

Image 1: Playing Friends with Different Abilities Game



## Purpose, Hypotheses and Background

The researcher has friends who have or have family members with disabilities who have been bullied. The researcher wanted to make a difference in how people with disabilities are treated. About 13% of U.S. public school students have a disability, and 91% of kids play computer/video games. Last year, the researcher made an educational computer game called Friends with Different Abilities (FwDA) with GameMaker 8.1 Lite. The game has 12 rooms and was shown to be effective in teaching about 7 disabilities (see Table 1; 69 people from 12-69 years old; see Table 1 and Image 7). The subjects got 59% on the pretest and 87% on the posttest for a statistically significant difference. The game is the first educational computer game to teach about disabilities. It is published and available to download and run on Windows-based PCs at [www.EducationalComputerGaming.com](http://www.EducationalComputerGaming.com).

The purposes of this second year project were to see if

- Friends with Different Abilities can be made better to present concepts about disabilities for increased player understanding.
- Subjects can retain the information that they learned about disabilities.
- Subjects would report a difference in attitude/behavior towards someone with a disability after playing the game.

This year, subjects were selected by ages 12-22 to reduce pre-knowledge.

### Hypothesis 1: (see H1 – Game Modifications and Table 2)

The educational computer game Friends with Different Abilities can be modified to be more understandable for people compared to last year.

#### Null Hypothesis 1:

The educational computer game Friends with Different Abilities cannot be modified to be more understandable for people compared to last year.

### Hypothesis 2: (see H2 – Table 3 and Table 4)

People can retain information about disabilities from playing Friends with Different Abilities for at least 2 weeks.

#### Null Hypothesis 2:

People cannot retain information about disabilities from playing Friends with Different Abilities for at least 2 weeks.

### Hypothesis 3: (see H3 – Surveys & Post-Survey Results)

After playing Friends with Different Abilities, people will report that they will be more considerate and understanding towards someone with a disability.

#### Null Hypothesis 3:

After playing Friends with Different Abilities, people will report that they will not be more considerate and understanding towards someone with a disability.

## Materials and Procedure

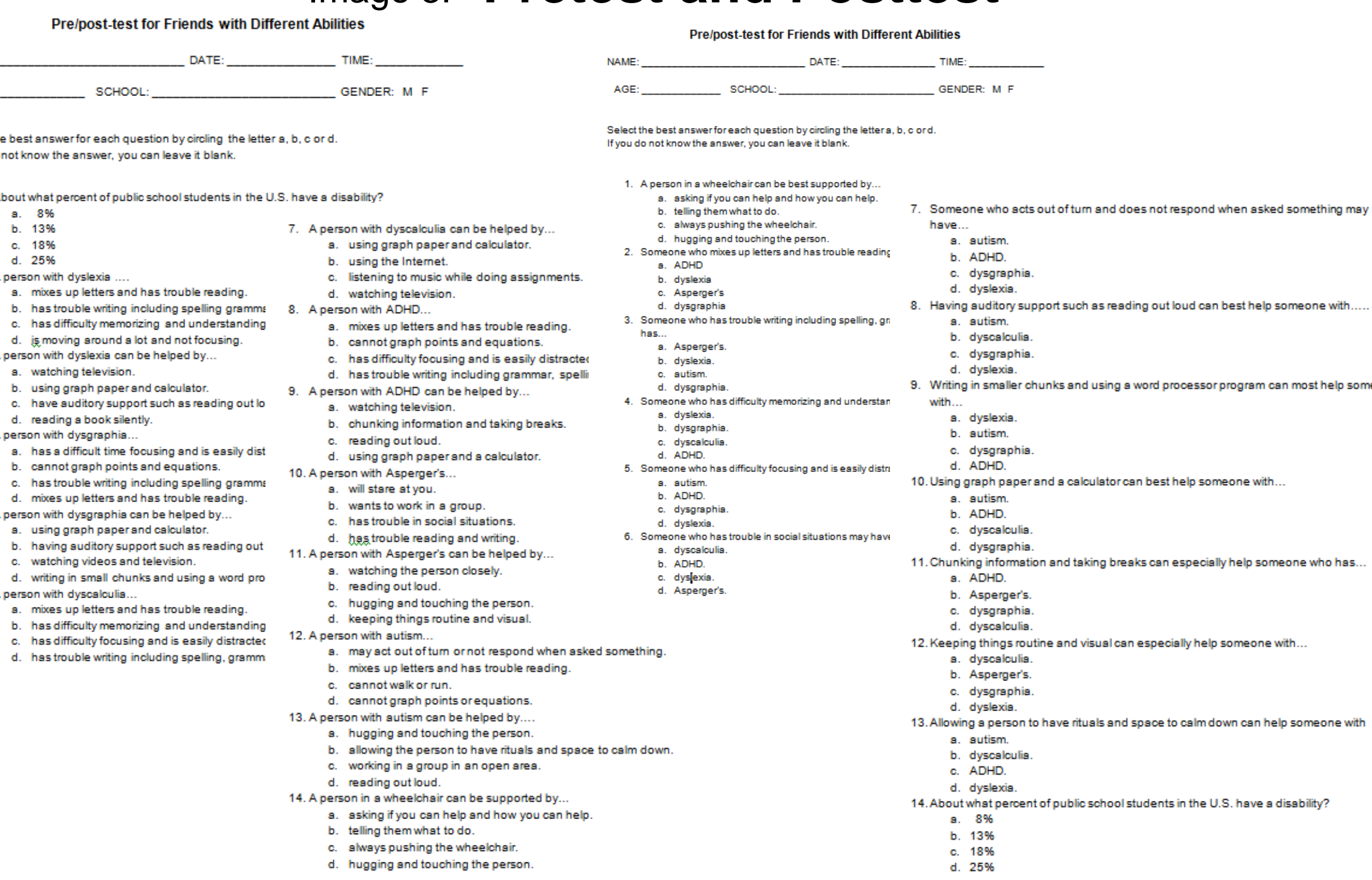
Materials used for this project include

- Laptop computer with Microsoft (MS) Windows and
  - MS Word
    - edit pretest and posttest
    - write pre-survey, post-survey, and report
  - MS Excel for data collection and analysis
  - GameMaker (GM) 8.1 to edit the FwDA game
- Google Forms for post-survey and 2<sup>nd</sup> posttest
- USB flash drive
- Various laptop computers at many school locations to run the game

The steps performed to complete the project this year were

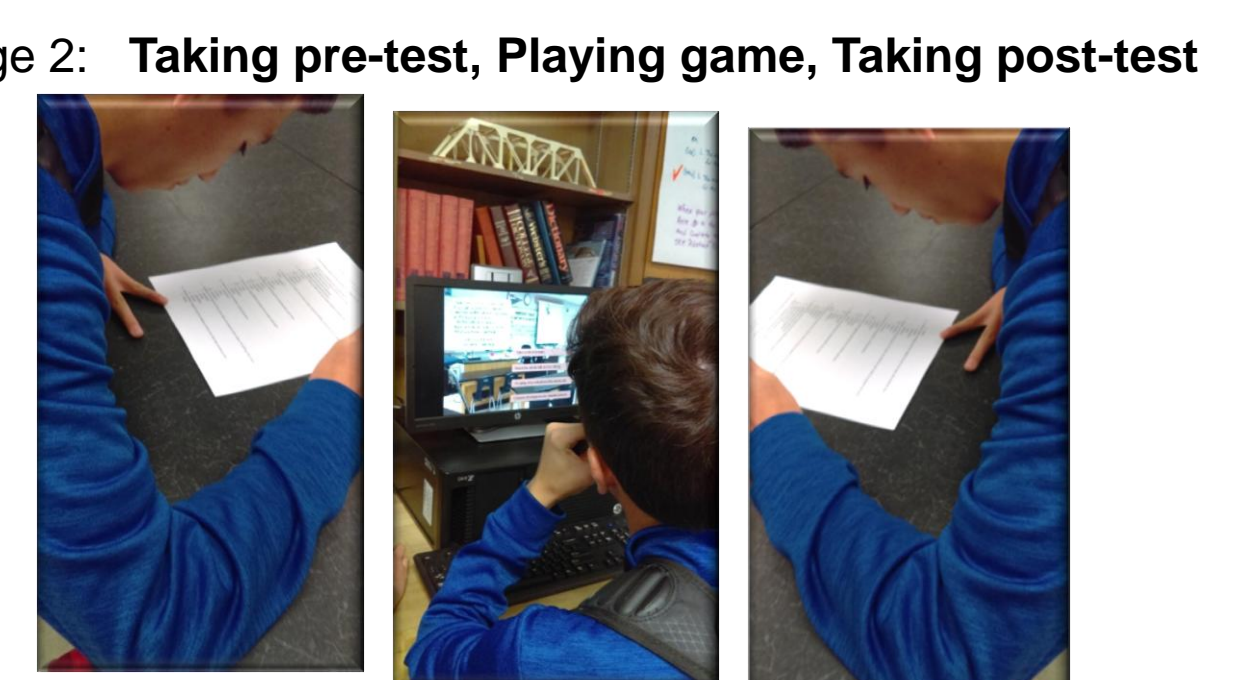
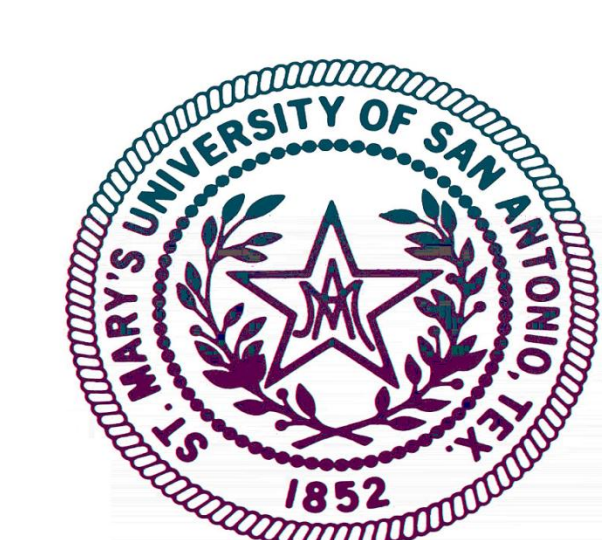
- Modify the game based on last year's feedback (10 changes; 7 were in facts)
- Develop a pre- and post-survey about attitudes and behaviors
- Put the post-survey and posttest into an online form
- Give potential participants informed consent (given to over 300 people)
- Administer to 83 people (who were 12 to 22 years old) at camps and schools
  - answer pretest and pre-survey
  - play the game
  - take post-test
- Send an email two weeks later with a link to the post-test and the post-survey to complete online
- Grade tests & analyze results by making tables and using Excel tools
- Write report and presentations

### Image 3: Pretest and Posttest



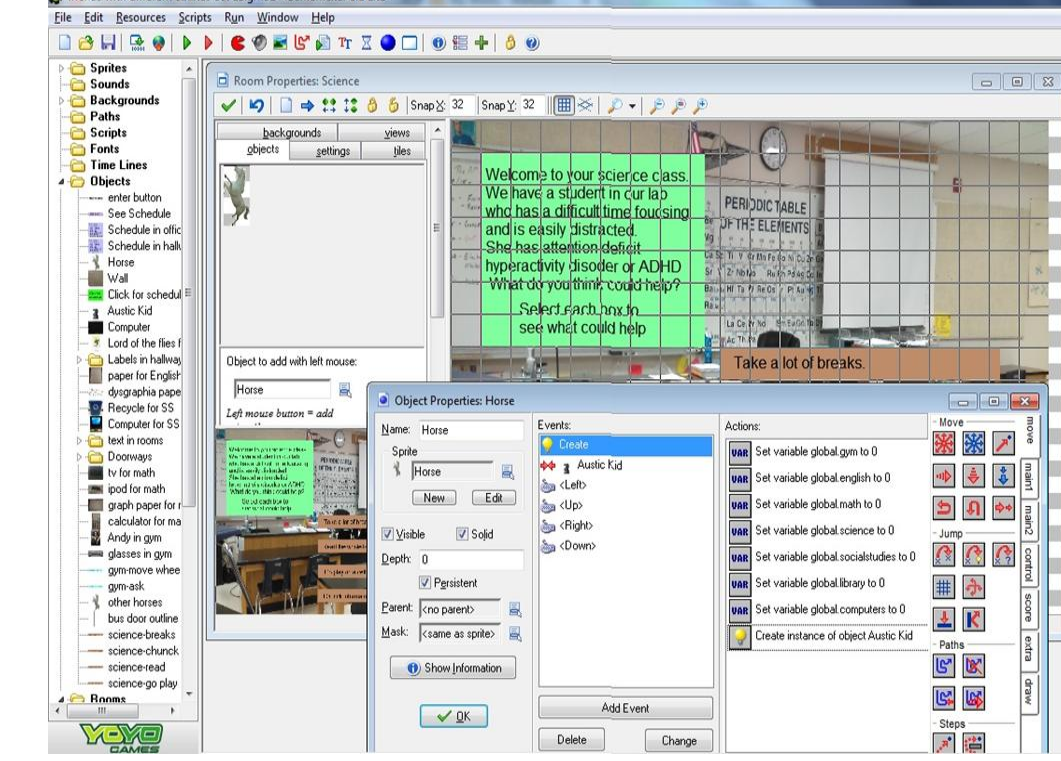
# Friends with Different Abilities: The Effectiveness of an Educational Computer Game about Disabilities

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### Game Modifications (H1)

Image 4: GameMaker Development Tool



Where outside school hallway	Modification
computer lab hallway	Press -> Click added instruction to move with arrow keys & how to see schedule message boxes -> larger text boxes
gym	message boxes -> larger text boxes
math	message boxes -> larger text boxes
science	message boxes -> larger text boxes
social studies	message boxes -> larger text boxes
bus	message boxes -> larger text boxes
	added text to go to the bus door

Image 5: Example Game Modification

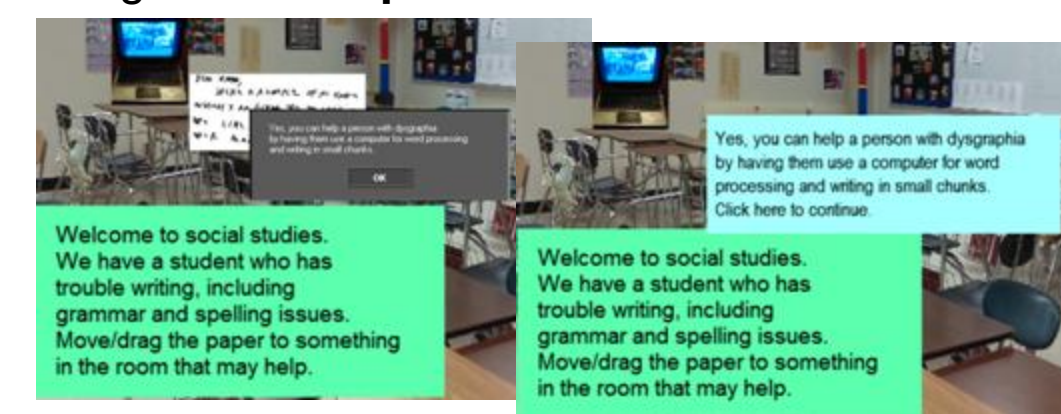


Table 1: Percent Correct on the 14 Facts for 12-22 Year Olds

Disability	Class room	Characteristic/ helped by	Activity	'16 Pretest % n=55	'16 Posttest % n=55	'17 Pretest % n=83	'17 Posttest % n=83	'17 1st Posttest % n=42	'17 2nd Posttest % n=42
ADHD	Science	Hard to focus; Easily distracted	Read	97	93	82	94	88	95
Asperger's	Computer	Chunk information, take breaks	Select 4 boxes	76	93	57	83	69	81
		Trouble in social situations	Read	76	93	51	94	60	100
		Keep routine, visual	Select computer r	62	83	22	86	36	81
Autism	Library	Act out of turn, not respond	Collide object	93	83	83	89	90	98
Dyscalculia	Math	Have rituals, space to calm	Read	79	93	60	87	76	86
		Difficulty with math facts	Read	69	76	46	93	55	93
Dysgraphia	Social studies	Use calculator, graphing paper	Select 2-4 objects	45	79	37	80	45	74
		Trouble writing, spelling, grammar, usage	Read	21	66	20	77	17	69
Dyslexia	English	Write small chunks, Word	Drag paper	21	52	24	76	21	62
		Mixes up letters, reading troubles	Read	86	90	94	93	98	95
Physical	Gym/PE	Use auditory support	Collide with book	93	72	86	87	90	76
		Wheelchair-ask if can help	Find glasses	76	97	80	100	88	100
% in schools with disabilities	Office	About 13% US public school	Read	14	97	20	94	31	95

Table 3: Retention of the 14 Facts 2+ Weeks Later (H2)

Disability	'17 Pretest % n=42	'17 1st Posttest % n=42	'17 2nd Posttest % n=42	Pre to 1st Posttest	1st to 2nd Posttest	Posttest Difference
ADHD	88	95	98	7	10	3
Asperger's	69	81	81	12	12	0
	60	100	90	40	30	-10
Autism	36	81	83	45	47	2
	90	90	98	0	8	8
Dyscalculia	76	86	95	10	19	9
	55	93	95	38	40	2
Dysgraphia	45	74	76	29	31	2
	17	69	74	52	57	5
Dyslexia	21	62	67	41	46	5
	98	95	100	-3	2	5
Physical	88	100	100	92	12	0
	31	95	67	64	36	-28

Table 2: Compare 2016 to 2017 Scores of 7 Changes (H1)

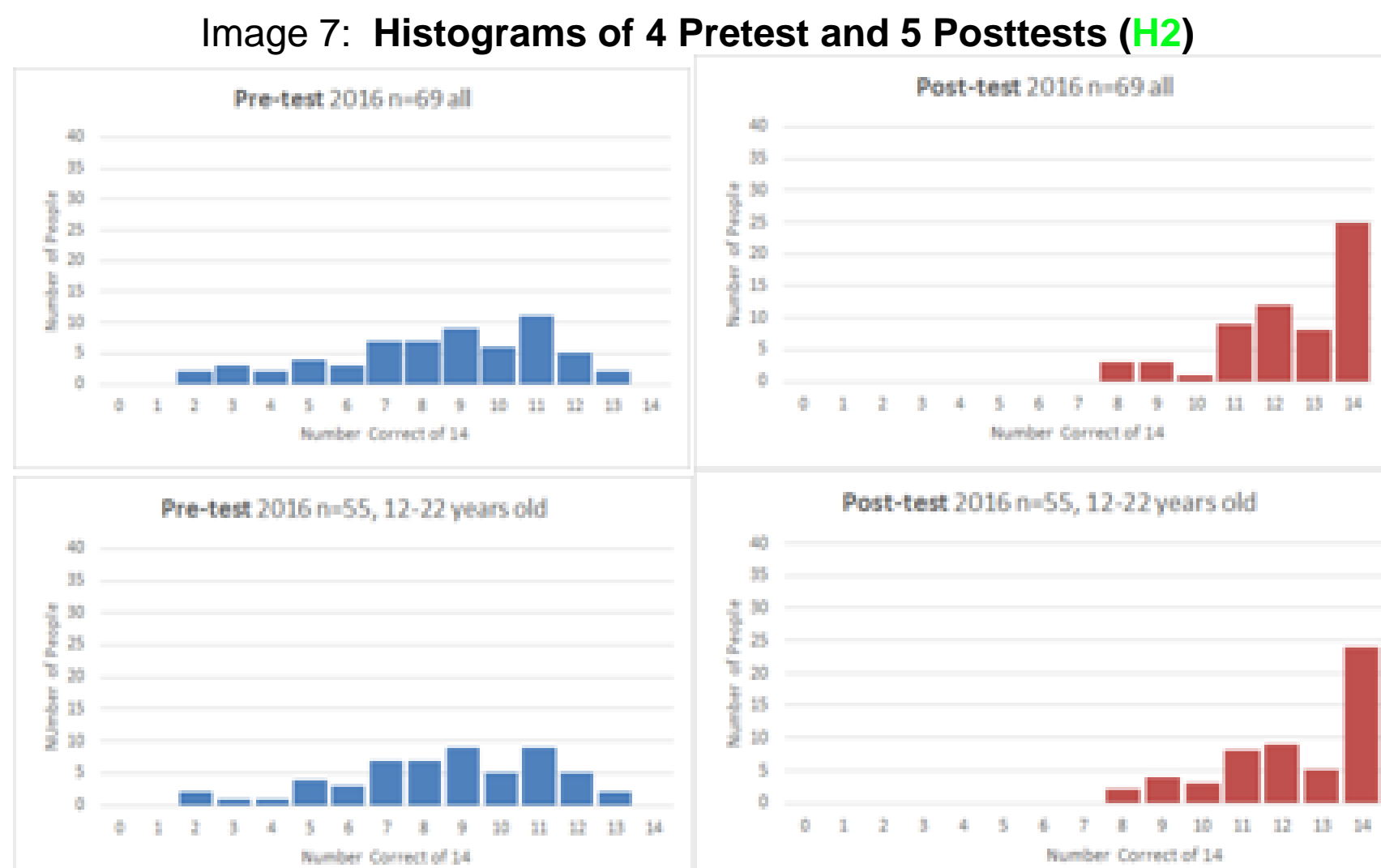
Disability	Characteristic/ helped by	'16 Pretest % n=55	'16 Posttest % n=55	'16 Percent Increase	'17 Pretest % n=83	'17 1st Posttest % n=83	'17 Percent Increase	Difference of increase
ADHD	Chunk information, take breaks	76	93	22	69	81	17	-5
Asperger's	Keep routine, visual	62	83	34	36	81	125	91
Autism	Act out of turn, not respond	93	83	-11	90	90	0	11
Dyscalculia	Use calculator, graphing paper	45	79	76	45	74	64	-12
Dysgraphia	Write small chunks, Word	21	52	148	21	62	195	47
Dyslexia	Use auditory support	93	72	-23	90	76	-16	7
Physical	Wheelchair-ask if can help	76	97	28	88	100	14	-14

Table 4: Scores and T-Tests (H2)

Description	N	Pre %	Post %	P-value
All 2016	69	59	87	1.3x10 <sup>-16</sup>
12-22 years old in 2016	55	61	88	8.1x10 <sup>-13</sup>
All 2017 (12-22)	83	68	88	6.2x10 <sup>-15</sup>
Pre-1 <sup>st</sup> post	42	71	91	1.1x10 <sup>-3</sup>
Pre-2 <sup>nd</sup> post	42	71	87	9.9x10 <sup>-8</sup>
All 2016 + 2017	152	65	88	4.4x10 <sup>-26</sup>

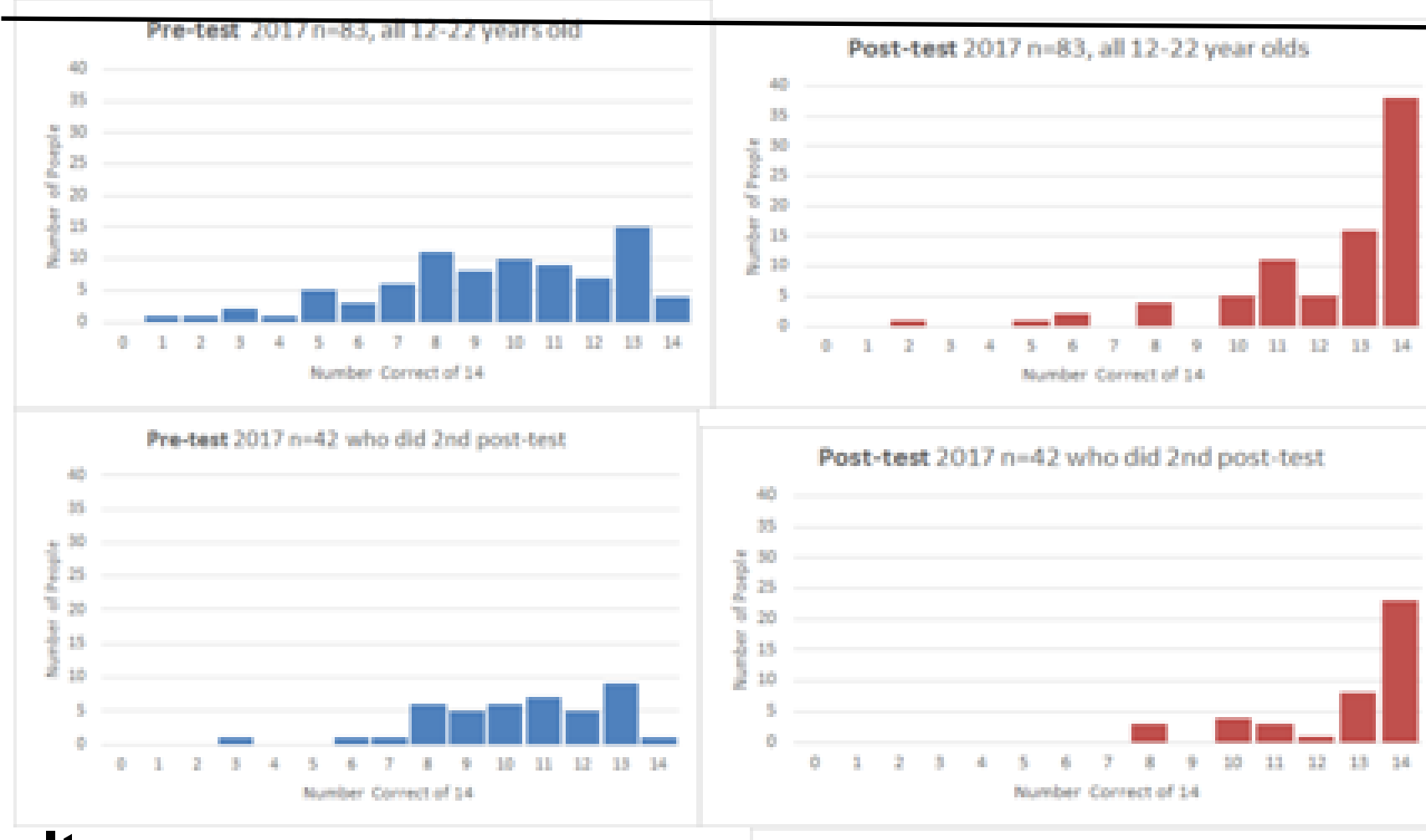
### Pre-Survey Questions

- What would you say your view or attitude is about someone with a disability?
- Do you know someone or multiple people with learning or other disabilities?
- If yes and you know, what disabilities?
- Do you see yourself behaving or acting differently with someone with a disability compared to someone without any known disability?
- If yes, how do you act or behave differently?
- Have you seen any bullying of someone with a disability?
- How do you think it might be stopped?



### Post-Survey Questions

- Do you think your view has changed about people with disabilities?
- If yes, how do you think it has changed?
- Do you think you have or will behave in a different way than before?
- If yes, in what way?
- Would you be more understanding?
- Would you be more considerate?
- Would you be more accommodating?
- Would you report or try to stop any bullying of someone with a disability?



### Post-Survey Results (H3)

Three questions with some responses on the **post-survey** of interest:

- 90% reported that they would be more understanding.
- 93% reported that they would be more considerate
- 98% reported that they would be more accommodating

**Do you think your view has changed about people with disabilities?**

- It has taught me to be more accepting and understand what they go through.
- I now understand how these individuals are affected and what can be done to assist them.
- I have more respect towards them and I'm more understanding.

**Do you think you have or would behave in a different way than before?**

- I would be more accommodating to their needs and be more patient.
- I learned really good tips regarding how to treat people with disabilities.
- I can help them now.

### Data Analysis

**Hypothesis 1** to see if Friends with Different Abilities could be modified to be more understandable is **rejected** (see Table 2) given that

- only 4 of the 7 altered facts were improved on (with an average of +18%)

**Hypothesis 2** to see if someone can retain information about disabilities from playing Friends with Different Abilities at least 2 weeks later is **accepted** (see Tables 3 & 4) since

- 71% on the pretest to 87% 2<sup>nd</sup> posttest for a statistically significant difference
- some fact percents decreased, so it is not likely that they looked up answers

**Hypothesis 3** to see if someone's attitude or behavior can be altered to be more understanding towards someone with a disability is **accepted** (see Post-Survey) since

- on average, 94% of the 42 responding said they would be more understanding, considerate and accommodating.

### Further Studies and Conclusions

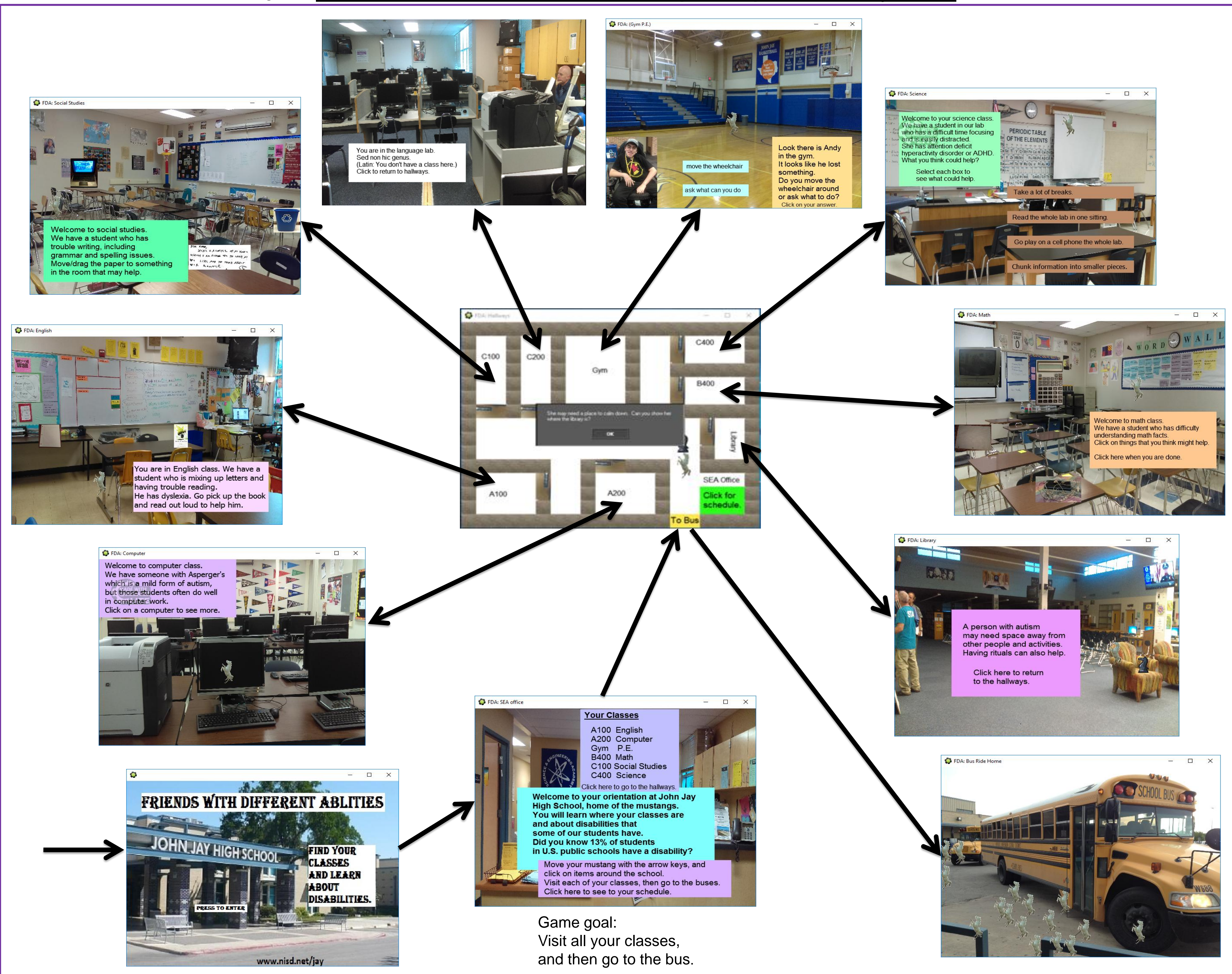
Further studies could include trying to observe behaviors in a controlled situation and take further posttests. The game could be expanded to include Downs syndrome, physical disabilities, and mental disorders. Simulations of disabilities could be added to the game.

This year's project affirms last year's results and showed that **someone can retain the information learned about disabilities** by playing the game Friends with Different Abilities. Those who responded to the online form reported that **they would be more understanding and considerate towards someone with a disability**. Hopefully, less bullying can result from more people knowing about disabilities.

### References

- Disabled World. "Disability: Definition, Types & Models." *Disabled World*. <http://www.disabled-world.com/disability/types/>, 2016. Web. 10 Sep 2016.
- Habgood, J., and Overmars, M. *The Game Maker's Apprentice: Game Development for Beginners*. Berkeley, CA: Apress, 2006. Print.
- Parra, M.Ed., Cheryl. Special Education Campus Coordinator. John Jay High School, room L220. In person. Aug 30, 2016 and Sep 6, 2016.

Image 6: Friends with Different Abilities (FwDA) Game Play Flow



All pictures, images, figures, charts, and graphs were taken or made by the researcher or mentor unless noted.  
**Acknowledgements:** The researcher is thankful to the JJ SEA teachers, St. Mary's University, and all the people who played the game.