



**Addendum Equals White Paper
Students with Autism
January 2015**

For Equals Mathematics product information
www.ablenetinc.com/equals
800-322-0956

Equals Math Curriculum and Students with Autism Executive Summary

BACKGROUND

A study of the effectiveness of the Equals Mathematics curriculum was undertaken by the staff at the Developmental Learning Program from a suburban special education school district in the mid-western United States. The study began in September of 2011 and ran through May of 2014 and included 103 participants. A One-Group Pre-test Post-test research design was selected (Campbell & Stanley, 1963). The goal was to record student progress over the course of each school year.

FULL STUDY DETAILS

Equals math instruction was provided to participating students each day for 40 minute sessions in groups of 3 to 8 students from September through May. Students were tested in September and in May using the Equals assessment protocol. May scores were compared to the September scores to determine the level of progress for each participating student. A year-end survey of teachers was taken to collect their comments on the process of delivery of Equals instruction. Comments were collected for anecdotal insight.

Of the 72 students who started using Equals in 2011, 43 have continued to participate for three consecutive years. There were 26 students who completed their second year in the program and 34 students who were involved for the first time in year three of this study. The disabilities of the participating students included cognitive disabilities (mild, moderate, and severe), autism, emotional disorder, multiple disabilities, and other health impairments. For the third consecutive year, every student in the project demonstrated progress in Math. This summary specifically examines the progress demonstrated by students with autism during this 3-year study.

STUDENTS WITH AUTISM

Equals is an appropriate math curriculum for students with autism because it is systematic, because it embraces an instructional progression from concrete to abstract, and because it provides for differentiation of instruction to address individual differences.

The basic structure of each Equals lesson is consistent and systematic. Each lesson follows the same set of guiding principles with a consistent format and presentation. The components include the following best practice math instruction methodologies present in every lesson (directly related to each objective and written into the lesson in a progression of learning):

- activation of background knowledge by way of review of past related vocabulary and concept
- exploration for building background knowledge
- connection of new concept to background knowledge
- verbal communication about the math concept
- modeling written communication about the math concept
- concrete representation of math concept/vocabulary

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- math vocabulary instruction
- CSA (Concrete – Semi-Concrete – Abstract) learning sequence instruction and exploration
- skill practice
- problem solving instruction
- problem solving
- math journaling
- formative assessment
- sensory math activity
- real-life problem solving connections
- workstations
- games for practice
- home letter communication and support activities

Equals derives its educational foundation from the Concrete, Semi-Concrete, Abstract (CSA) pedagogy found in general education mathematics curricula (Allsopp, 1999; Allsopp, et al., 2008; Fahsl, 2007; Jordon, Miller and Mercer, 1998). The CSA approach supports teachers with the means to provide students the opportunity to use concrete objects, images, numbers, and math symbols to help them grasp math concepts. In this way the Equals curriculum helps each student learn math in the manner that they learn best and helps them build background knowledge and a wider view of all which math entails.

DIFFERENTIATED INSTRUCTION

Instruction in the Equals math curriculum is structured so that it may be differentiated at three levels:

1. Students with severe/profound disabilities, who have significant challenges with language, motor, and/or cognitive skills (Jimenez, 2011), who generally require assistance throughout the day for safety, to complete daily cares, and for learning, typically benefit from instruction at Level 1.
2. Students with moderate disabilities, who have similar challenges as students with severe disabilities but to a lesser degree, are able to address their language and motor difficulties when supports are placed in the environment that allow them to perform more independently. These students often benefit from instruction at Level 2.
3. Students with mild disabilities have fewer challenges with cognitive skills. They may still have to deal with Language and/or motor disabilities, but usually not across all three areas. Students with mild disabilities benefit from instruction at Level 3.

STUDENT RESULTS

The data from this study indicates that students with autism, on average, made greater progress each year than other students in this study. Students with autism who participated in the study for 3 years (N=20) demonstrated an average gain of 82.68 points as measured by the Equals assessment protocol.

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This reflects average gains of 120.56% (as compared with 73.55 points and 112.09% gain for all participants) over the baseline recorded in September of 2011.

Among 3-year participants impressive gains were evident in students with autism in level 3 instruction (N=4). For these students the average gain over 3 years was 115.63 points as measured by the Equals assessment protocol. Having started with a higher baseline, this reflects average gains of 96.87%. Level 2 students with autism (n=13) with 3 years in the program showed steady progress and slightly higher achievement than all students (75.5 points and 124.49% increase).

Students with autism who took part in the study for 2 years (n=10) also showed above average performance. These students demonstrated an average gain of 51.3 points over 2 years (as compared with 46.12 points for all students in the project for 2 years) and an average percentage gain of 64.95% (compared to 62.36% for all 2nd year participants). The greatest progress among these second year students with autism was demonstrated by the level 2 students (n=5) who produced an average gain of 63.5 points (70.24%).

Among students with autism who were in the project for their first year (n=8) progress was slightly below that of all students (20.25 average gain for students with ASD compared to 21.35 for all 1st year participants). The data suggests that students in level 2 for the first year (n=4) may have done much better (29.65 point gain average) than the average gain for all first year students.

The progress of students with autism who received instruction at level 1 during this project is also remarkable. These students are generally those with significant intellectual disabilities. Every student who received level 1 instruction in the Equals curriculum progressed in each year in the program. The progress of those students with autism in their third year in the project reflects a 406% (69.8333 points) average gain over their baseline from 2011. While less dramatic, students with autism in their second year in the project in level 1 also registered important progress of 57.03% (39.1 points) average gains. Students with autism in their first year at level 1 reported 62.14% (10.8750 points) average gain.

This aspect of the Equals project – which highlights progress made by students with significant disabilities (level 1 students) - has important implications for the field. Under current instructional methods these students typically demonstrate marginal progress. Our current system is at a loss to demonstrate measureable progress for these students. They are often given alternative assessments instead of standardized testing in the school setting. To have a systematic math curriculum that can support effective direct instruction with measureable outcomes for these students would be a tremendous advantage.

TEACHER COMMENTS

A survey of the participating teachers indicated that teachers regarded the Equals curriculum as well-organized and effective. They affirmed that Equals provided a framework within which to teach math to their students. Teachers confirmed that the use of Equals produced learning beyond what had been previously expected of their students. Teacher comments echoed the survey results. Several teachers remarked that the Equals curriculum simplified lesson planning and made them feel more productive.

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One teacher noted: “The planning is very simplified. It is awesome to have a curriculum that is already modified for so many levels.”

Other teachers commented upon the success experienced by their students. “The curriculum has allowed our students the opportunity to learn important concepts and skills which they wouldn’t necessarily be exposed to... The student growth over the past [school year] coupled with the students ability to articulate math concepts has been outstanding.”

The performance of the 38 students with autism participating in this project provides evidence of consistent progress. Progress by students with autism in Equals was universal and in many cases above that demonstrated by other students. This suggests that the Equals Math Curriculum may be particularly well suited to instruction of students with autism.

References

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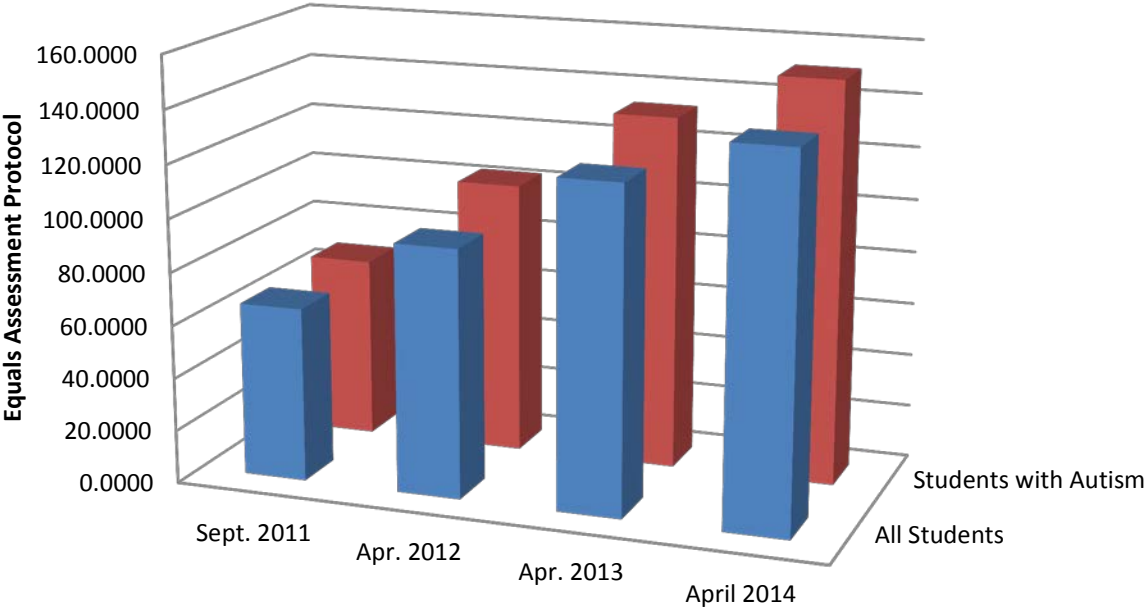
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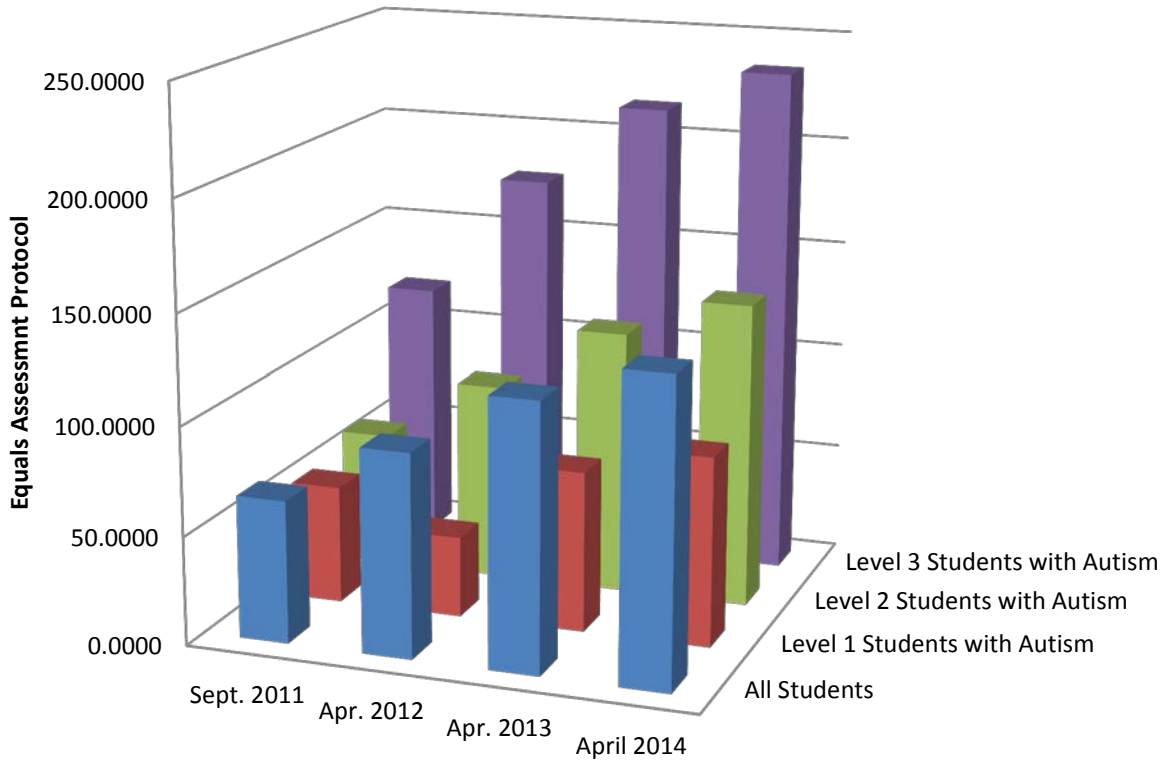
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DLP STUDY 2014 STUDENTS IN PROGRAM FOR THIRD YEAR



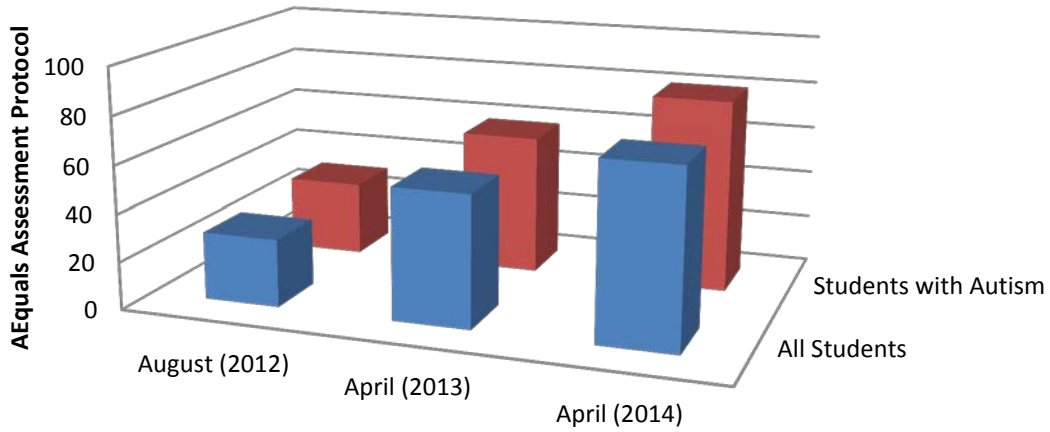
	Sept. 2011	Apr. 2012	Apr. 2013	April 2014
■ All Students	65.6163	93.6163	122.3721	139.1628
■ Students with Autism	68.5750	103.1750	133.4000	151.2500

DLP STUDY 2014 STUDENTS IN PROGRAM FOR THIRD YEAR Levels 1, 2, & 3



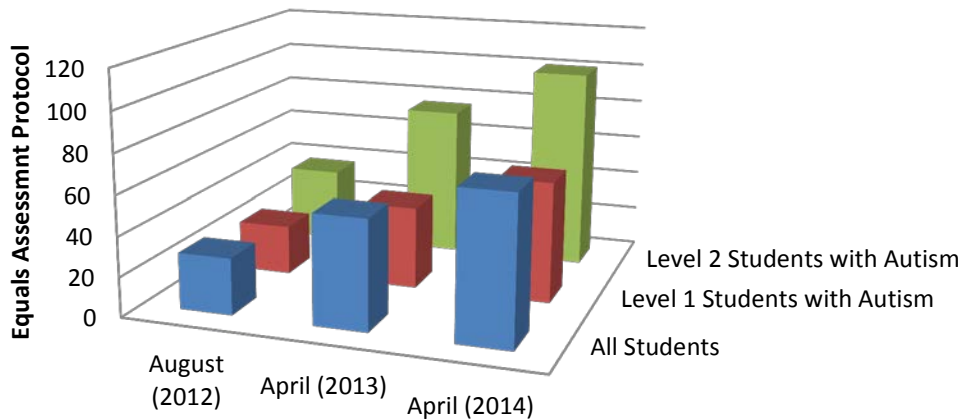
	Sept. 2011	Apr. 2012	Apr. 2013	April 2014
■ All Students	65.6163	93.6163	122.3721	139.1628
■ Level 1 Students with Autism	54.3333	37.1667	73.8333	87.0000
■ Level 2 Students with Autism	62.5000	91.5000	122.0000	140.3077
■ Level 3 Students with Autism	119.3750	177.0000	215.1250	235.0000

DLP STUDY - 2014 STUDENTS IN PROJECT FOR SECOND YEAR



	August (2012)	April (2013)	April (2014)
All Students	28.4038	54.9231	73.3846
Students with Autism	31.1000	58.6500	80.6500

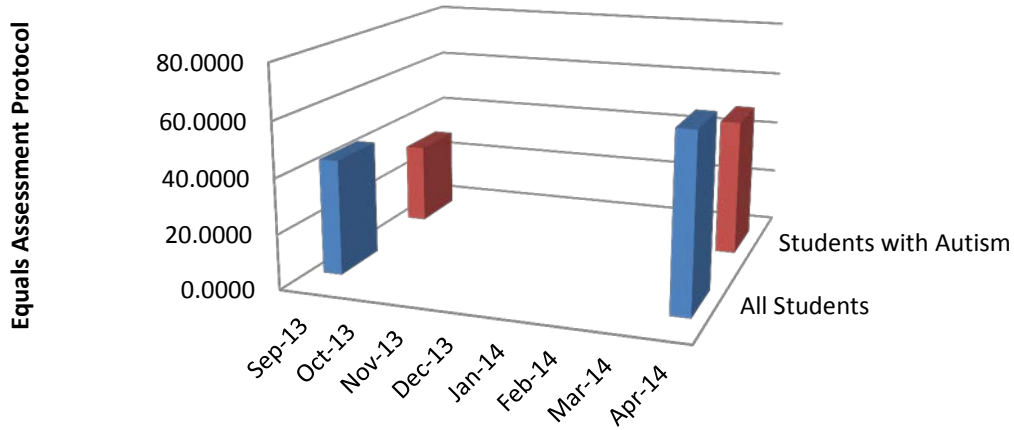
DLP STUDY - 2014 STUDENTS IN PROJECT FOR SECOND YEAR Levels 1 & 2



	August (2012)	April (2013)	April (2014)
All Students	28.4038	54.9231	73.3846
Level 1 Students with Autism	24.9000	41.4000	60.5000
Level 2 Students with Autism	37.3000	75.9000	100.8000

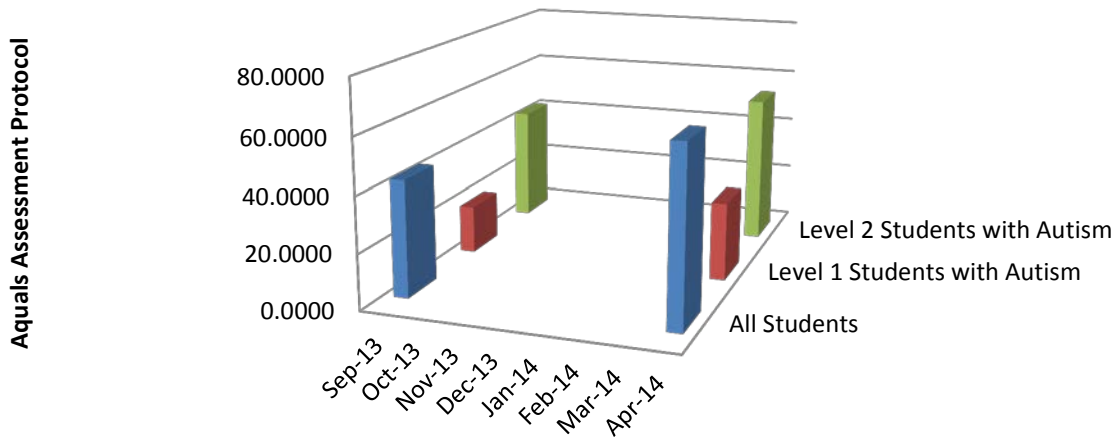
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DLP STUDY - 2014 STUDENTS ENTERING FOR FIRST YEAR



	Sep-13	Apr-14
All Students	42.1176	63.4706
Students with Autism	29.8750	50.1250

DLP STUDY - 2014 STUDENTS ENTERING FOR FIRST YEAR Level 1 & Level 2



	Sep-13	Apr-14
All Students	42.1176	63.4706
Level 1 Students with Autism	17.5000	28.3750
Level 2 Students with Autism	42.2500	54.1250