractions and decimals may refer to parts of a set and parts of a whole:**
- **2.NS.4.1 Recognize, name, and compare unit fractions from $\frac{1}{12}$ to $\frac{1}{2}$.**
 - [Fractions: Identify halves, thirds, fourths \(Kindergarten - L.1\)](#)
 - [Fractions: Halves, thirds, and fourths \(First grade - I.1\)](#)

- [Fractions: Compare fractions \(First grade - I.6\)](#)
- [Fractions: Simple fractions: which shape matches the fraction? \(First grade - I.7\)](#)
- [Fractions: Halves, thirds, and fourths \(Second grade - U.1\)](#)
- [Fractions: Which shape illustrates the fraction? \(Second grade - U.3\)](#)
- [Fractions: Compare fractions \(Second grade - U.6\)](#)
- [Fractions: Order fractions \(Second grade - U.7\)](#)
- **2.NS.4.2 Recognize fractions of a whole and parts of a group (e.g., one-fourth of a pie, two-thirds of 15 balls).**
 - [Fractions: Equal parts \(First grade - I.2\)](#)
 - [Fractions: Simple fractions: what fraction does the shape show? \(First grade - I.3\)](#)
 - [Fractions: Simple fractions: parts of a group \(First grade - I.4\)](#)
 - [Fractions: Fractions - word problems \(First grade - I.5\)](#)
 - [Fractions: Identify the fraction \(Second grade - U.2\)](#)
 - [Fractions: Parts of a group \(Second grade - U.4\)](#)
- **2.NS.4.3 Know that when all fractional parts are included, such as four-fourths, the result is equal to the whole and to one.**
- **2.NS.5.0 Students model and solve problems by representing, adding, and subtracting amounts of money:**
- **2.NS.5.1 Solve problems using combinations of coins and bills.**
 - [Money: Count money - up to \\$1 \(Second grade - P.3\)](#)
 - [Money: Count money - up to \\$5 \(Second grade - P.4\)](#)
 - [Money: Equivalent amounts of money - up to \\$1 \(Second grade - P.5\)](#)
 - [Money: Equivalent coins I \(Second grade - P.6\)](#)
 - [Money: Equivalent coins II \(Second grade - P.7\)](#)
 - [Money: Which picture shows more - up to \\$5 \(Second grade - P.10\)](#)
 - [Money: Least number of coins \(Second grade - P.11\)](#)
 - [Money: Purchases - do you have enough money - up to \\$1 \(Second grade - P.12\)](#)
 - [Money: Purchases - do you have enough money - up to \\$5 \(Second grade - P.13\)](#)
 - [Money: How much more to make a dollar? \(Second grade - P.14\)](#)
 - [Money: Making change \(Second grade - P.15\)](#)
- **2.NS.5.2 Know and use the decimal notation and the dollar and cent symbols for money.**
 - [Money: Identify names and values of common coins \(Second grade - P.1\)](#)
 - [Money: Identify names and values of all coins \(Second grade - P.2\)](#)
 - [Money: Add and subtract money - up to \\$1 \(Second grade - P.8\)](#)
 - [Money: Add and subtract money - word problems - up to \\$1 \(Second grade - P.9\)](#)
- **2.NS.6.0 Students use estimation strategies in computation and problem solving that involve numbers that use the ones, tens, hundreds, and thousands places:**
- **2.NS.6.1 Recognize when an estimate is reasonable in measurements (e.g., closest inch).**
 - [Measurement: Which customary unit of length is appropriate? \(First grade - M.2\)](#)
 - [Measurement: Which customary unit of weight is appropriate? \(First grade - M.4\)](#)
 - [Estimation and rounding: Estimate to the nearest ten \(Second grade - N.1\)](#)
 - [Measurement: Which customary unit of length is appropriate? \(Second grade -](#)

[S.2\)](#)

2.AF Algebra and Functions

- **2.AF.1.0 Students model, represent, and interpret number relationships to create and solve problems involving addition and subtraction:**
- **2.AF.1.1 Use the commutative and associative rules to simplify mental calculations and to check results.**
 - [Addition - one digit: Add three or more numbers \(Second grade - E.13\)](#)
 - [Addition - two digits: Add three or more numbers \(Second grade - G.13\)](#)
 - [Properties: Solve inequalities using addition and subtraction shortcuts \(Second grade - K.5\)](#)
- **2.AF.1.2 Relate problem situations to number sentences involving addition and subtraction.**
 - [Addition - one digit: Review - add one-digit numbers - sums to 10 \(Second grade - E.1\)](#)
 - [Addition - one digit: Review - writing addition sentences - sums to 10 \(Second grade - E.3\)](#)
 - [Addition - one digit: Addition with pictures - sums to 20 \(Second grade - E.5\)](#)
 - [Addition - one digit: Write addition sentences to describe pictures - sums to 20 \(Second grade - E.6\)](#)
 - [Addition - one digit: Write the addition sentence \(Second grade - E.11\)](#)
 - [Subtraction - one digit: Review - subtract one-digit numbers - up to 10 \(Second grade - F.1\)](#)
 - [Subtraction - one digit: Review - writing subtraction sentences - up to 10 \(Second grade - F.3\)](#)
 - [Subtraction - one digit: Subtraction with pictures \(Second grade - F.5\)](#)
 - [Subtraction - one digit: Write subtraction sentences to describe pictures \(Second grade - F.6\)](#)
 - [Subtraction - one digit: Write the subtraction sentence \(Second grade - F.11\)](#)
 - [Addition - two digits: Write addition sentences to describe pictures \(Second grade - G.6\)](#)
 - [Addition - two digits: Write the addition sentence \(Second grade - G.11\)](#)
 - [Subtraction - two digits: Write subtraction sentences to describe pictures \(Second grade - H.6\)](#)
 - [Subtraction - two digits: Write the subtraction sentence \(Second grade - H.11\)](#)
 - [Addition - three digits: Write the addition sentence \(Second grade - I.6\)](#)
 - [Subtraction - three digits: Write the subtraction sentence \(Second grade - J.6\)](#)
- **2.AF.1.3 Solve addition and subtraction problems by using data from simple charts, picture graphs, and number sentences.**
 - [Mixed operations: Write addition and subtraction sentences \(Second grade - L.12\)](#)
 - [Data and graphs: Interpret pictographs \(Second grade - R.6\)](#)
 - [Data and graphs: Interpret line graphs \(Second grade - R.8\)](#)

2.MG Measurement and Geometry

- **2.MG.1.0 Students understand that measurement is accomplished by identifying a unit of measure, iterating (repeating) that unit, and comparing it to the item to be measured:**
- **2.MG.1.1 Measure the length of objects by iterating (repeating) a nonstandard or standard unit.**
- **2.MG.1.2 Use different units to measure the same object and predict whether the measure will be greater or smaller when a different unit is used.**
 - [Measurement: Which customary unit of length is appropriate? \(Second grade - S.2\)](#)
 - [Measurement: Which customary unit of weight is appropriate? \(Second grade - S.4\)](#)
 - [Measurement: Which customary unit of volume is appropriate? \(Second grade - S.5\)](#)
 - [Measurement: Which metric unit of length is appropriate? \(Second grade - S.7\)](#)
 - [Measurement: Which metric unit of weight is appropriate? \(Second grade - S.9\)](#)
 - [Measurement: Which metric unit of volume is appropriate? \(Second grade - S.10\)](#)
- **2.MG.1.3 Measure the length of an object to the nearest inch and/or centimeter.**
- **2.MG.1.4 Tell time to the nearest quarter hour and know relationships of time (e.g., minutes in an hour, days in a month, weeks in a year).**
 - [Time: Days of the week \(Second grade - Q.1\)](#)
 - [Time: Reading clocks \(Second grade - Q.2\)](#)
 - [Time: Time words: o'clock, half, quarter \(Second grade - Q.3\)](#)
 - [Time: Match clocks and times \(Second grade - Q.4\)](#)
 - [Time: Match analog and digital clocks \(Second grade - Q.5\)](#)
 - [Time: Seasons \(Second grade - Q.6\)](#)
 - [Time: A.M. and P.M. \(Second grade - Q.7\)](#)
 - [Time: Compare clocks \(Second grade - Q.8\)](#)
 - [Time: Choose the appropriate time units \(Second grade - Q.11\)](#)
 - [Time: Read a calendar \(Second grade - Q.12\)](#)
 - [Time: Months of the year \(Second grade - Q.13\)](#)
 - [Time: Number of days in each month \(Second grade - Q.14\)](#)
 - [Time: Relate time units \(Second grade - Q.15\)](#)
 - [Time: Time patterns \(Second grade - Q.16\)](#)
- **2.MG.1.5 Determine the duration of intervals of time in hours (e.g., 11:00 a.m. to 4:00 p.m.).**
 - [Time: Elapsed time I \(Second grade - Q.9\)](#)
 - [Time: Elapsed time II \(Second grade - Q.10\)](#)
- **2.MG.2.0 Students identify and describe the attributes of common figures in the plane and of common objects in space:**
- **2.MG.2.1 Describe and classify plane and solid geometric shapes (e.g., circle, triangle, square, rectangle, sphere, pyramid, cube, rectangular prism) according to the number and shape of faces, edges, and vertices.**

- [Geometry: Geometry of everyday objects \(First grade - J.3\)](#)
- [Geometry: Identify planar and solid shapes \(Second grade - T.1\)](#)
- [Geometry: Compare sides, vertices, edges, and faces \(Second grade - T.2\)](#)
- [Geometry: Count sides, vertices, edges, and faces \(Second grade - T.3\)](#)
- [Geometry: Congruent \(Second grade - T.5\)](#)
- **2.MG.2.2 Put shapes together and take them apart to form other shapes (e.g., two congruent right triangles can be arranged to form a rectangle).**

2.SDAP Statistics, Data Analysis, and Probability

- **2.SDAP.1.0 Students collect numerical data and record, organize, display, and interpret the data on bar graphs and other representations:**
- **2.SDAP.1.1 Record numerical data in systematic ways, keeping track of what has been counted.**
 - [Data and graphs: Which bar graph is correct? \(Second grade - R.3\)](#)
 - [Data and graphs: Create line plots \(Second grade - R.5\)](#)
 - [Data and graphs: Create pictographs \(Second grade - R.7\)](#)
 - [Data and graphs: Which line graph is correct? \(Second grade - R.9\)](#)
- **2.SDAP.1.2 Represent the same data set in more than one way (e.g., bar graphs and charts with tallies).**
- **2.SDAP.1.3 Identify features of data sets (range and mode).**
 - [Probability and statistics: Mode and range \(First grade - P.3\)](#)
 - [Probability and statistics: Median, mode, and range \(Second grade - V.3\)](#)
 - [Probability and statistics: Interpret graphs to find median, mode, and range \(Second grade - V.4\)](#)
- **2.SDAP.1.4 Ask and answer simple questions related to data representations.**
 - [Comparing and ordering: Greatest and least - word problems - up to 100 \(Second grade - B.6\)](#)
 - [Comparing and ordering: Greatest and least - word problems - up to 1,000 \(Second grade - B.7\)](#)
 - [Data and graphs: Interpret bar graphs \(Second grade - R.2\)](#)
 - [Data and graphs: Interpret line plots \(Second grade - R.4\)](#)
 - [Data and graphs: Interpret pictographs \(Second grade - R.6\)](#)
 - [Data and graphs: Interpret line graphs \(Second grade - R.8\)](#)
 - [Data and graphs: Interpret Venn diagrams \(Second grade - R.10\)](#)
- **2.SDAP.2.0 Students demonstrate an understanding of patterns and how patterns grow and describe them in general ways:**
- **2.SDAP.2.1 Recognize, describe, and extend patterns and determine a next term in linear patterns (e.g., 4, 8, 12 ...; the number of ears on one horse, two horses, three horses, four horses).**
 - [Counting and number patterns: Skip-counting \(Second grade - A.1\)](#)
 - [Counting and number patterns: Skip-counting sequences \(Second grade - A.2\)](#)
 - [Counting and number patterns: Counting patterns - up to 100 \(Second grade - A.3\)](#)

- [Counting and number patterns: Which even or odd number comes before or after? \(Second grade - A.8\)](#)
- [Counting and number patterns: Counting patterns - up to 1,000 \(Second grade - A.12\)](#)
- [Patterns: Repeating patterns \(Second grade - D.1\)](#)
- [Patterns: Growing patterns \(Second grade - D.2\)](#)
- [Patterns: Describe patterns \(Second grade - D.3\)](#)
- **2.SDAP.2.2 Solve problems involving simple number patterns.**
 - [Counting and number patterns: Skip-counting stories \(Second grade - A.9\)](#)
 - [Counting and number patterns: Skip-counting puzzles \(Second grade - A.10\)](#)

2.MR Mathematical Reasoning

- **2.MR.1.0 Students make decisions about how to set up a problem:**
- **2.MR.1.1 Determine the approach, materials, and strategies to be used.**
 - [Addition - one digit: Word problems \(Second grade - E.9\)](#)
 - [Addition - one digit: Add three or more numbers - word problems \(Second grade - E.14\)](#)
 - [Subtraction - one digit: Word problems \(Second grade - F.9\)](#)
 - [Addition - two digits: Word problems \(Second grade - G.9\)](#)
 - [Addition - two digits: Add three or more numbers - word problems \(Second grade - G.14\)](#)
 - [Subtraction - two digits: Word problems \(Second grade - H.9\)](#)
 - [Addition - three digits: Word problems \(Second grade - I.4\)](#)
 - [Subtraction - three digits: Word problems \(Second grade - J.4\)](#)
 - [Fractions: Word problems \(Second grade - U.5\)](#)
- **2.MR.1.2 Use tools, such as manipulatives or sketches, to model problems.**
 - [Counting and number patterns: Hundreds chart \(Second grade - A.5\)](#)
- **2.MR.2.0 Students solve problems and justify their reasoning:**
- **2.MR.2.1 Defend the reasoning used and justify the procedures selected.**
 - [Mixed operations: Addition and subtraction word problems - up to 20 \(Second grade - L.3\)](#)
 - [Mixed operations: Addition and subtraction word problems - up to 100 \(Second grade - L.8\)](#)
 - [Logical reasoning: Guess the number \(Second grade - O.1\)](#)
 - [Probability and statistics: More, less, and equally likely \(Second grade - V.1\)](#)
 - [Probability and statistics: Certain, probable, unlikely, and impossible \(Second grade - V.2\)](#)
- **2.MR.2.2 Make precise calculations and check the validity of the results in the context of the problem.**
 - [Comparing and ordering: Inequalities with addition and subtraction - up to 100 \(Second grade - B.2\)](#)
 - [Money: Purchases - do you have enough money - up to \\$1 \(Second grade - P.12\)](#)
 - [Money: Purchases - do you have enough money - up to \\$5 \(Second grade - P.13\)](#)

- [Money: Making change \(Second grade - P.15\)](#)
- **2.MR.3.0 Students note connections between one problem and another.**

Appendix C

WBLE Evaluation Form

<https://spreadsheets.google.com/a/u.boisestate.edu/viewform?formkey=dGpsMmJBd1dGaTZkT2dhaUVZVXdJR0E6MA>