

**Whole Cohort Progress  
Comparison Research Report:  
Whole Cohort Progress Compared  
to Full and  
Part-Time Progress**

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## Introduction

This study compared the performance of two groups of students, one working in either the Full-Time or Part-Time Program, and the other working in the Whole Cohort Program.

### Full and Part-Time Program

The Arrowsmith Full-Time Program involves students working anywhere from a half to full day, five days per week on a series of cognitive programs designed to enhance cognitive functioning.

The Arrowsmith Part-Time Program involves students working for four to twelve hours per week on 1 to 3 cognitive programs. Each cognitive program requires four hours per week of work.

In both the Full-Time and Part-Time, each participant completes a cognitive assessment which determines the cognitive programs they work on.

### Whole Cohort Program

The Whole Cohort Program involves all students in a mainstream grade to enhance a specific cognitive function. A school may choose to have all grades working in this program or only selected grades. Arrowsmith has developed a sequence of developmentally appropriate cognitive exercises per grade based on the learning demands that occur in each grade. Students work 30 to 40 minutes per day five days per week on the specific cognitive program over the academic year.

## Cognitive Programs

The five cognitive programs used in this comparison study each enhance a different cognitive function involved in learning.

- Motor Symbol Sequencing – motor planning necessary for writing, and eye-tracking in reading
- Symbol Recognition – visual memory function to learn and retain symbol patterns necessary for reading and spelling
- Quantification Sense – sense of number and quantification necessary for numeracy
- Symbol Relations – conceptual grasp and speed of processing of ideas and relationships
- Symbolic Thinking – executive functions, problem-solving, strategy generation, mental initiative

Each Arrowsmith Cognitive Exercise has a sequence of levels of increasing difficulty. Each level consists of several items or tasks that the student performs. Each item or task is scored, and each level has a mastery criterion for successful completion of that level over a sequence of items or tasks.

## Study Group

The first group, Full and Part-Time (FT/PT), consisted of students who had been identified as having learning disabilities in the associated cognitive area and who were enrolled in either a Full-Time or Part-Time program at an Arrowsmith site.

The second group, Whole Cohort (WC), consisted of students in mainstream classes at multiple Arrowsmith sites who were enrolled in a whole cohort program. The WC group is drawn from the entire student body and so is expected to exhibit the same distribution of learning difficulties as found in the general population.

## Measures

**Effort:** This measure is the amount of work completed on each level of the associated exercises, for example, the average of the number of attempts per level or per item for exercises with multiple items per level.

**Mastery:** This measure is the percentage of mastered levels out of the levels worked on.

## Results

### Motor Symbol Sequencing

#### Students

The FT/PT study group had 43 students aged from 6 to 10, with 13 females and 30 males. The WC study group had 74 individuals in the same age range with 49 females, 23 males, and 2 unspecified.

The two bar charts in Figure 1 below show the comparison of the relative effort and of the mastery rates for the two populations. The results show that the WC group took 17% less effort per level and achieved a 9% higher mastery rate.

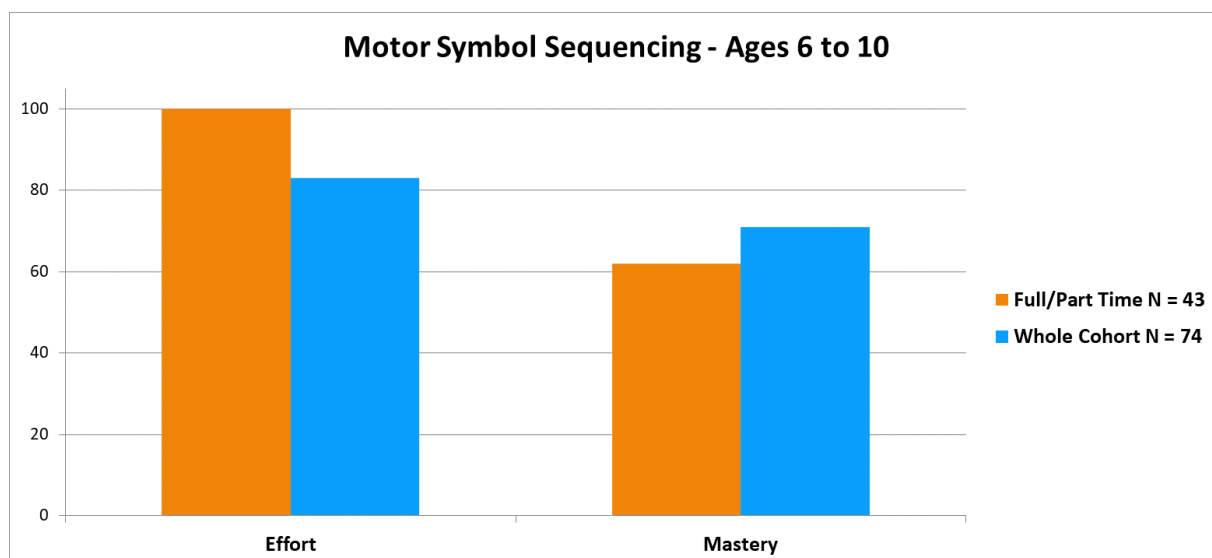


Figure 1: MSS Effort and Mastery Comparisons

## Symbol Recognition

### Students

The FT/PT group had 16 students aged 6 to 7, with 3 females and 10 males. The WC group had 10 students in the same age range, all males.

Figure 2 shows that the WC group took 20% less effort than the FT/PT group and achieved a 14% higher mastery rate.

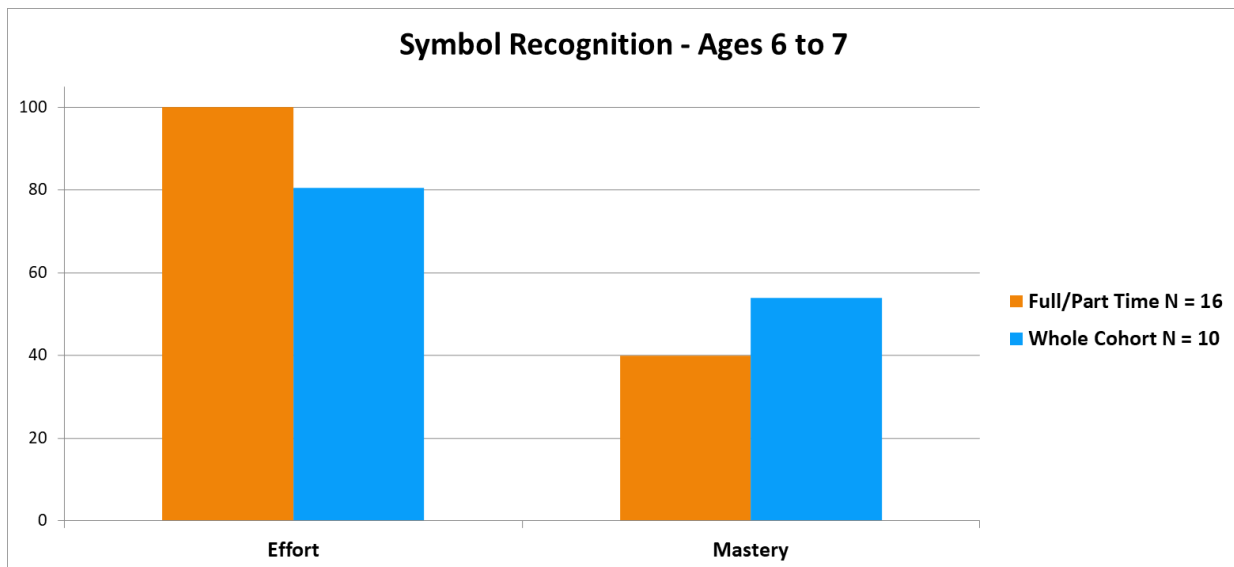


Figure 2: Symbol Recognition Effort and Mastery Comparisons

## Quantification Sense

### Students

The FT/PT group had 19 students aged 7 to 9, with 6 females and 13 males. The WC group had 17 students in the same age range, with 17 females and no males.

Figure 3 shows that the WC group took 48% less effort per level than the FT/PT group and achieved a 10% higher mastery rate.

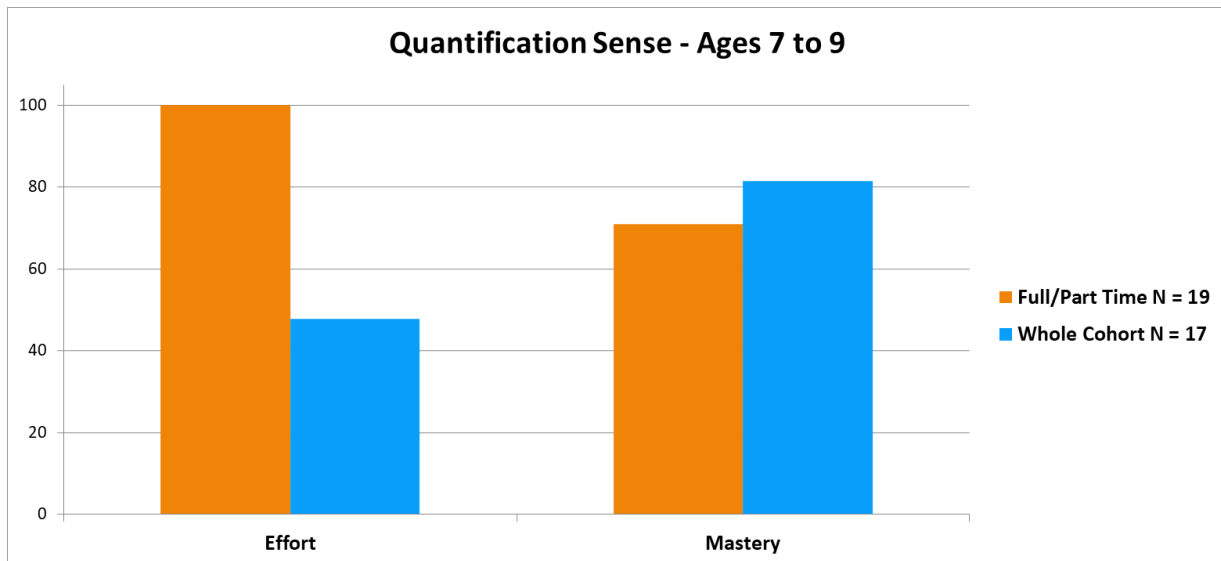


Figure 3: Q Sense Effort and Mastery Comparisons

## Symbol Relations

### Students

The FT/PT group had 144 students aged 8 to 12 with 48 females, 94 males and 2 unspecified. The WC group had 253 students in the same age range with 113 females and 140 males.

Figure 4 shows that the WC group took 13% less effort per level and achieved a mastery rate 2% higher than the FT/PT group.

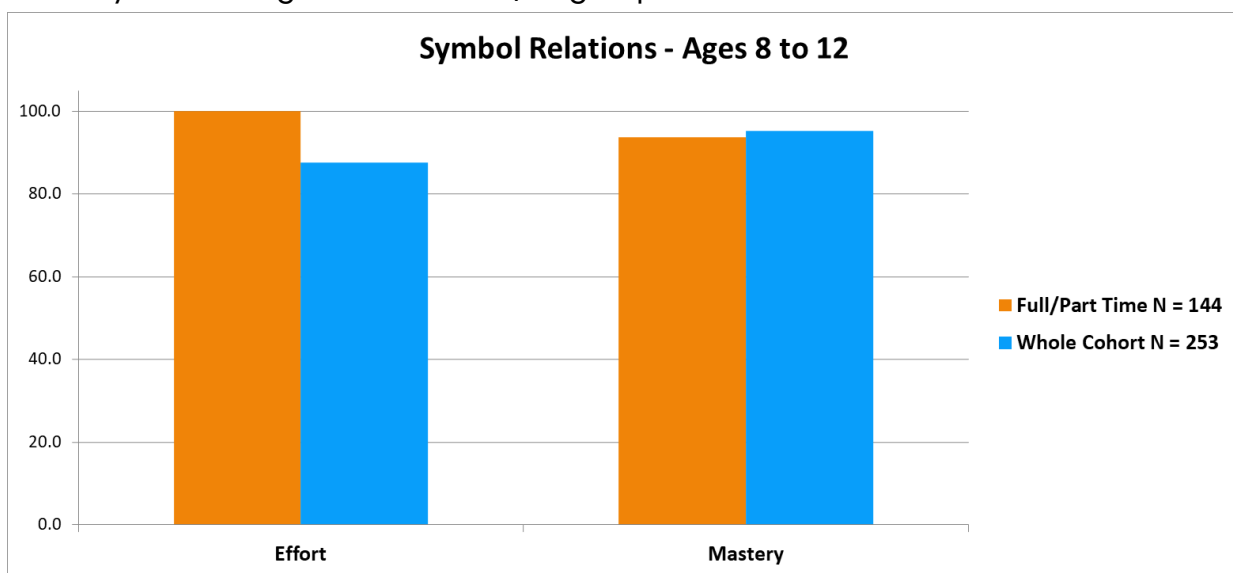


Figure 4: Symbol Relations Effort and Mastery Comparisons

## Symbolic Thinking

Students in the FT/PT group had 77 students aged 9 to 10 with 24 females and 53 males. The WC group had 22 students in the same age range, all females.

Figure 5 shows that the WC group took 44% less effort per level and achieved a 5% higher mastery rate than the FT/PT group.

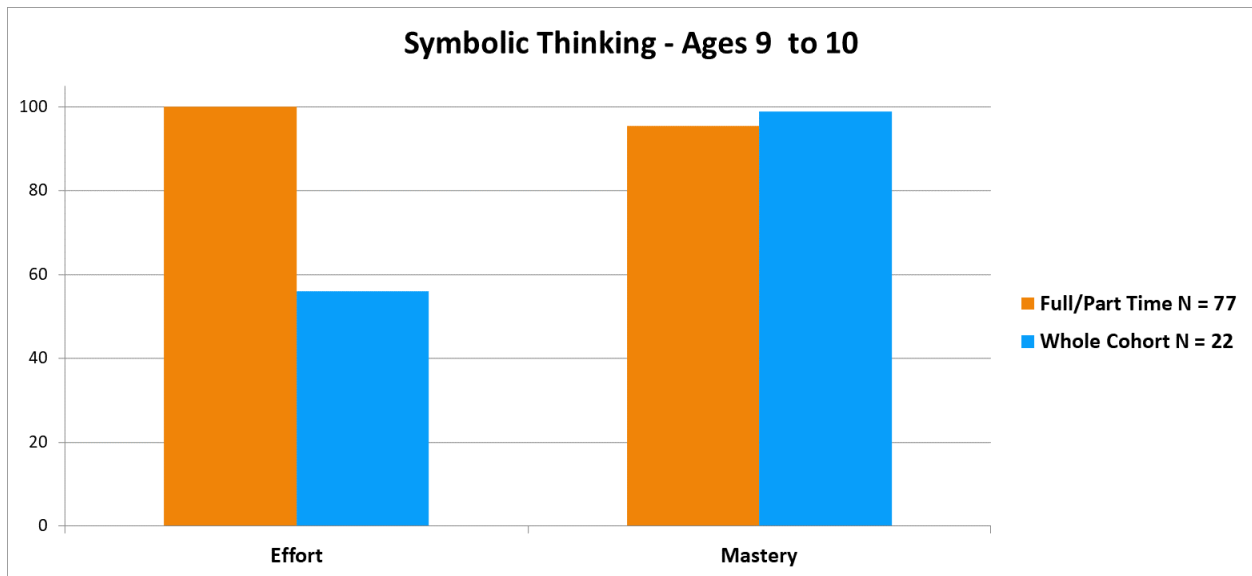


Figure 5: Symbolic Thinking Effort and Mastery Comparisons

## Summary of WC Student Effort and Mastery compared to FT/PT Students

<b>Cognitive Exercise</b>	<b>Mastery</b>	<b>Effort</b>
Motor Symbol Sequencing	9% ↑	17% ↓
Symbol Recognition	14% ↑	20% ↓
Quantification Sense	10% ↑	48% ↓
Symbol Recognition	14% ↑	20% ↓
Symbol Relations	2% ↑	13% ↓
Symbolic Thinking	5% ↑	44% ↓

In all cases, the WC group had a higher rate of progress (Mastery) with less effort compared to FT/PT students.



## Discussion

This analysis shows that the WC students were able to achieve similar or higher rates of mastery as the FT/PT students and were able to do this while expending less effort.

Each of these cognitive functions operates on a continuum from a severe level of difficulty to above-average functioning. The students in the FT/PT group have all been assessed, prior to working on the cognitive exercise, with a deficit in that cognitive function. The students in the WC group are students in mainstream classes and as such, the majority of these students do not have learning disabilities or learning difficulties. It is reasonable to expect that the FT/PT students would require more attempts on average to attain mastery than the members of the WC group.

## Conclusion

Students in mainstream classes achieved, on all of the cognitive exercises, higher levels of mastery with less effort than the students identified with learning disabilities or learning difficulties. Both groups made significant positive progress on the cognitive exercises. Information on the cognitive and academic benefits of the Whole Cohort Program are documented in the [Research Report: Arrowsmith Whole Cohort Program Outcomes](#).

Data is continuing to be collected from these two groups to continue the research analysis.