About the Survey and Teacher-Respondents

Of the 167 teachers who were using Intensified Algebra I materials around the nation in 2010-2011, 67 responded to the Inverness Research survey in spring 2011, a 40% return rate. As a follow-up to the survey, Inverness also interviewed 12 teachers in-depth about their experiences using the materials. These interviews were especially helpful in illuminating the factors that contributed to—or inhibited—effective use of the materials at the school level.

The survey gathered information to help answer questions about the use and value of the IA materials, including:

- How are teachers using the IA materials?
- What do teachers think about the quality and usefulness of the materials?
- What do teachers think about the IA materials in terms of being well designed to meet the challenges and opportunities of double-period structure?
- What conditions and supports lead to optimum usage and success?
- What challenges and issues are there in using the materials?
- What are the benefits to students?
- What are the benefits to teachers?

Evaluation findings reflect the experiences of teachers at all career stages, teaching in a variety of school systems and settings, in diverse classrooms that include many students who have traditionally struggled with algebra. Teacher-respondents represent 13 states.

Nine percent of respondents were in their first or second year of teaching; 42% had been teaching 3 to 5 years; 24% for 6 to 10 years; and 25% for 11 or more years.

The majority of teachers (82%) were teaching classes of primarily ethnic minority student populations. Most were teaching low-achieving students. Forty percent of teachers indicated that half or more of students in their IA classes ranked in the bottom quartile on standardized tests. Sixty-two percent of teachers used IA materials in classrooms where 75% or more students were in the third and lowest quartiles.

The majority of teachers (75%) based their responses on 6 to 7 months' use of the IA materials. The remaining teachers had used the materials for 1½ to 2½ years.

Inverness Research (IR) is a national educational evaluation and consulting group headquartered in Northern California. IR has over 20 years' experience studying local, state, and national investments in the improvement of education.

Inverness Research • P. O. Box 313, Inverness, CA 94937 • phone: 415-669-7156 • fax: 415-669-7186

Published July 2012

INVERNESS RESEARCH

Evaluation Brief

What Teachers Think About Intensified Algebra I

A Study of Teacher Experience

External Evaluation by Inverness Research, Inc.

To complete an external evaluation of the Intensified Algebra I Project, Inverness Research developed and administered a survey to document the experiences and opinions of teachers who piloted Intensified Algebra I (IA) materials in their classrooms from 2008 to 2011.

Major Contributions of the Intensified Algebra I Program: Survey Highlights

- ❖ At least 90% of teachers say IA benefitted their students in:
  - Deeper conceptual learning of mathematics
  - Learning mathematics content
  - Developing problem-solving skills
  - Communicating mathematical ideas
  - Perseverance in solving mathematical problems
- ❖ At least 75% say IA also benefitted their students in:
  - Preparation for future math courses
  - Acquisition of mathematics skills
  - Reading and writing skills
  - Positive attitudes and dispositions toward mathematics
- ❖ 88% of teachers say IA materials are likely to benefit students who have traditionally not been successful in mathematics.
- ❖ 88% report that using IA materials influenced how they teach mathematics.
- ❖ 73% rate the IA materials "good" or "excellent" in terms of being teacher friendly.
- ❖ 73% found IA materials to work well in a double-period structure.
- ❖ 69% say IA materials are superior to alternatives for teaching double-period algebra.

Intensified Algebra I, a comprehensive program used in an extended-time algebra class, helps students who are one to two years behind in mathematics become successful in algebra. It is a research and development initiative of the Charles A. Dana Center at The University of Texas at Austin, the Learning Sciences Research Institute at the University of Illinois at Chicago, and Agile Mind that transforms the teaching of algebra to students who struggle in mathematics.

Central to the program is the idea that struggling students need a powerful combination of a challenging curriculum; cohesive, targeted supports; and additional well-structured classroom time. Intensified Algebra I seeks to address the need for a robust Algebra I curriculum with embedded, efficient review and repair of foundational mathematical skills and concepts. It aims to address multiple dimensions of learning mathematics, including social, affective, linguistic, and cognitive.

Intensified Algebra I uses an asset-based approach that builds on students' strengths and helps students to develop academic skills and identities by engaging them in the learning experience. The program is designed to help struggling students succeed in catching up to their peers, equipping them to be successful in Algebra I and in their future mathematics and science courses.

My view on teaching has changed immensely, as I see my Intensified Algebra students really engaged in important math content. While fluency with skills has its obvious place in the curriculum, the avenue for getting there should be through the conceptual understanding. My students don't see my class as a typical math class where they 'take notes,' but rather, they solve problems.

— Teacher response

Survey Results

BENEFITS FOR STUDENTS

Teachers report that their students' math skills and understanding benefit from the Intensified Algebra I curriculum, along with their confidence and attitudes toward mathematics.

At least 90% of teachers report that their students benefit mathematically in the following areas, either to some extent, a large extent, or a very great extent:*

- Communicating mathematical ideas (94%)
- Developing a deeper conceptual learning of mathematics (93%)
- Developing problem-solving skills (93%)
- Perseverance in solving mathematic problems (91%)
- Learning mathematics content (90%)
- Development of self-confidence in mathematical ability (90%)

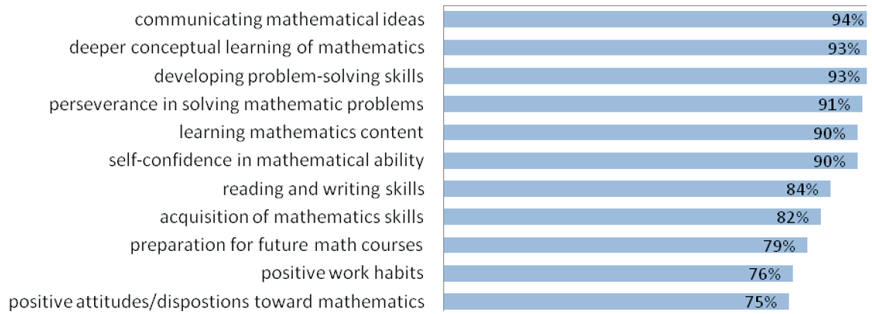
The IA materials are really good at making the kids write and think about what they're doing. Instead of just giving them problems and having them work them 50 times, they have to explain their answers and rely on previously learned materials.

— Teacher response

Teachers see student benefits in other important areas as well:*

- Reading and writing skills (84%)
- Acquisition of mathematics skills (82%)
- Preparation for future math courses (79%)
- Positive work habits (76%)
- Positive attitudes and dispositions toward mathematics (75%)

Perceived Benefits to Students in IA Classes



*Rated 3, 4, or 5 on a 5-point scale.

A minority (but still substantial) number of teachers (42%)—including some who felt well prepared to use the IA materials—would have liked additional professional development or other support. They asked for an opportunity to see the materials in action and talk to other users and experts on the materials, whether through demonstration lessons, videos, or some other format. They asked for practical assistance in areas such as differentiated instructional use of the materials, assessment, and ways to engage students. Teachers may also need administrative support to understand the rationale for the curriculum and the contexts required for successful implementation.

- *I would like administrators to attend the professional development to understand the importance of a double period and how it makes this more effective.*

- *We did this program with fidelity and were happy with the results that we obtained. We accepted the fact we weren't going to cover exponents and polynomials but with the belief that if the group of students we pass on to Algebra 2 actually understand linear functions, how to solve equations and inequalities, and are capable of explaining solutions, they will far exceed those past students that barely understood a little of each piece of content that got them that passing grade. We also believe that the letter to the parents needs to stress that this course is not meant to fill in the gaps of what they did not understand in grade school or middle school and that additional tutoring should be sought to help their child's future.*

Some factors that led to less successful usage were identified.

What does not work is mandated use, use by teachers who do not understand the materials well and who have not been prepared to use them, and/or use of the materials with students for whom they were not designed.

Placing all students in IA regardless of math level can be a problem. High-level students move through content much more quickly than students with very low skills, particularly struggling and emerging readers.

IA is also less successful in a single-period class, and although it is clearly designed for use in a double-block class it is used in single-period classes too.

- *From the beginning I felt like it didn't make sense to do a double period Algebra I program if we didn't have double periods.*

IN SUMMARY

Teachers' experiences and opinions suggest that Intensified Algebra I is substantially different from most textbooks and single-period lessons. As a result, its successful implementation requires significant change on the part of the teacher and the students; therefore, it is not the easiest curriculum to implement. But survey data suggest that potential payoffs of supporting high-quality usage are substantial for teachers and their students. Teachers who are well prepared to use IA materials and who use them with lower-achieving students for whom the materials are designed tend to like the materials and find them effective.

Inverness Research concludes that the Intensified Algebra I curriculum, when well supported and well understood by both teachers and administrators, can be an effective tool to help improve the overall quality of the algebra learning experience for lower achieving students.

- *We have much work to do in refining the way the course is taught, how we assess the students and keep track of the data that we collect. As we explore new ideas on teaching this course better we should see math students with a greater understanding of mathematics when they leave high school than we have in the past.*

Teachers who liked the materials less commented more often on the need to add more practice and to give greater attention in the materials to "developing skills."

- *I need to supplement about once a week usually to give more practice and stop and do an informal assessment. I can't always wait until the end of the unit to assess, so I'll do it midcourse.*

Teachers varied in the extent to which they value the Academic Youth Development (AYD) component. Those who liked it thought it helps struggling learners understand how to succeed in math.

- *I loved the AYD part the most! We were trying to bring these important issues into our classroom. I loved that it was built in. The students responded well most of the time. I think it's one of those things that you might not see affect kids but that it's in the back of their minds niggling at them. We brought the parents in to share with them the AYD.*

- *Because of AYD, my IA students become better thinkers and have better problem-solving skills and a better work ethic.*

- *The part about what it takes to be a good learner and good effort was something that initially we weren't liking because we wondered when we would get to the math. But boy did it pay dividends, and down the road it was so helpful to be able to say "is this really your best effort?" The students would self-evaluate, and the maturity has increased ten-fold.*

- *The essential thing about AYD is the part with the Toolbox. That is so valuable and because of it my students move to the next level of rigor. I made the students walk through making a poster and solving a problem and they saw the value of 4 stages of math problem solving. The kids didn't understand that before.*

- *The students find it interesting and it gives them a chance to show success. Where they are used to being shot down in a math class it allows us to build a relationship with the students before we start. Then when I talk to them about effort I can point them back to what they wrote down in their notebook about effort. Last year was the best year of teaching I've had in a long time, and that's what the other two teachers said too. The kids have been told they are dumb and we go through a period of attitude adjustment and the way the IA is unfolded it really builds them up. I tell them that they are doing things that 11th graders are doing, and they can't believe it.*

- *Sometimes they are just too corny and it doesn't draw our students into it. The kids don't buy into it because we're trying to sell it.*

What supports optimal usage of IA materials?

Almost three-fourths of teachers (73%) felt they were well prepared or very well prepared to use the materials. They cite the contributions of both formal professional development and collegial support. Some credited prior experience with other Agile Mind curriculum. In addition, an openness to the approach also helped prepare teachers to use the IA materials effectively.

- *I appreciated the professional development at the beginning of the year and mid-year. I also meet with another teacher after school to plan lessons, so I'm very comfortable with the material. Also, because I'm a proponent of the functions-based approach, it's easy for me to implement the materials.*

Teachers who felt less well prepared said they needed more planning time than they initially expected or than was available to them. This lack of time can lead to pacing issues.

- *Because it is a "prescribed" curriculum, it gives the illusion that you don't have to plan much, but it's actually the opposite. It requires that much more planning.*

∞ Based on their experiences using IA in the classroom, 88% of teachers say the materials are likely to benefit students who have traditionally not been successful in mathematics.

More than half (52%) of the teachers indicate that IA materials are likely or very likely to help students who have traditionally not been successful in mathematics. Another 36% say that they are somewhat likely to help these students. A few of the survey comments follow:

- *It definitely made a huge difference in my underperforming students. Some of my students will do extremely well in geometry next year. I have a very good feeling about the program and I would recommend it to other schools as well as other teachers.*

- *I have 6 students who are in the Intensified Algebra now but who failed the traditional algebra class last year and are doing great in IA!*

- *I am very excited to get to teach IA again next year! My kids are seeing amazing gains in their math abilities, confidence and willingness to take risks in math. They are the kids who usually hide in the classroom, are afraid to get called on, and are now feeling good about their math abilities!*

∞ Teachers say Intensified Algebra I units are engaging for students and teach important math content.

Most teachers say the IA units are engaging for students. Even greater numbers of teachers rated the units as teaching important math content.

	Engaging for students*	Teaches important math content*
Unit 1: Getting started with Algebra	82%	83%
Unit 2: Introduction to functions and equations	88%	97%
Unit 3: Rate of change	89%	100%
Unit 4: Linear functions	83%	97%
Unit 5: Linear equations and inequalities	87%	97%
Unit 6: Systems of linear equations	78%	96%
Unit 7: Exponential and quadratic functions**	78%	100%
Unit 8: Solution methods for quadratic equations**	84%	95%

**Rated to "some extent," "a large extent," or "a very great extent" (3, 4, or 5 on a 5-point scale).*
***Because of the timing of the survey, more teachers had used Units 1-6 than Units 7-8.*

Teacher Responses:

- *The quality of the program is excellent because it utilizes many strategies/resources to help students truly conceptualize the various concepts/materials. This includes but is not limited to the use of technology, partner/group activities, graphing calculators, etc.*

- *It's much more interactive and students are heavily involved and engaged. The online assignments make the kids way more involved in the class process. This is more discussion-based.*

- *We chose IA because the students start right away doing equations instead of using remedial math. That is very exciting for the kids.*

- *I liked how it makes students think. They need to understand that much of learning is dependent on themselves, not on what the teacher does.*

BENEFITS FOR TEACHERS

∞ 88% of teachers report that participating in the IA project was educative, and that using IA materials with their students has influenced how they teach mathematics.

Many teachers report that their practices changed as a result of using IA materials, demonstrating that IA can deepen and shift teacher understanding of what effective mathematics instruction entails and its potential positive outcomes—even beyond the classes where they use IA materials.

- *I am finding that I want students to know how to use several different methods to solve a problem. I'm teaching them to become problem solvers rather than problem doers.*
- *It has been very helpful in causing me to develop strategies with struggling learners. It has helped me break down the lessons for the students and really give them a conceptual understanding of the material.*
- *I now feel more comfortable teaching certain topics that I used to have a difficult time getting some students to understand. It broke it down into smaller chunks so the students could understand.*
- *I think I'm better at waiting for students to see patterns, and letting them draw their own conclusions. One trick to use these materials successfully is that you can't give the students too much too early. They are the explorers on the journey, and you can't take that away from them.*
- *It revived me in the sense that I feel I actually was capable of teaching 9th grade algebra to students with a content level of understanding around 5th /6th grade on average. If you can keep them actively involved because of the spiral learning and the reading comprehension level you will get more students working IN class than I've seen in years.*

∞ Teachers say the materials are well designed in the sense of being teacher friendly and a good fit for the double-period structure.

Almost three-fourths of teachers (73%) rate the IA materials as "good" or "excellent" in terms of being teacher friendly, and 74% find them to work well in a double-period structure.

∞ Teachers report that the IA materials are superior to alternatives for the double-period structure.

Sixty-nine percent of surveyed teachers say IA materials are superior to alternatives for teaching algebra in a double-period format. Another 17% said the IA materials were as good as the alternatives.

- *We also offer another double-block period traditional algebra class paired with a basic skills drill practice period, which has not been as successful as the IA class (when compared to students' scores on state assessments and semester final tests).*
- *Even though it's been difficult for me to implement IA the way it was written due to classroom management issues, I still see more improvement in these students than in my regular Algebra I class. They do better on constructed response type problems than my regular algebra students do. They justify way more than the regular algebra students as well. They have a bigger toolbox with different strategies they can access and use. Finally they can tackle a problem and use multiple representations to solve it.*

ADDITIONAL FINDINGS FROM SURVEY AND INTERVIEW DATA

Teachers used IA materials as designed most of the time.

Fifty-nine percent of teachers indicate they follow the IA materials as designed all or most of the time. Nearly all others (37%) say they follow them closely some of the time. The percentage of teachers who reported that they were implementing with fidelity was much higher among interviewed teachers (as opposed to those who only took the survey) with one caveat: most also said that they don't do the Processing Homework as designed.

- *I do the processing homework differently because I tried using the IA process but it wasn't helpful for me. I would see students doing homework in class or cheating when we did it in class so I would rather collect it at the beginning.*

Did all teachers succeed equally with the IA materials?

Survey responses revealed that about one-third of the teachers flourished, one-third adapted and adjusted at least in part, and one-third struggled or simply did not like the approach. This finding is understandable in that the materials are challenging, teachers did not all volunteer, and teachers' contexts vary greatly in terms of how much support they were offered both for the goals of Intensified Algebra I and its implementation. In addition, though IA was designed to be used in a double-period structure, double periods were not available to all teachers.

What did we learn about teachers who are most positive about the IA materials?

Sub-analyses of survey data and probing during interviews helped to reveal the factors that tend to be associated with successful and positive use of the materials. Teachers who responded most positively to the survey tended to use the IA materials as designed, though there was some variation in the level of fidelity of usage by those teachers. Overall, experienced and veteran teachers tended to use the materials with more fidelity than did newer teachers, and the more experienced teachers tended to be most positive about the materials.

What criticisms of the materials do some teachers have?

When asked what they did not like about the materials, some teachers who were generally positive nevertheless commented on pacing issues—they had to be careful to keep moving in order to complete the materials and sometimes found the authors' estimates of time required to complete lessons and units overly optimistic.

- *It was hard to get through the whole thing every day. My kids rarely got that chance to get started on their homework. So, often they wouldn't do it at all. I didn't do the processing homework the way they suggested. I went back to my standby and told them the answers to the homework.*
- *Ideally, the elements and the flow work great. The problem is that the whole section can take an hour but more difficult content could take 2 days.*
- *The homework is a little bit long in my opinion. It takes more than the recommended time. I spend between 15-20 minutes so that my students are sure to understand. I solve the problems with my kids so they get the conceptual understanding. Then the homework actually works.*
- *Some of the tests are half period but they take us a whole block. Some of the lessons are one-day lessons but it takes us two.*
- *There was just too much reading for our low students and we couldn't keep up with the pacing. What we needed to do in one day would take a week because of the low reading level of the students.*