The SPORT-C Intervention: An Integration of Sports, Case-Based Pedagogy and Systems Thinking Learning

Jeffrey K. Basoah| Dr. William Scherer |Dr. Karis Boyd-Sinkler | Dr. Reid Bailey

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July 25th – 28th, 2022

Outline

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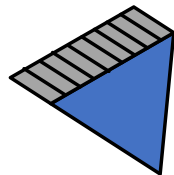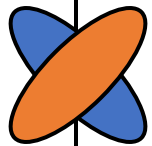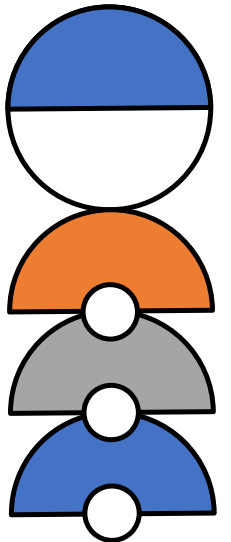Intervention Activity
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03 Findings

Academic Engagement
Self Efficacy
Expectancy
Value
Cost

04 Discussion

Implications
Limitations
Recommendation for Future Works
Conclusion

MOTIVATON
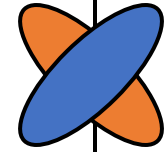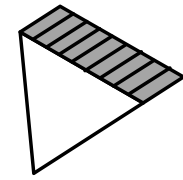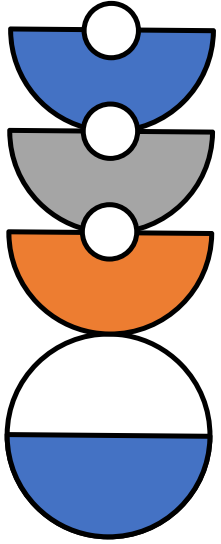
Representation Matters
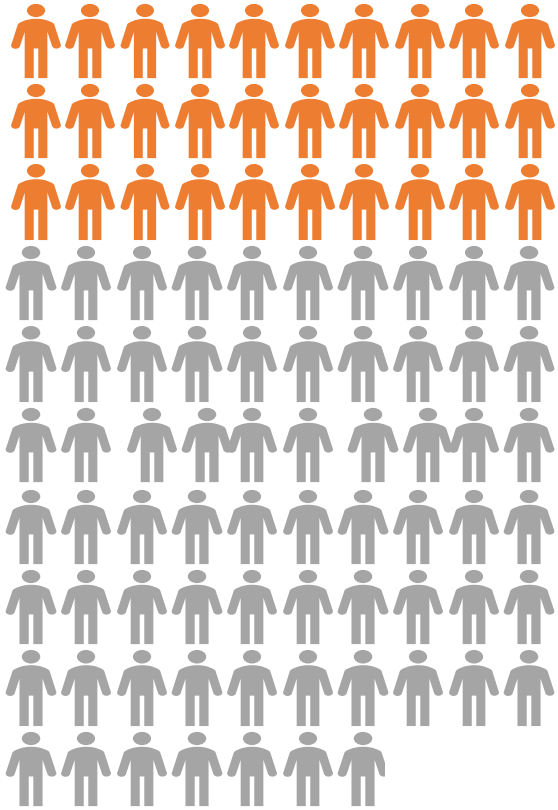
U.S. Population

U.S. STEM

Underrepresented racial groups (URGs)

Overrepresented racial groups (ORGs)

US Census Bureau. (2020, June 25). *2019 Population Estimates by Age, Sex, Race and Hispanic Origin*. Census.Gov. https://www.census.gov/newsroom/press-kits/2020/population-estimates-detailed.html

STEM Education is linked to the STEM Field
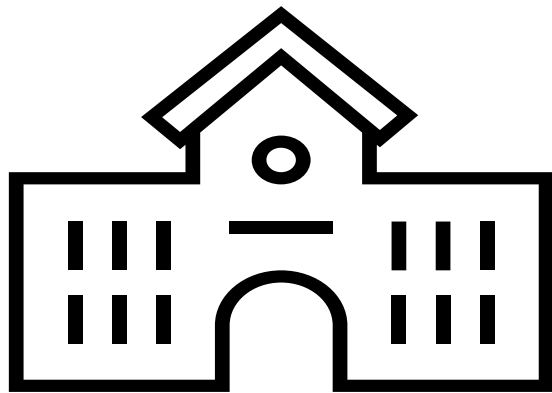
STEM Industry

STEM Education
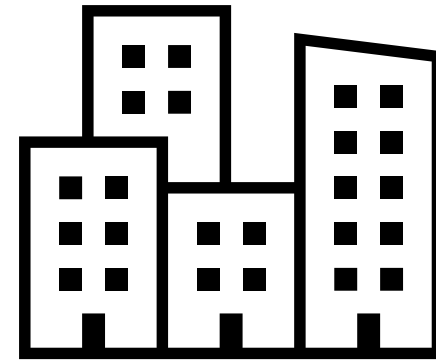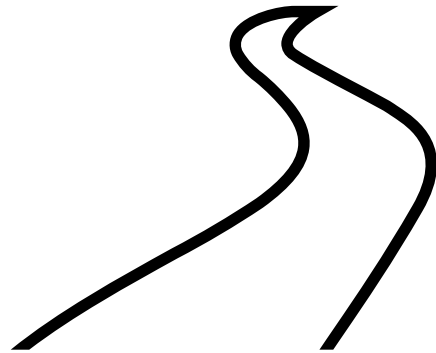
The essential connection
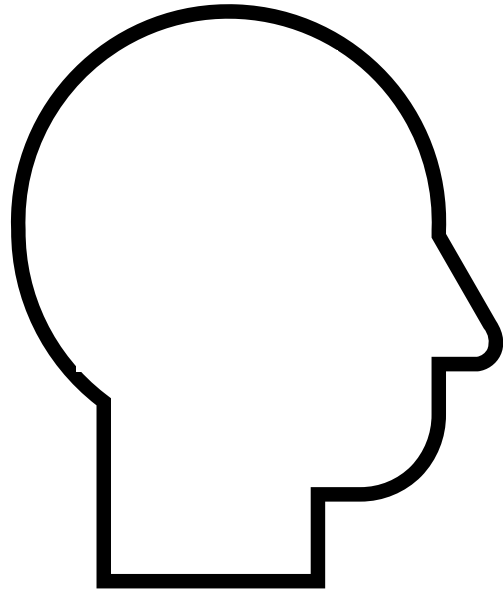
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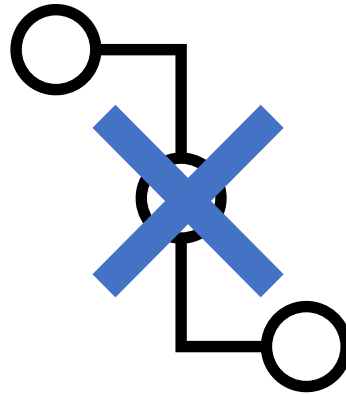
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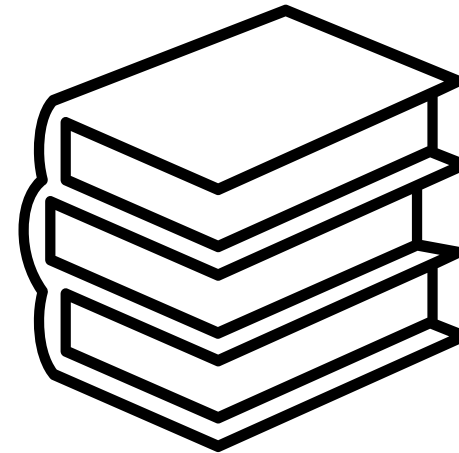
STEM
Learning
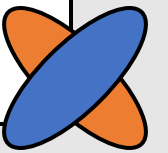
STEM Learning
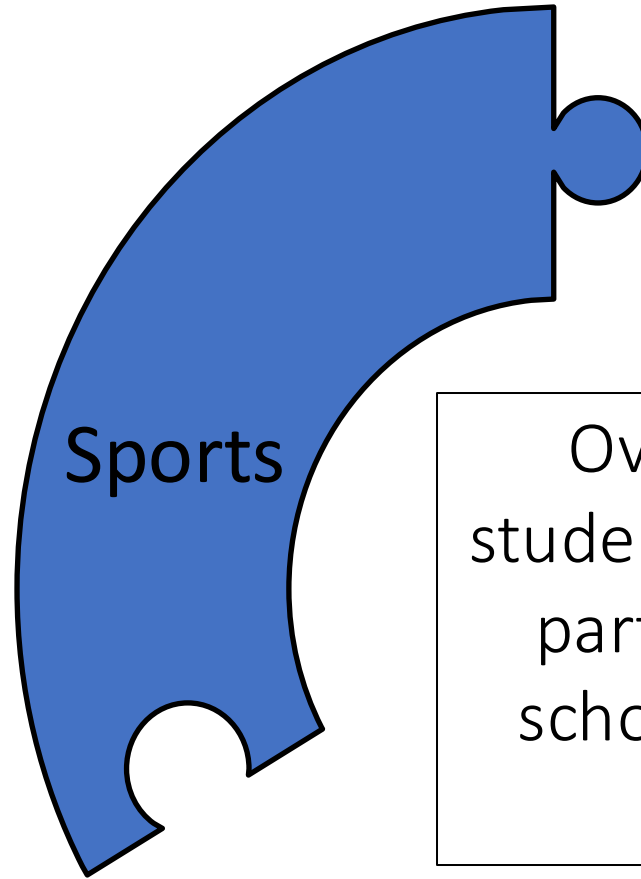
Sports

Over 70% of students ages 6-17 participated in school sports in 2019

Aspen Institute. (2020b). Youth Sports Facts: Participation Rates. The Aspen Institute Project Play. https://www.aspenprojectplay.org/state-of-play-2021/ages-13-17
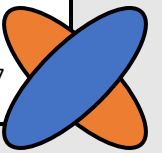
STEM Learning
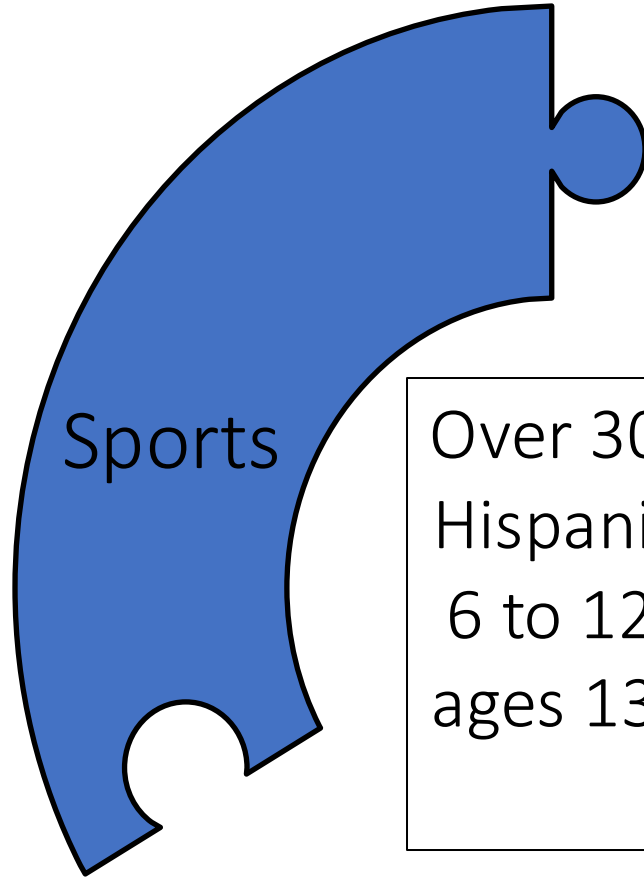
Sports

Over 30% of Black and Hispanic children ages 6 to 12 and over 40% ages 13 to 17 played a sport

Aspen Institute. (2020b). Youth Sports Facts: Participation Rates. The Aspen Institute Project Play. https://www.aspenprojectplay.org/state-of-play-2021/ages-13-17

STEM Learning

A case is a description of a real-life situation in which the reader is asked to imagine themselves in the shoes of a particular decision-maker

Case Based Pedagogy
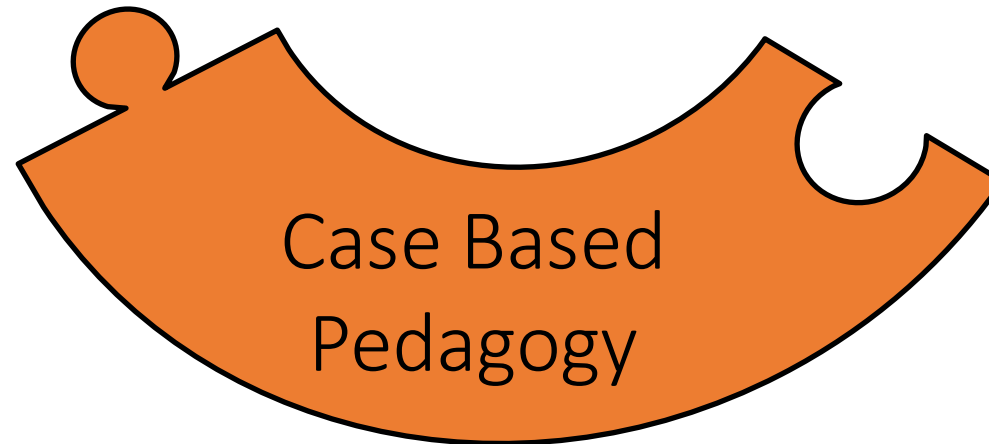
Herreid, C. F. (2007). Start with a Story: The Case Study Method of Teaching College Science. NSTA Press.

STEM Learning

Systems thinking is understanding the connection between inputs and outputs that work toward a common goal

Systems Thinking Learning

Lavi, R., & Dori, Y. J. (2019). Systems thinking of pre- and in-service science and engineering teachers. International Journal of Science Education, 41(2), 248–279. https://doi.org/10.1080/09500693.2018.1548788
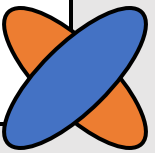
The SPORT-C Intervention
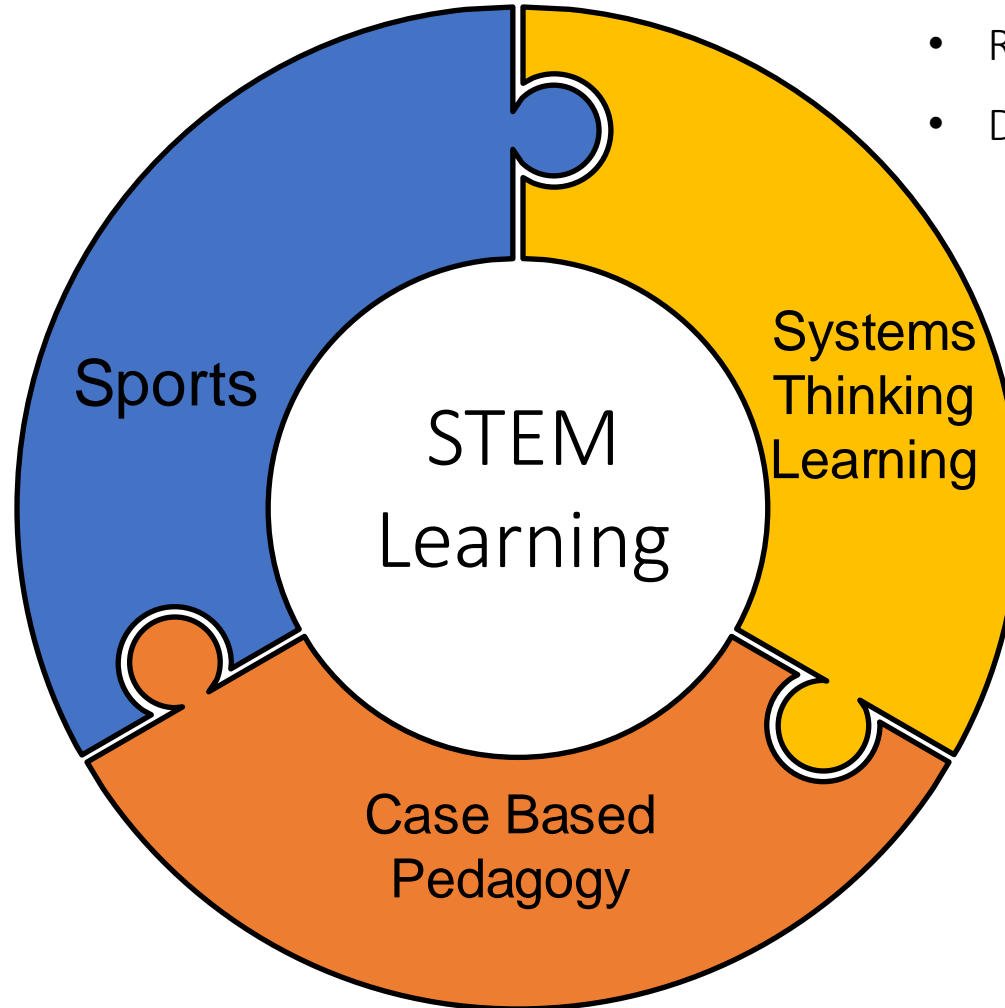
- Relevancy to life
- Real-world scenario
- Develop problem solving skills

Sports

Systems Thinking Learning

STEM Learning

Case Based Pedagogy

Purpose of Study

To understand the impacts of the SPORT-C intervention on the motivation levels of high school students who participate in STEM courses.

Research Questions

RQ1 — How does the SPORT-C intervention impact a student's motivation to participate in their STEM course?

RQ2 — Does the impact of the SPORT-C intervention vary by racial identity?

Motivation Factors

Academic engagement

Degree of attention that an individual shows
when they are learning or being taught

Student Engagement Definition. (2013, December 13). The Glossary of Education Reform. https://www.edglossary.org/student-engagement/

Motivation Factors

Self-efficacy

An individual's confidence in their ability to successfully complete tasks

Luo, T., So, W. W. M., Li, W. C., & Yao, J. (2020). The Development and Validation of a Survey for Evaluating Primary Students' Self-efficacy in STEM Activities. *Journal of Science Education and Technology, 30*(3), 408–419. https://doi.org/10.1007/s10956-020-09882-0

Motivation Factors

Expectancy

The extent to which a student thinks he or she can be successful in a task

Kosovich, J. J., Hulleman, C. S., Barron, K. E., & Getty, S. (2015). A Practical Measure of Student Motivation: Establishing Validity Evidence for the Expectancy-Value-Cost Scale in Middle School. The Journal of Early Adolescence, 35(5–6), 790–816. https://doi.org/10.1177/0272431614556890

Motivation Factors

Value

The extent to which a student
thinks a task is worth completing

Kosovich, J. J., Hulleman, C. S., Barron, K. E., & Getty, S. (2015). A Practical Measure of Student Motivation: Establishing Validity Evidence for the Expectancy-Value-Cost Scale in Middle School. The Journal of Early Adolescence, 35(5–6), 790–816. https://doi.org/10.1177/0272431614556890

Motivation Factors

Cost

Negative aspects of participating in an activity, such as the loss of other valuable activities

Kosovich, J. J., Hulleman, C. S., Barron, K. E., & Getty, S. (2015). A Practical Measure of Student Motivation: Establishing Validity Evidence for the Expectancy-Value-Cost Scale in Middle School. The Journal of Early Adolescence, 35(5–6), 790–816. https://doi.org/10.1177/0272431614556890

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Self-efficacy

An individual's confidence in their ability to successfully complete tasks

Expectancy

The extent to which a student thinks he or she can be successful in a task

Value

The extent to which a student thinks a task is worth completing

Cost

Negative aspects of participating in an activity, such as the loss of other valuable activities

METHODS
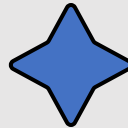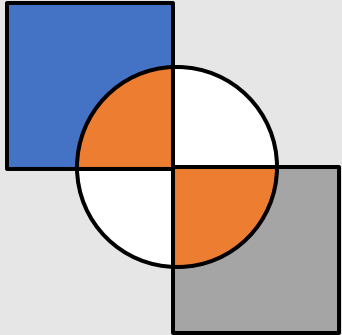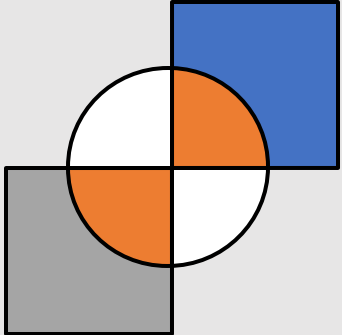
Study Design

Image adopted from Creswell, J. W., & Clark, V. L. P. (2011). *Designing and Conducting Mixed Methods Research*. SAGE.

Study Design

QUANT
data collection

QUAL
data collection

Image adopted from Creswell, J. W., & Clark, V. L. P. (2011). *Designing and Conducting Mixed Methods Research*. SAGE.

Study Design

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│     QUANT       │      │     QUANT       │
│ data collection │ ───▶ │ data analysis   │ ────
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│      QUAL       │      │      QUAL       │
│ data collection │ ───▶ │  data analysis  │ ────
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Image adopted from Creswell, J. W., & Clark, V. L. P. (2011). *Designing and Conducting Mixed Methods Research*. SAGE.

Study Design


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│   QUANT      │───▶│   QUANT      │───▶│   QUANT      │──┐
│ data collection │  │ data analysis │  │   results    │  │      ┌──────────────┐    ┌──────────────┐
└──────────────┘    └──────────────┘    └──────────────┘  │      │ Compare and  │    │              │
                                                           ├─────▶│  Contrast    │───▶│ Interpretation │
┌──────────────┐    ┌──────────────┐    ┌──────────────┐  │      │              │    │              │
│   QUAL       │───▶│   QUAL       │───▶│   QUAL       │──┘      └──────────────┘    └──────────────┘
│ data collection │  │ data analysis │  │   results    │
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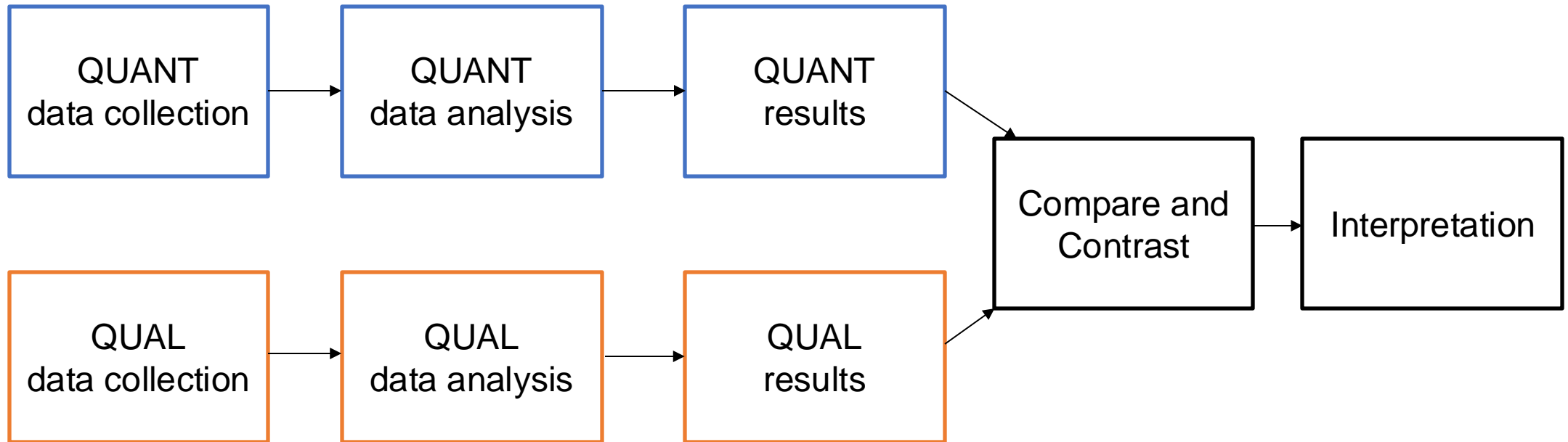
Image adopted from Creswell, J. W., & Clark, V. L. P. (2011). *Designing and Conducting Mixed Methods Research*. SAGE.

School Population

Race Breakdown

- ■ Asian
- ■ Black or African American
- ■ Hispanic or Latino
- ■ Two or more races
- ■ White

6%
29%
14%
7%
44%

Gender Breakdown

51% 49%

- ■ Female
- ■ Male
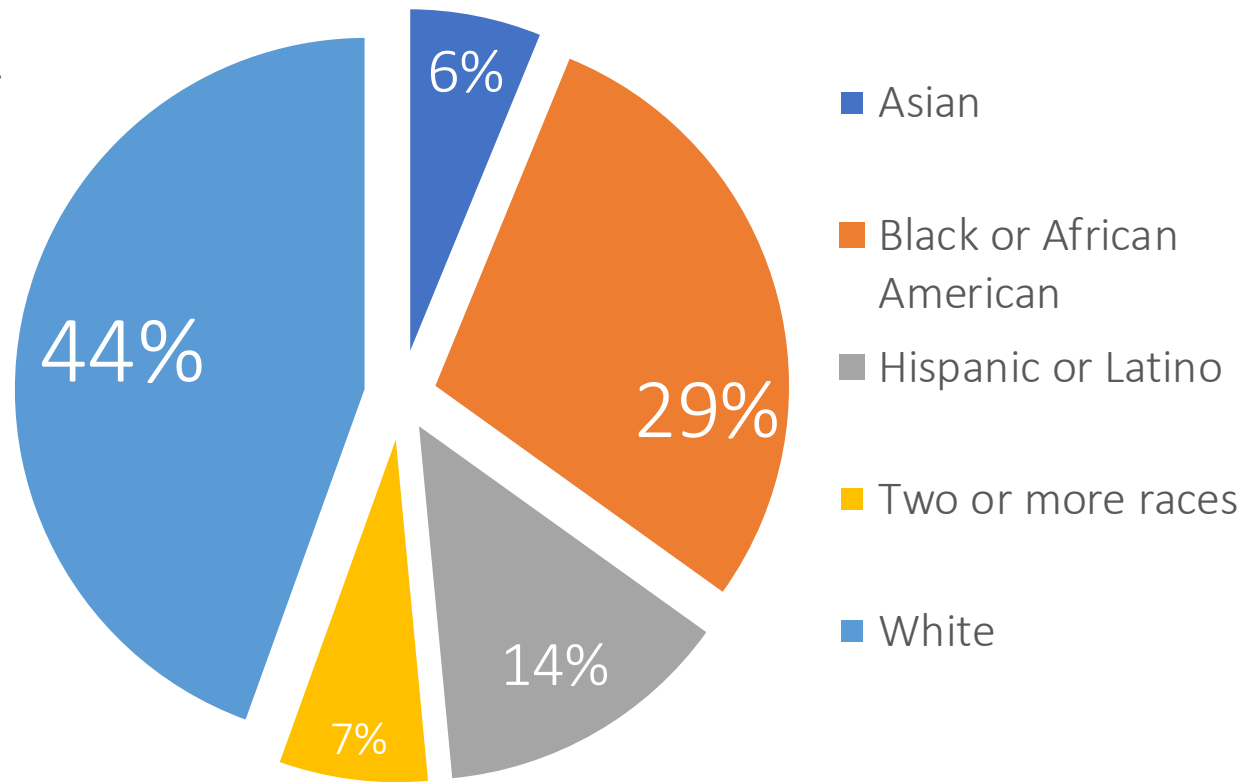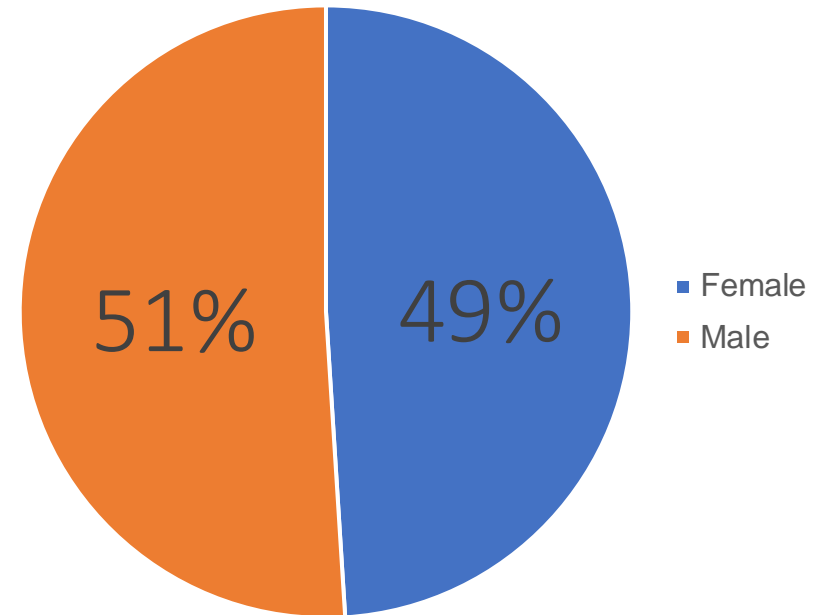
Charlottesville High. (2022, April 3). Virginia School Quality Profiles. https://schoolquality.virginia.gov/schools/charlottesville-high

Participants

Group (Intervention or Control)	Race	Focus Group (Y/N)	Gender	Grade
Control	Black/African-American	N	Male	10th
Control	Some other race or more than one race	N	Female	10th
Control	White	N	Male	12th
Intervention	Black/African-American	N	Female	11th
Intervention	Black/African-American	N	Male	11th
Intervention	Black/African-American	N	Prefer not to answer	11th
Intervention	Black/African-American	Y	Female	11th
Intervention	Black/African-American	Y	Male	11th
Intervention	Native Hawaiian or Other Pacific Islander	Y	Female	11th
Intervention	White	N	Male	10th

Study Timeline

INTERVENTION group expected value lesson

CONTROL group expected value lesson

LEARNING	LEARNING

Thursday, March 3rd	Friday, March 4th	Monday, March 7th	Tuesday, March 8th	Wednesday, March 9th	Thursday, March 10th

Study Timeline

INTERVENTION group expected value lesson

CONTROL group expected value lesson

LEARNING	LEARNING

Thursday, March 3rd	Friday, March 4th	Monday, March 7th	Tuesday, March 8th	Wednesday, March 9th	Thursday, March 10th

PRE-SURVEY	PRE-SURVEY

INTERVENTION group pre-survey administered

CONTROL group pre-survey administered

Study Timeline

INTERVENTION group expected value lesson

CONTROL group expected value lesson

INTERVENTION group activity

LEARNING	LEARNING	ACTIVITY

Thursday, March 3rd	Friday, March 4th	Monday, March 7th	Tuesday, March 8th	Wednesday, March 9th	Thursday, March 10th

PRE-SURVEY	PRE-SURVEY	ACTIVITY

INTERVENTION group pre-survey administered

CONTROL group pre-survey administered

CONTROL group activity

Study Timeline

INTERVENTION group expected value lesson

CONTROL group expected value lesson

INTERVENTION group activity

INTERVENTION group post survey administered

| LEARNING | LEARNING | ACTIVITY | POST SURVEY |

| Thursday, March 3rd | Friday, March 4th | Monday, March 7th | Tuesday, March 8th | Wednesday, March 9th | Thursday, March 10th |

| PRE-SURVEY | PRE-SURVEY | ACTIVITY | | POST SURVEY |

INTERVENTION group pre-survey administered

CONTROL group pre-survey administered

CONTROL group activity

CONTROL group post survey administered

Study Timeline

INTERVENTION group expected value lesson

INTERVENTION group pre-survey administered

INTERVENTION group activity

INTERVENTION group post survey administered

LEARNING

PRE-SURVEY

ACTIVITY

POST SURVEY
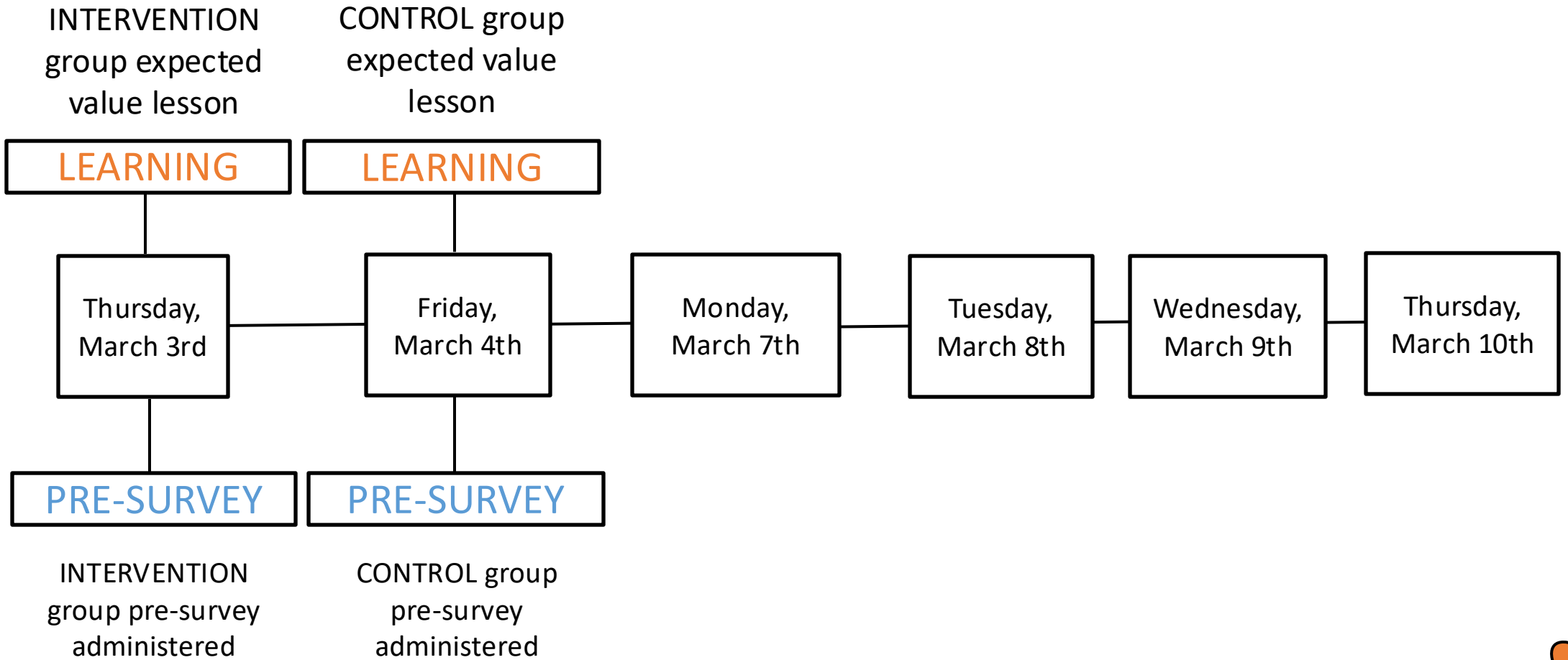
FOCUS GROUP & INTERVIEW

Thursday, March 3rd

Friday, March 4th

Monday, March 7th

Tuesday, March 8th

Wednesday, March 9th

Thursday, March 10th

LEARNING

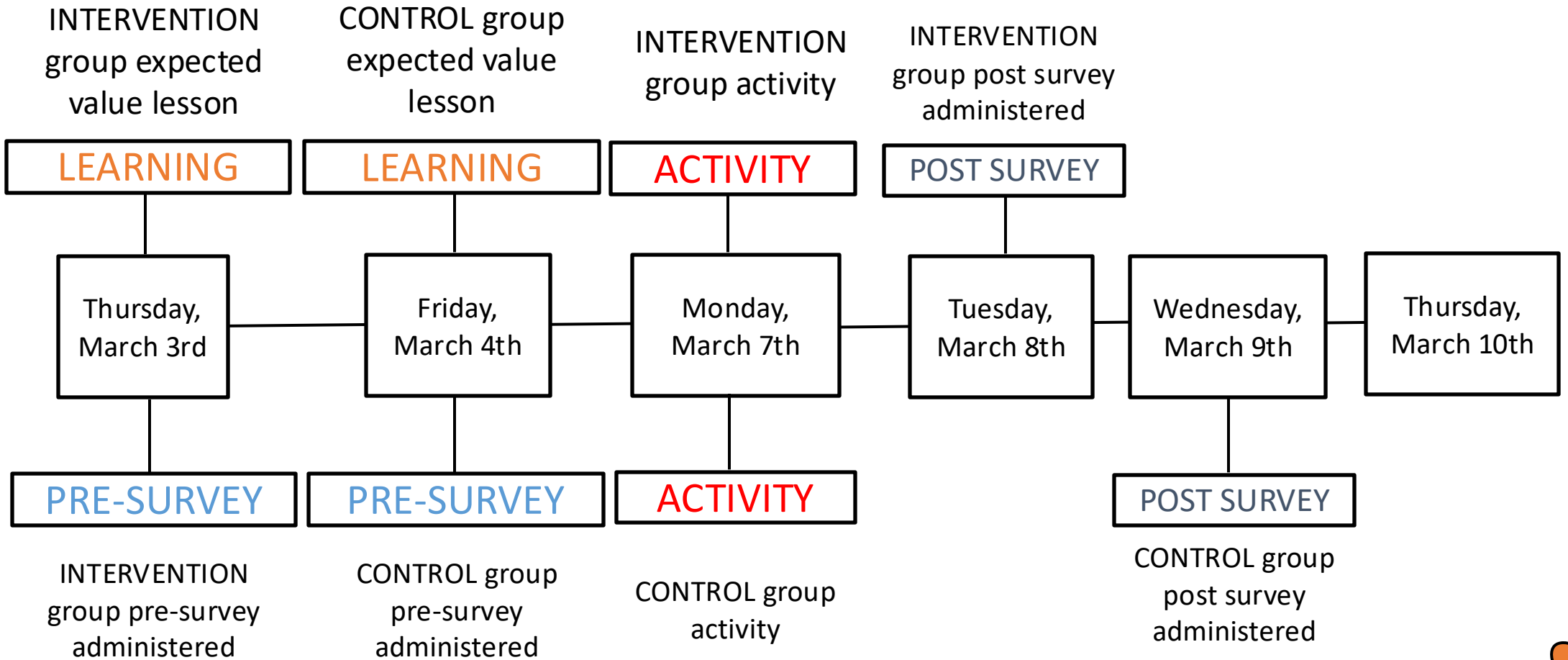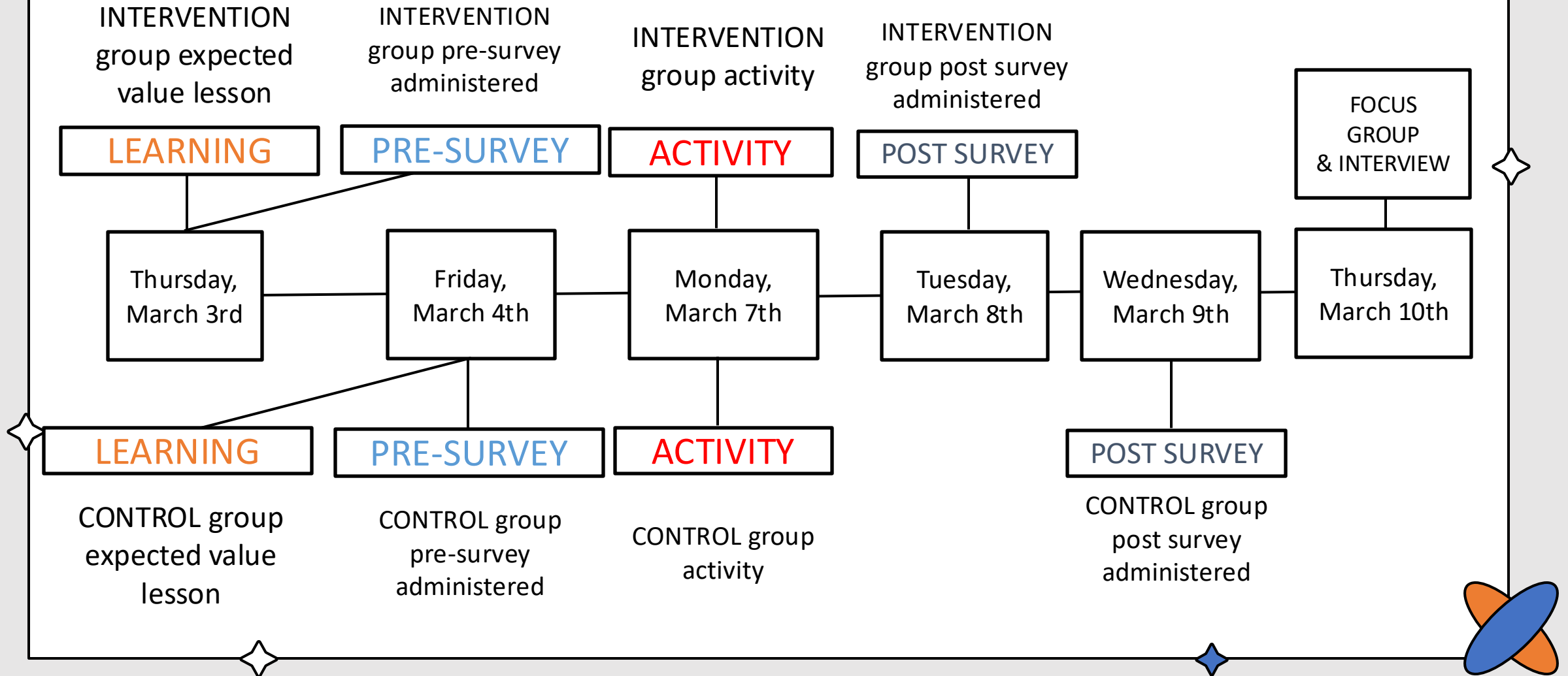PRE-SURVEY

ACTIVITY

POST SURVEY

CONTROL group expected value lesson

CONTROL group pre-survey administered

CONTROL group activity

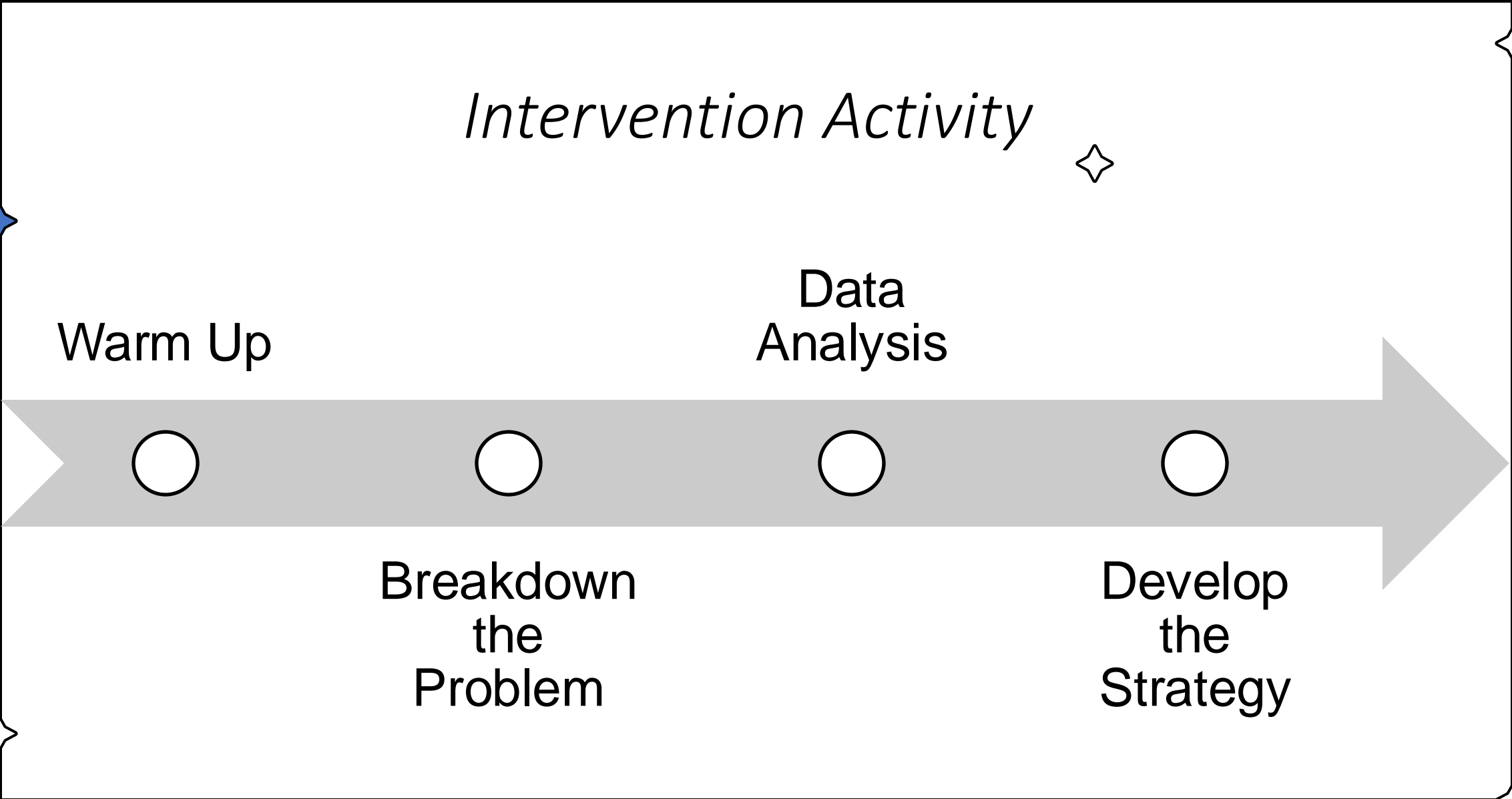CONTROL group post survey administered

Intervention Activity

Warm Up

Data Analysis

Breakdown the Problem

Develop the Strategy

Data Collection

- 40-item survey administered via Qualtrics
  - Academic engagement – 5Q
  - Self-efficacy – 12Q
  - Expectancy – 3Q
  - Values – 3Q
  - Cost – 4Q
  - Demographic -13Q
- Focus Group
- Classroom Instructor Interview

I am motivated towards my studies.

Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

I expect to do well in my class.
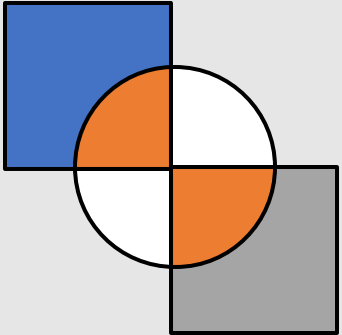
Strongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree

FINDINGS
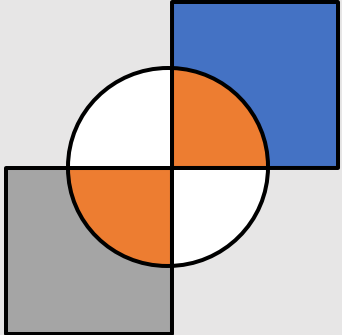
THEMES
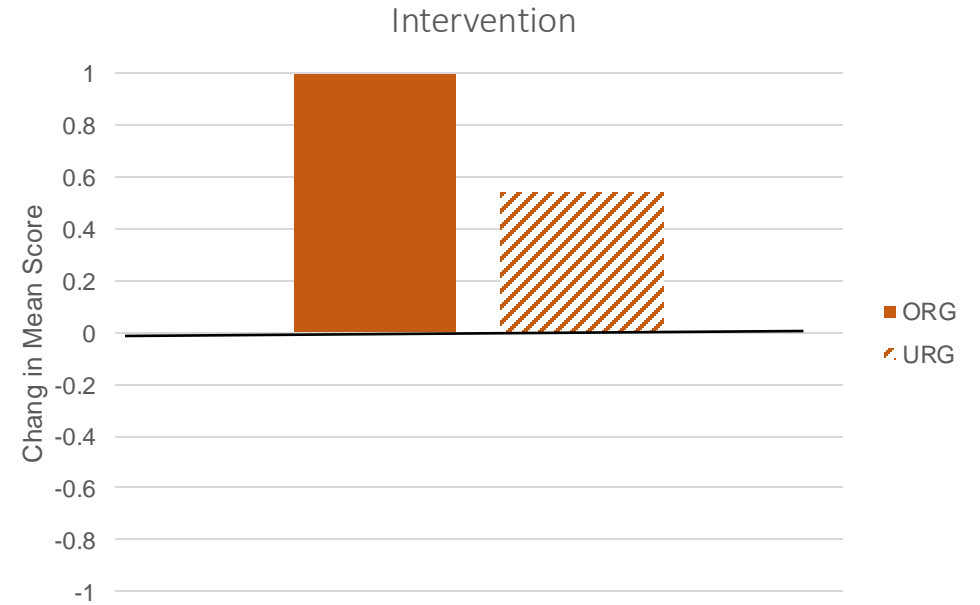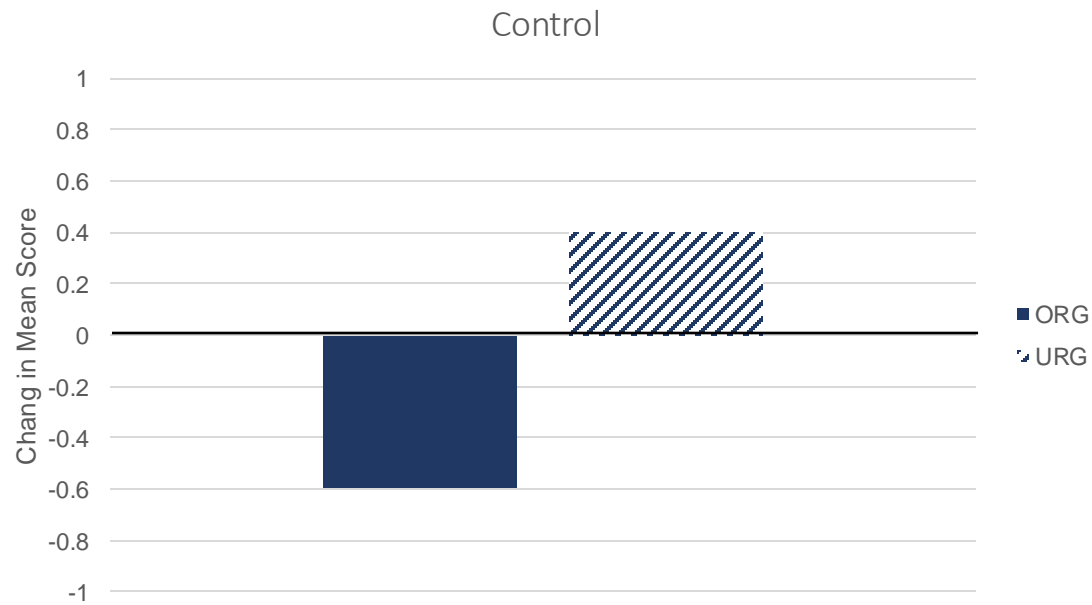
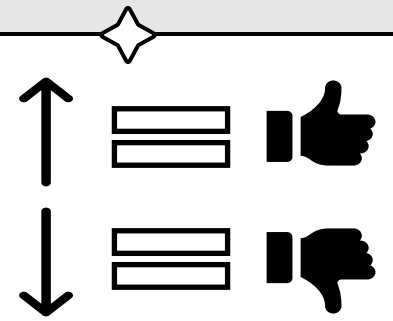| STRUCTURE	LEARNING	RELEVANCY

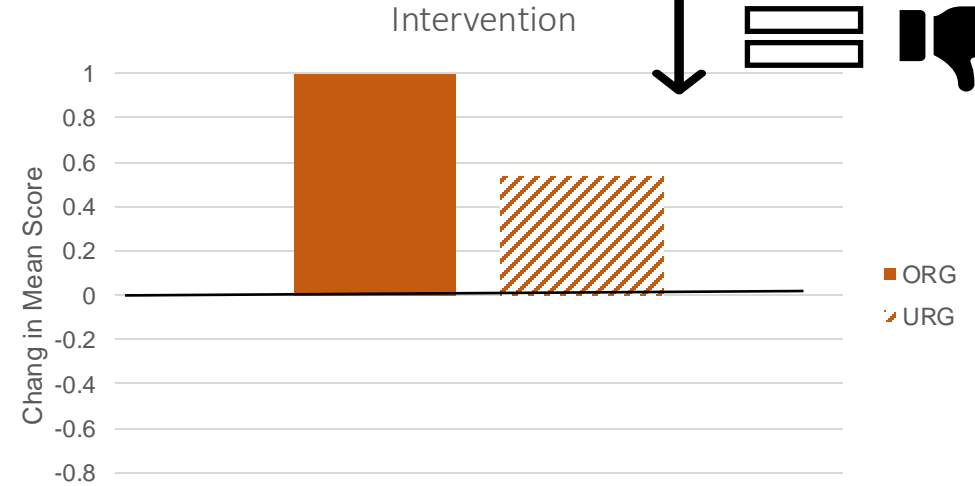| ACTIVITIY DIFFICULTY	ACTIVITY COMPREHENSION	ACTIVITIY ENGAGEMENT

Academic Engagement

Academic Engagement

Control

Chang in Mean Score (y-axis: -0.8 to 1)
- ORG: approximately -0.6
- URG: approximately 0.4

Legend:
- ORG
- URG

Intervention

Chang in Mean Score (y-axis: -0.8 to 1)
- ORG: approximately 1.0
- URG: approximately 0.55

Legend:
- ORG
- URG
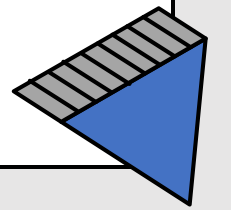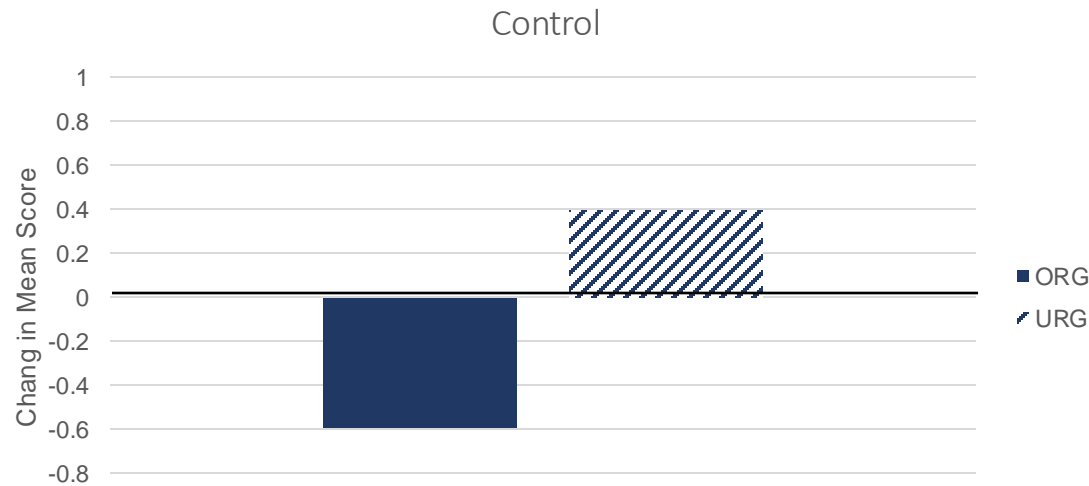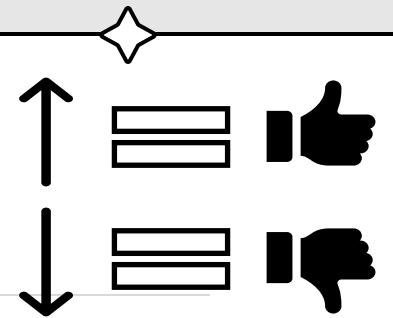
Theme	Examples
Learning Experience	"I was actually paying attention in class for once which is rare for me" "…didn't zone out completely"
Structure	"[it] just felt more put together,"
Relevance	"I understand [the assignment] quicker because it's something you know that's like in our world and tangible and like is an actual something that a lot of people watch and participate in, so I think that just made the connection easier in my brain."

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences of the United States of America*, *111*(23), 8410–8415. https://doi.org/10.1073/pnas.1319030111

Self-Efficacy

Self-Efficacy

Control

Intervention

Theme	Examples
Learning Experience	"[I] felt like I was actually like understanding some of the things that I was actually working on" "For me [it] was good [as] basketball is my favorite sport and to use it [it] make more sense for me to do because before we started it was very hard [but] like when he explained to us I understand a lot of what he was doing" "You know I learned a few things by myself, even though I got stuck really on most a lot of places, but [as] it just gradually went through my head I collected myself, and you know I just push[ed] through without any help at all, which you know I actually you know I really loved about it to be honest"

Ladson-Billings, G. (1995). Toward a Theory of Culturally Relevant Pedagogy. *American Educational Research Journal, 32*(3), 465–491.
https://doi.org/10.3102/00028312032003465
Ladson-Billings, G. (2009). But Thats Just Good Teaching! The Case for Culturally Relevant Pedagogy. *Theory Into Practice*. https://doi.org/10.1080/00405849509543675
Ladson-Billings, G. (2014). Culturally Relevant Pedagogy 2.0: A.k.a. the Remix. *Harvard Educational Review, 84*(1), 74–84. https://doi.org/10.17763/haer.84.1.p2rj131485484751

Cost

Expectancy

Value

Value

Control

		■ ORG
		◨ URG

Intervention

		■ ORG
		◨ URG

Theme	Examples
Relevancy	"it's a good skill that actually applies to like real life, and not just like learning the functions of like A B and C." "but i'd say that assignment brought out the fact that you know you can solve anything, and you can pretty much figure out the probability of anything as long as you know how you're doing it what numbers using and just know all around how you understand the topic."

Diekman, A. B., Clark, E. K., Johnston, A. M., Brown, E. R., & Steinberg, M. (2011). Malleability in communal goals and beliefs influences attraction to stem careers: Evidence for a goal congruity perspective. *Journal of Personality and Social Psychology*, *101*(5), 902–918. https://doi.org/10.1037/a0025199

DISCUSSION
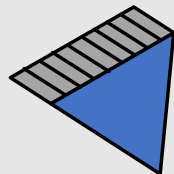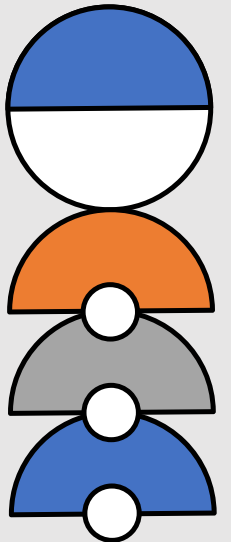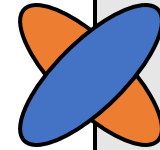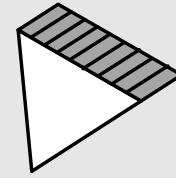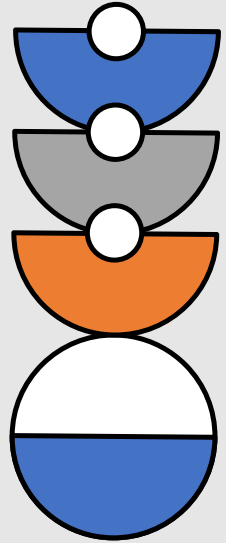
Implications

Sports topic has an influence on the academic engagement and perceived cost of STEM

The structure of the SPORT-C intervention aids in material comprehension and classroom participation

Students appreciate a challenge in classwork

Research Questions

RQ1 — How does the SPORT-C intervention impact a student's motivation to participate in their STEM course?

RQ2 — Does the impact of the SPORT-C intervention vary by racial identity?

Limitations

COVID-19

Participant Pool

Motivation Measurement

Study Design

Accessibility

Intersectionality

Sport Choice

Global Application

Recommendation for Future Works

49
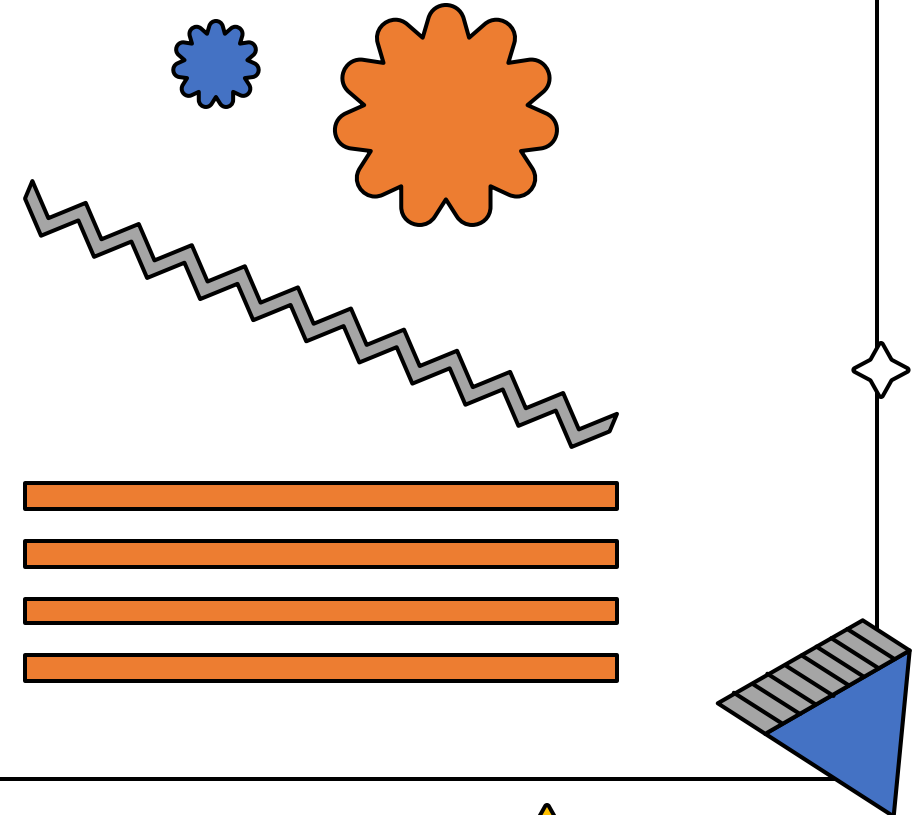
NBA players by ethnicity 2020. (n.d.). Statista. Retrieved April 13, 2022, from https://www.statista.com/statistics/1167867/nba-players-ethnicity/

Baseball Player Demographics and Statistics [2022]: Number Of Baseball Players In The US. (2021, January 29). https://www.zippia.com/baseball-player-jobs/demographics/
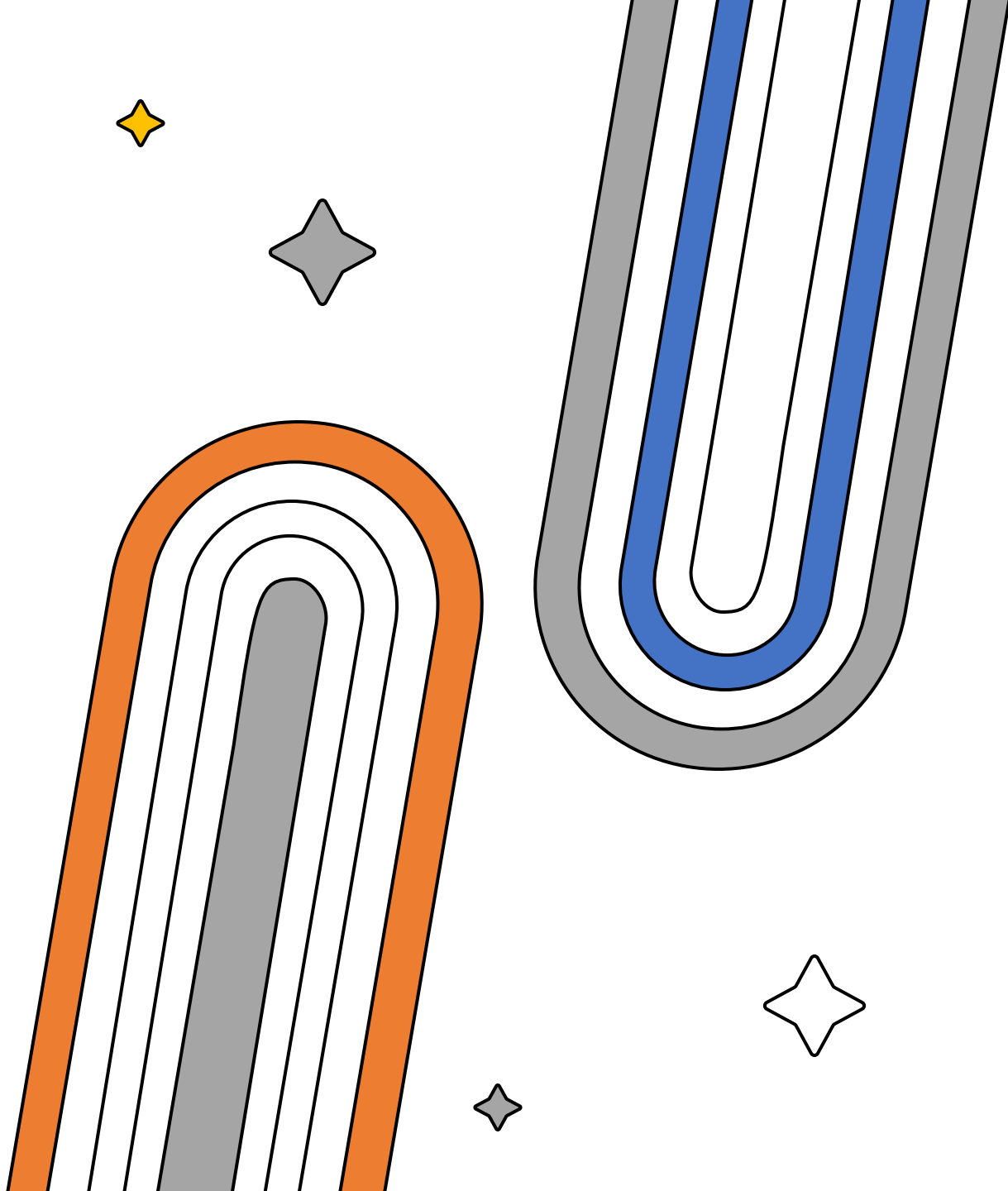
Final Thoughts

"Just because you covered it,
doesn't mean they learned it."
- *Internet*

Potential Publication Outlets

FECS'22 - The 18th Int'l Conf on Frontiers in
Education: Computer Science and Computer
Engineering

The Collaborative Network for Engineering
and Computing Diversity

Journal Negro Education

Journal of Curriculum

Acknowledgements
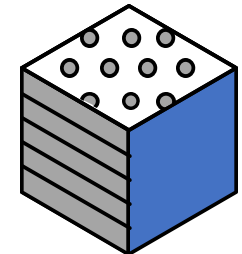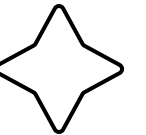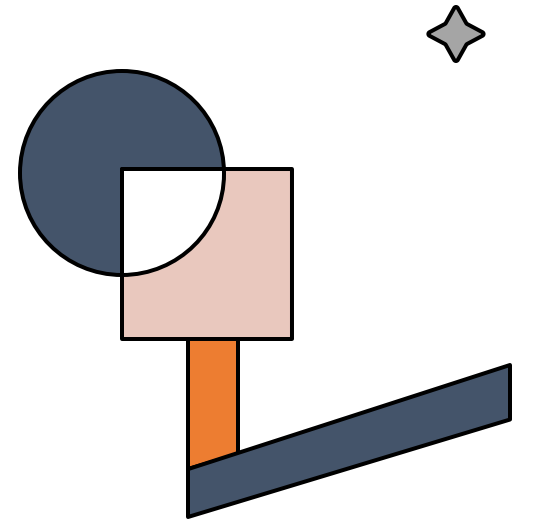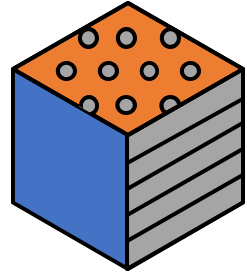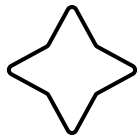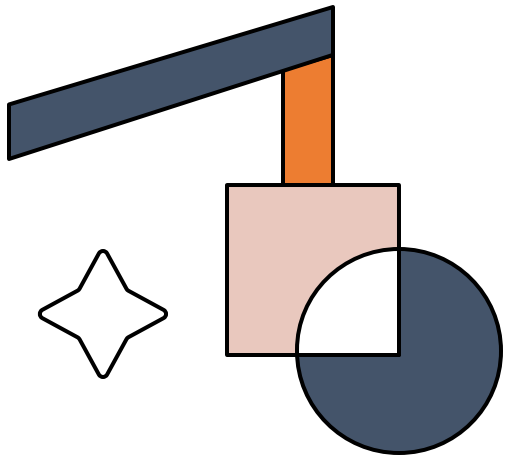
Questions?

jkb2jf@virginia.edu
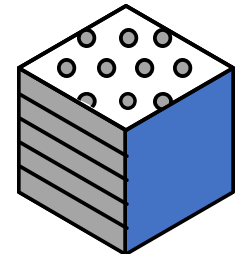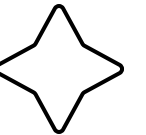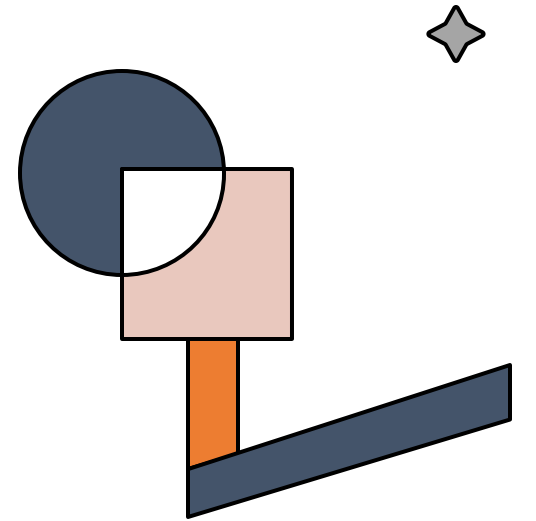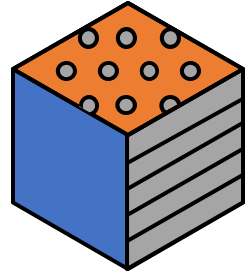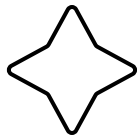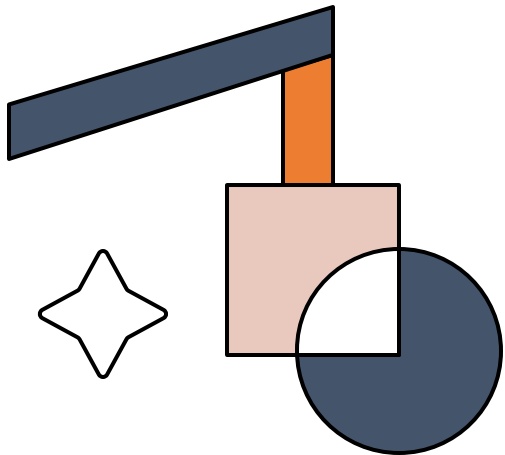
BACKUP SLIDES
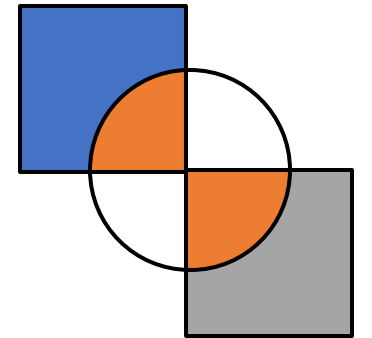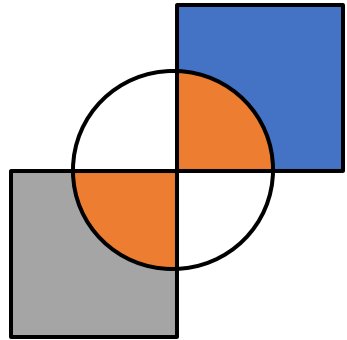
Systems Thinking Learning
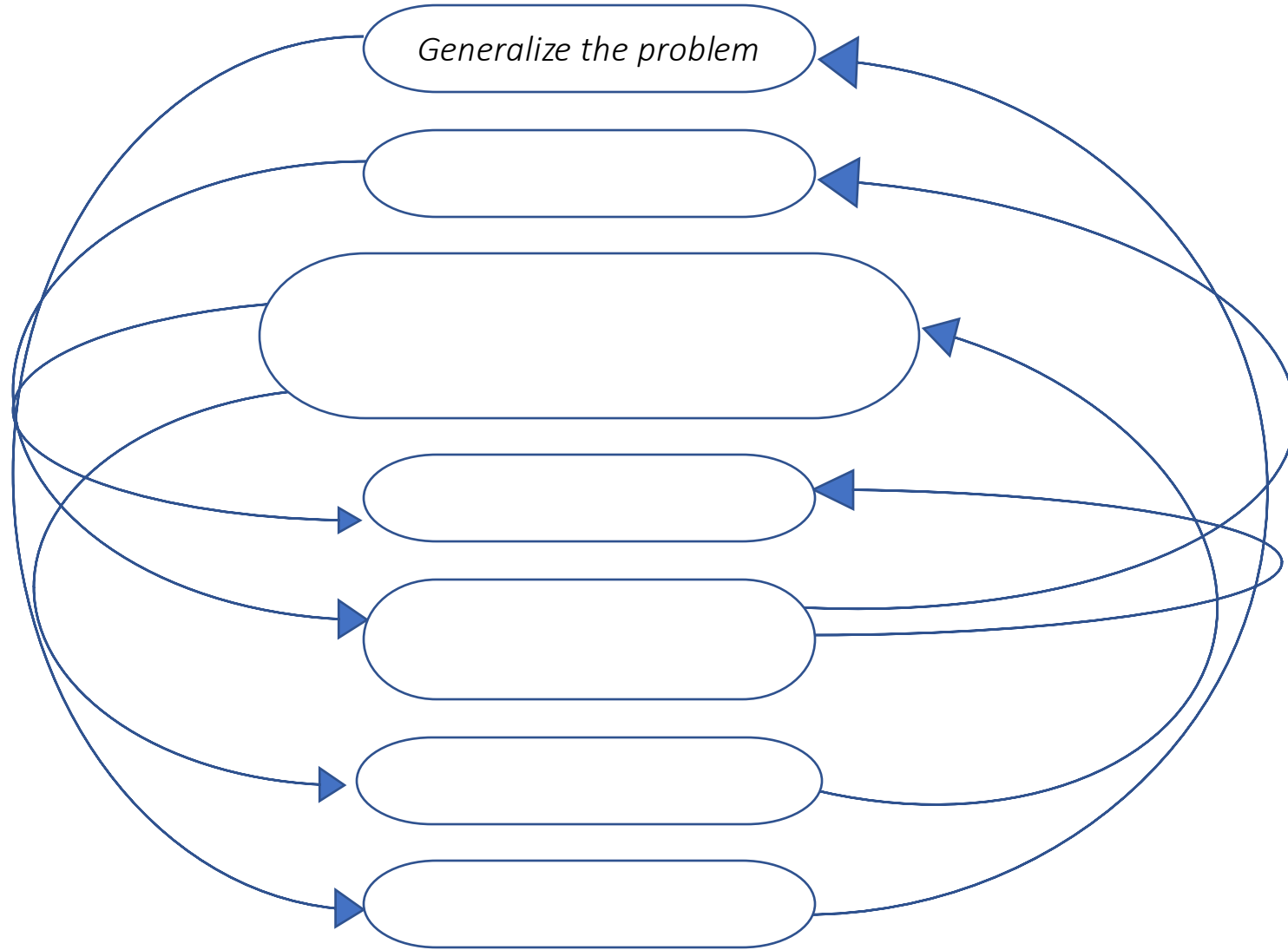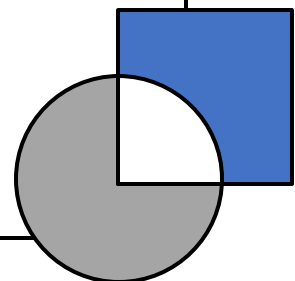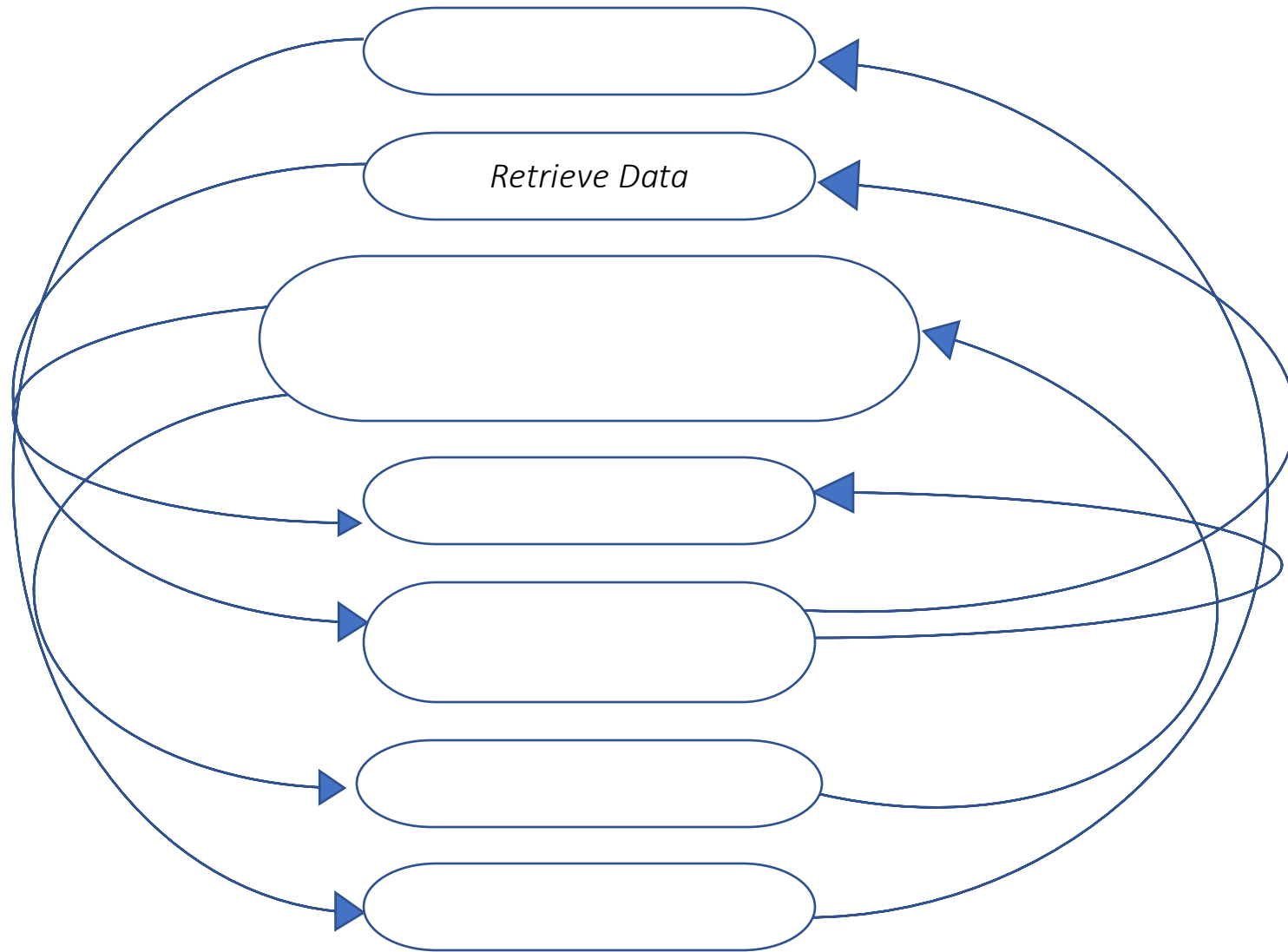
Generalize the problem

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Systems Thinking Learning

Retrieve Data

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Systems
Thinking
Learning

Data Walkthrough and Clean

Systems Thinking Learning

Develop Hypothesis

Systems Thinking Learning

Analysis

59
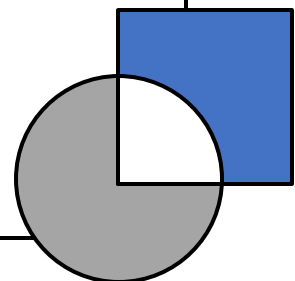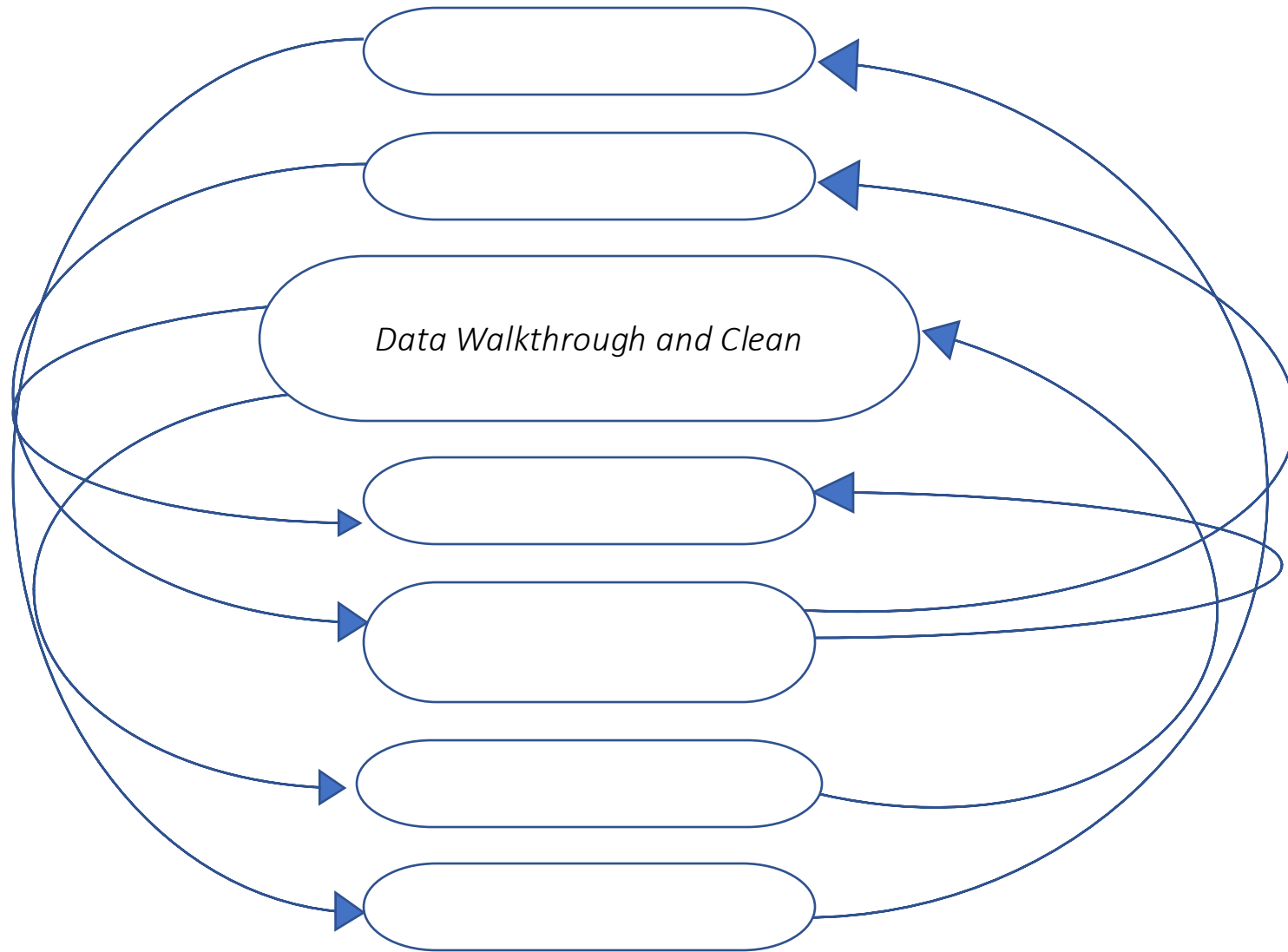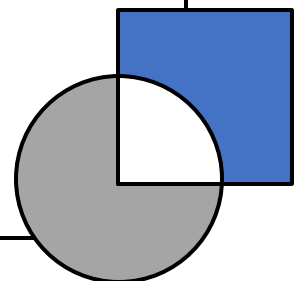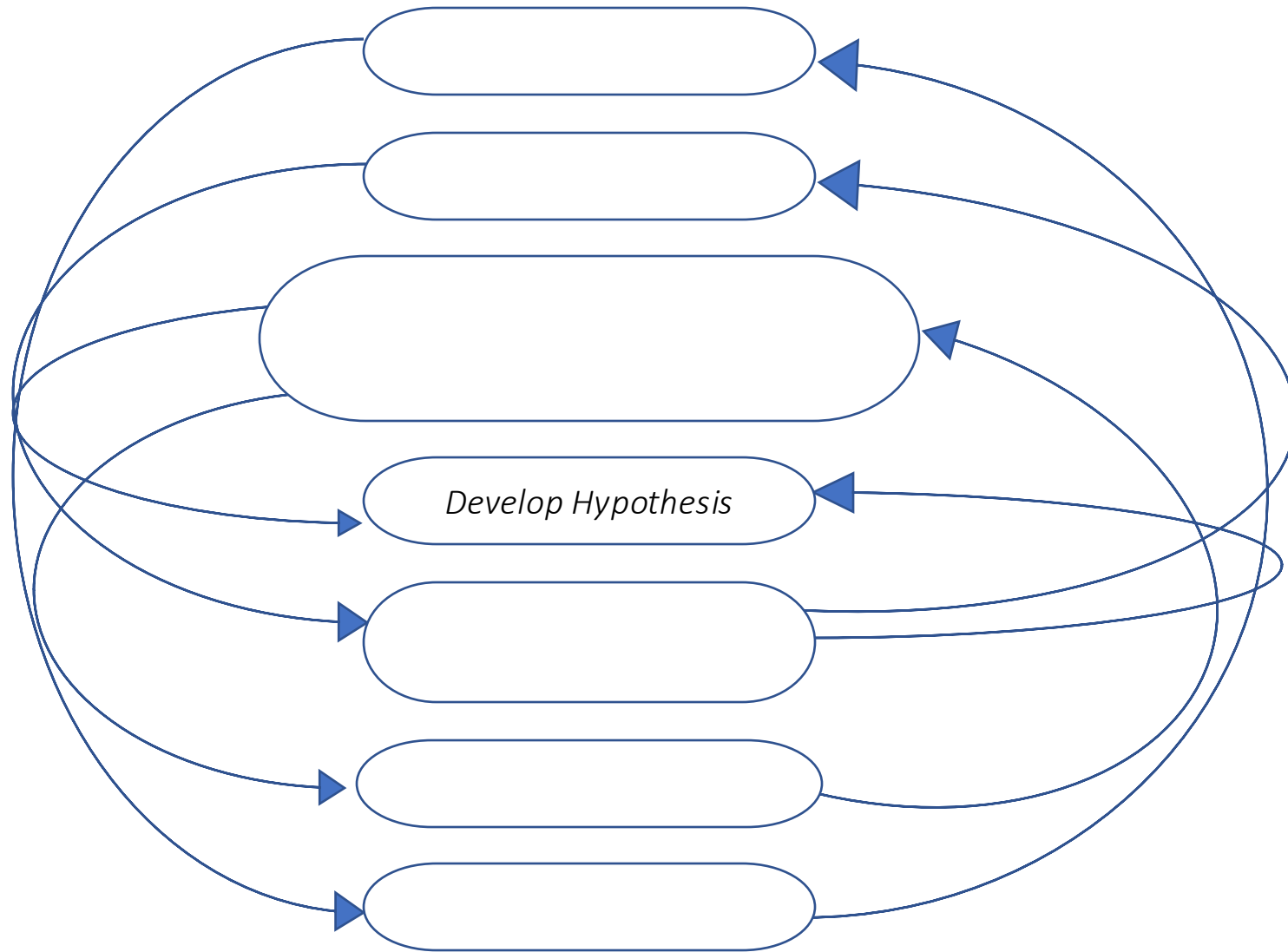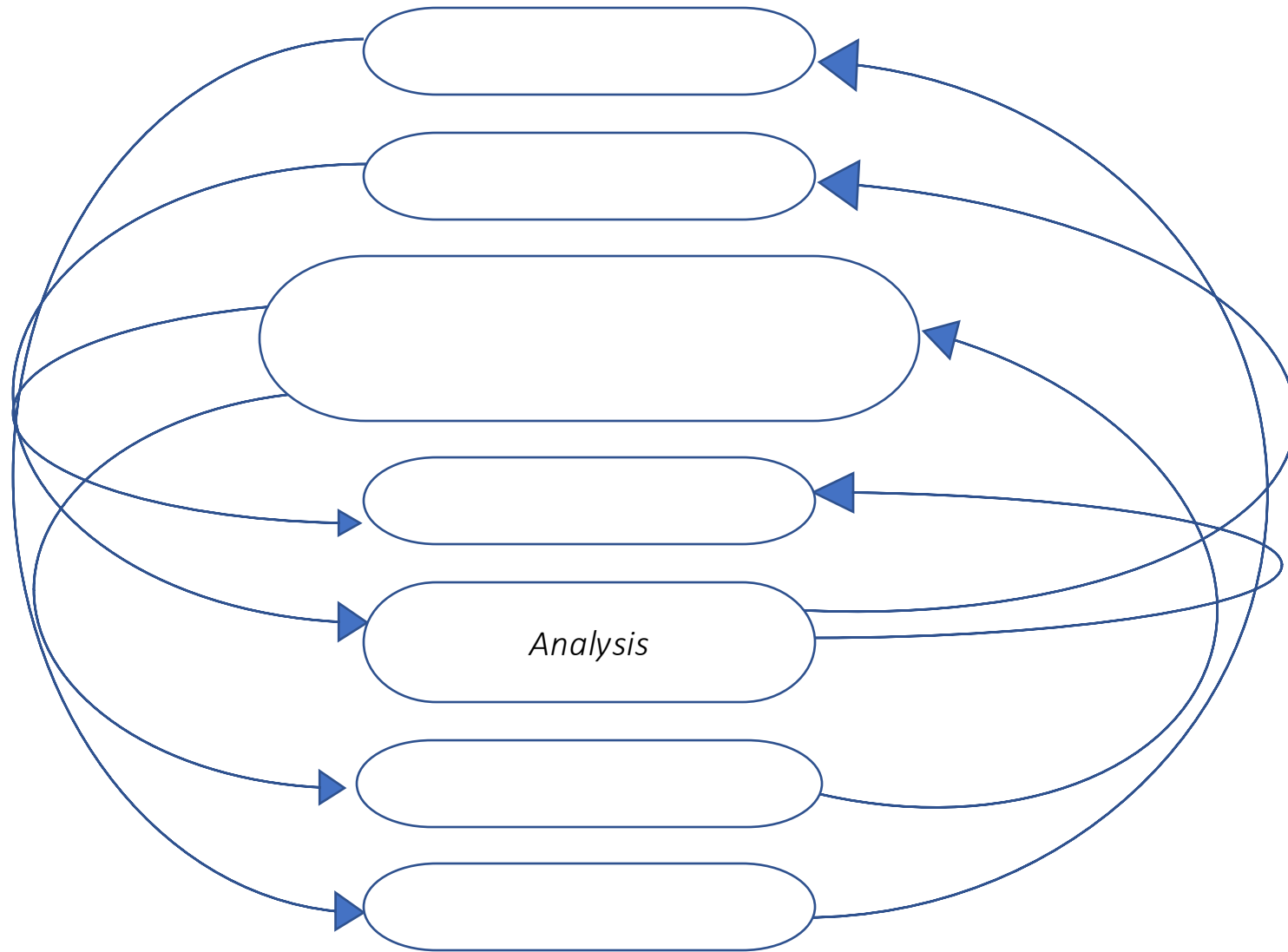
Systems Thinking Learning

Connect to Decision

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Systems Thinking Learning

Make Recommendations

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Systems Thinking Learning

- Generalize the problem
- Retrieve Data
- Data Walkthrough and Clean
- Develop Hypothesis
- Analysis
- Connect to Decision
- Make Recommendations
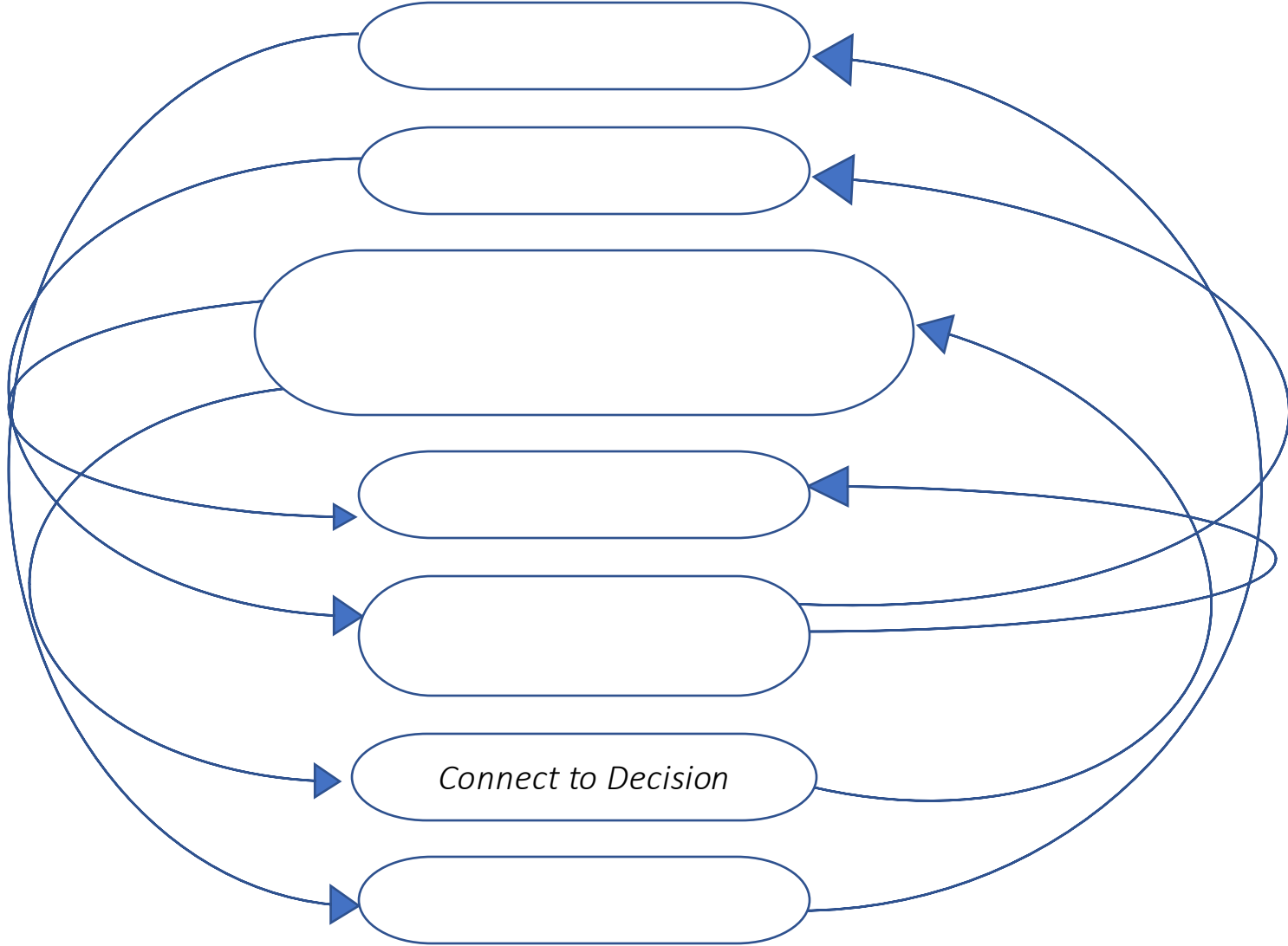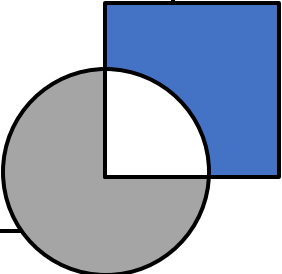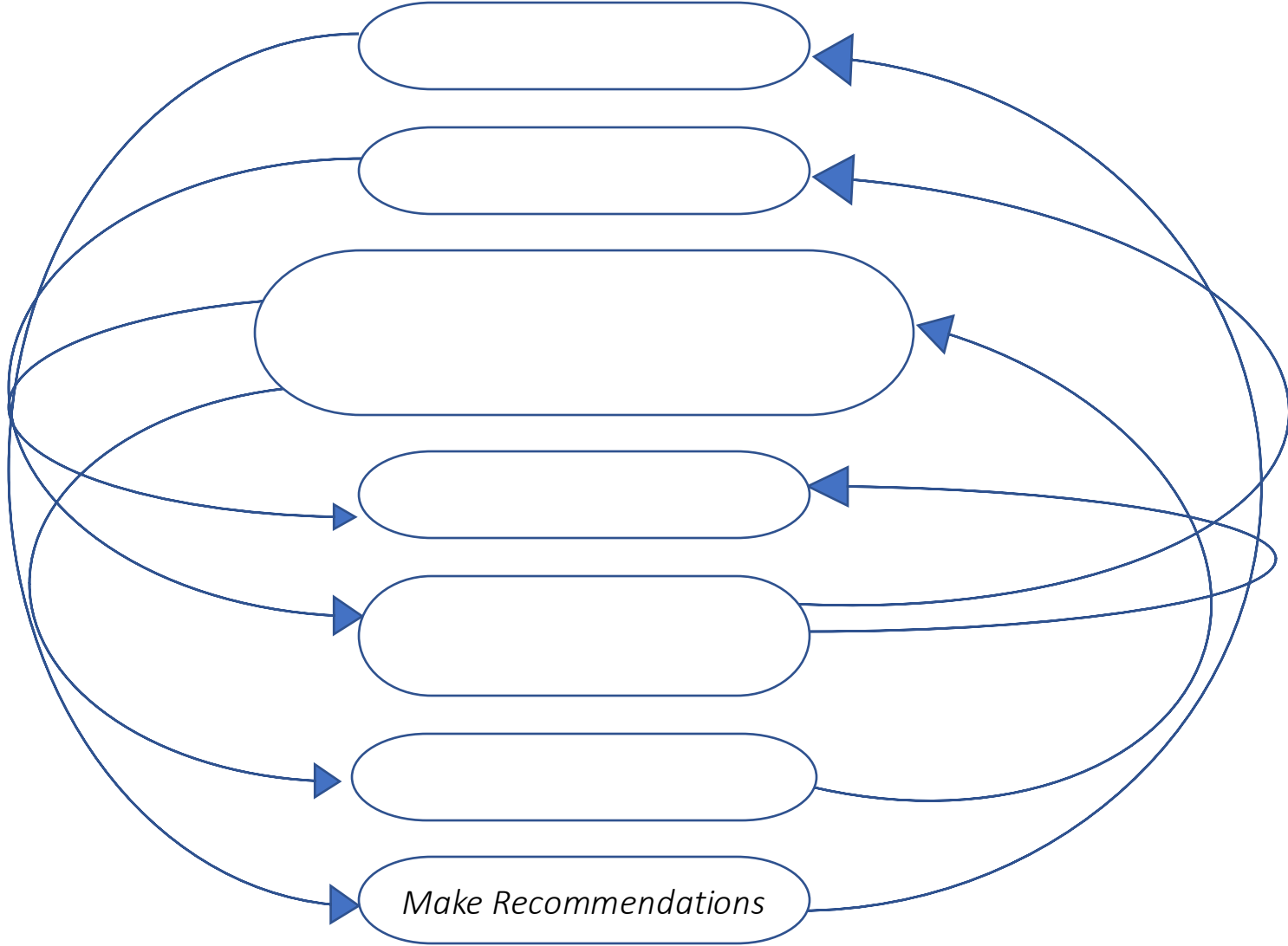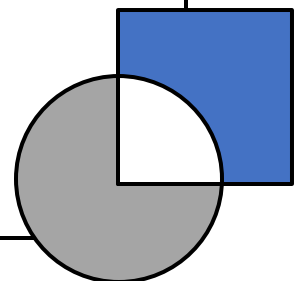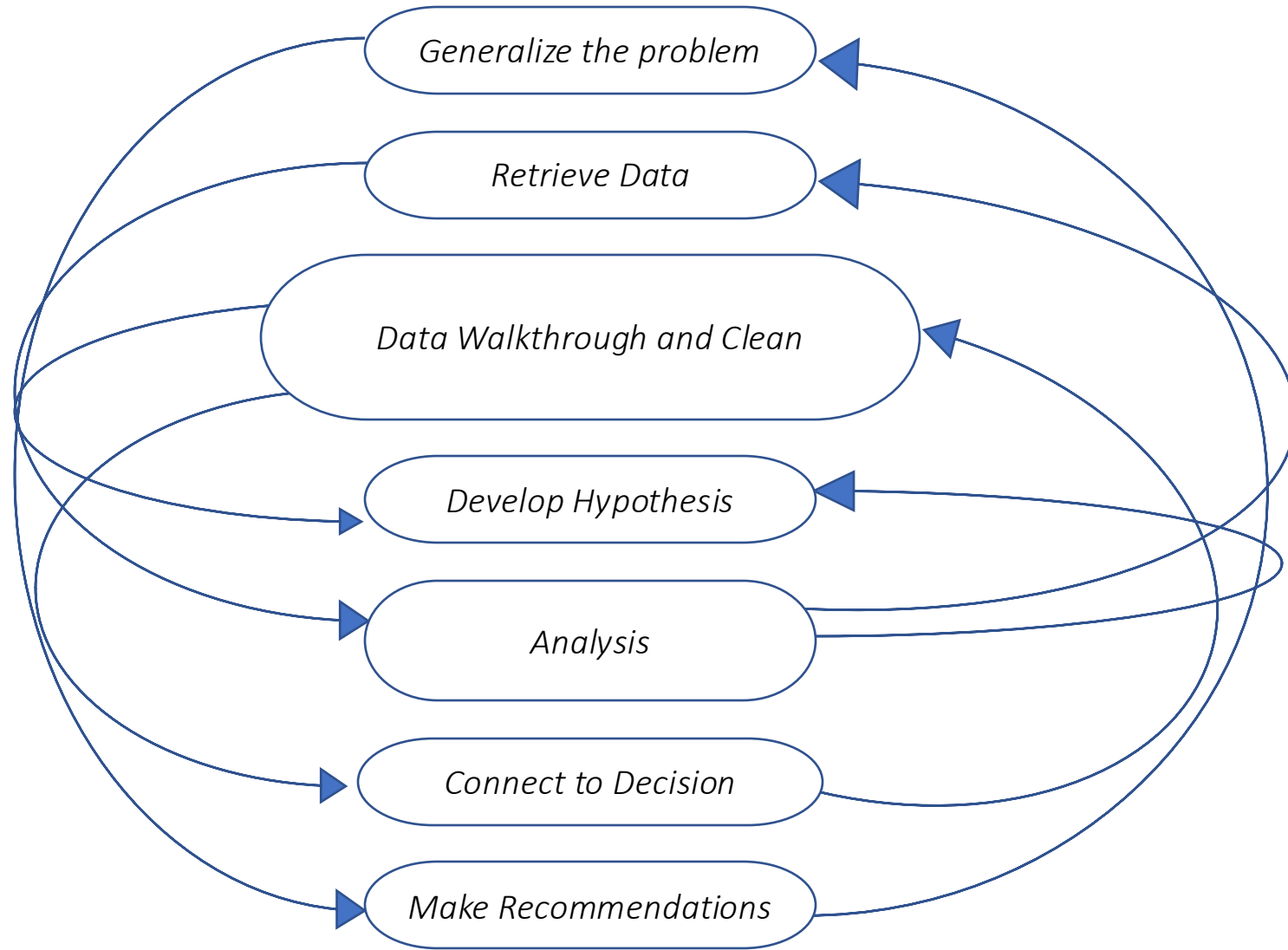
Academic Engagement	Cronbach α to equal .781. Each item was rated on a five-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neither agree or disagree, 4 = Agree, 5 = Strongly Agree)
Self-Efficacy	Cronbach α to equal .90. Each item was rated on a five-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neither agree or disagree, 4 = Agree, 5 = Strongly Agree)
Expectancy	McDonald's ω to equal .88. Each item was rated on a seven-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Somewhat Disagree, 4 = Neither agree or disagree, 5 = Somewhat Agree, 6 = Agree, 7 = Strongly Agree)
Value	McDonald's ω to equal .84. Each item was rated on a seven-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Somewhat Disagree, 4 = Neither agree or disagree, 5 = Somewhat Agree, 6 = Agree, 7 = Strongly Agree)
Cost	McDonald's ω to equal .86. Each item was rated on a seven-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Somewhat Disagree, 4 = Neither agree or disagree, 5 = Somewhat Agree, 6 = Agree, 7 = Strongly Agree)

Baseline Equivalence

	p-value
Academic Engagement	.392
Self-Efficacy	.027
Expectancy	.274
Value	.007
Cost	.161

Academic Engagement – with Race Data

Between-Subjects Factors

		Value Label	N
condition	1	control	3
	2	experimental	7
Race	1	Majority	2
	2	URM	8

Descriptive Statistics

	condition	Race	Mean	Std. Deviation	N
acadengagepre	control	Majority	3.0000	.	1
		URM	3.0000	.28284	2
		Total	3.0000	.20000	3
	experimental	Majority	1.6000	.	1
		URM	3.3917	1.26032	6
		Total	3.1357	1.33501	7
	Total	Majority	2.3000	.98995	2
		URM	3.2938	1.08576	8
		Total	3.0950	1.09607	10
acadengagepost	control	Majority	2.4000	.	1
		URM	3.4000	.28284	2
		Total	3.0667	.61101	3
	experimental	Majority	2.6000	.	1
		URM	3.9333	.58878	6
		Total	3.7429	.73679	7
	Total	Majority	2.5000	.14142	2
		URM	3.8000	.56569	8
		Total	3.5400	.74267	10

Academic Engagement – with Race Graph
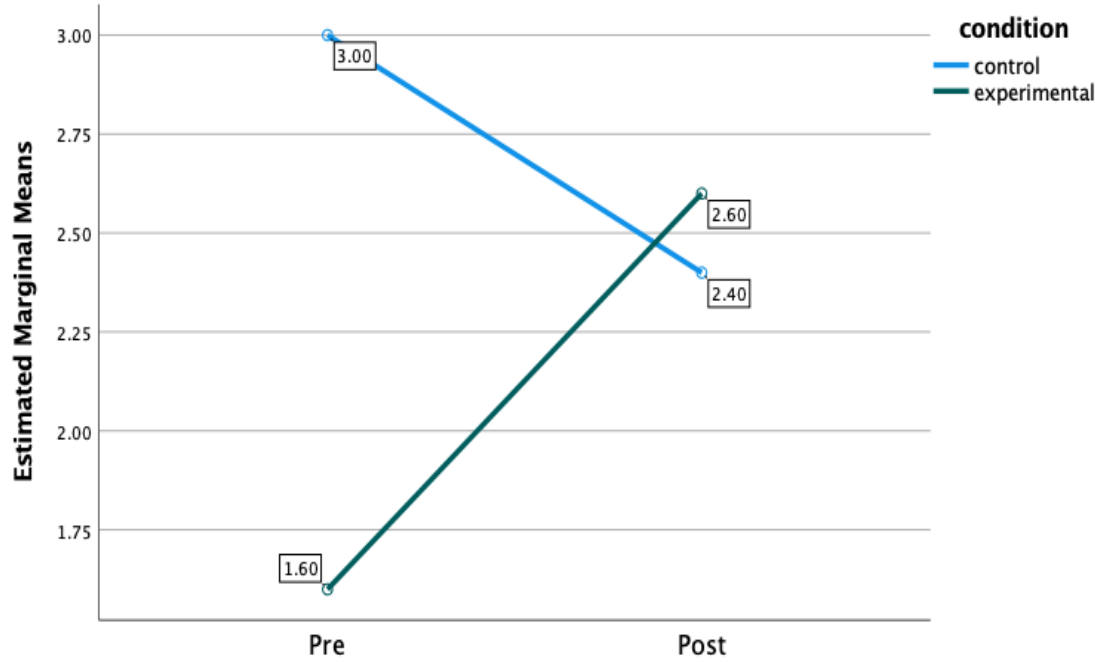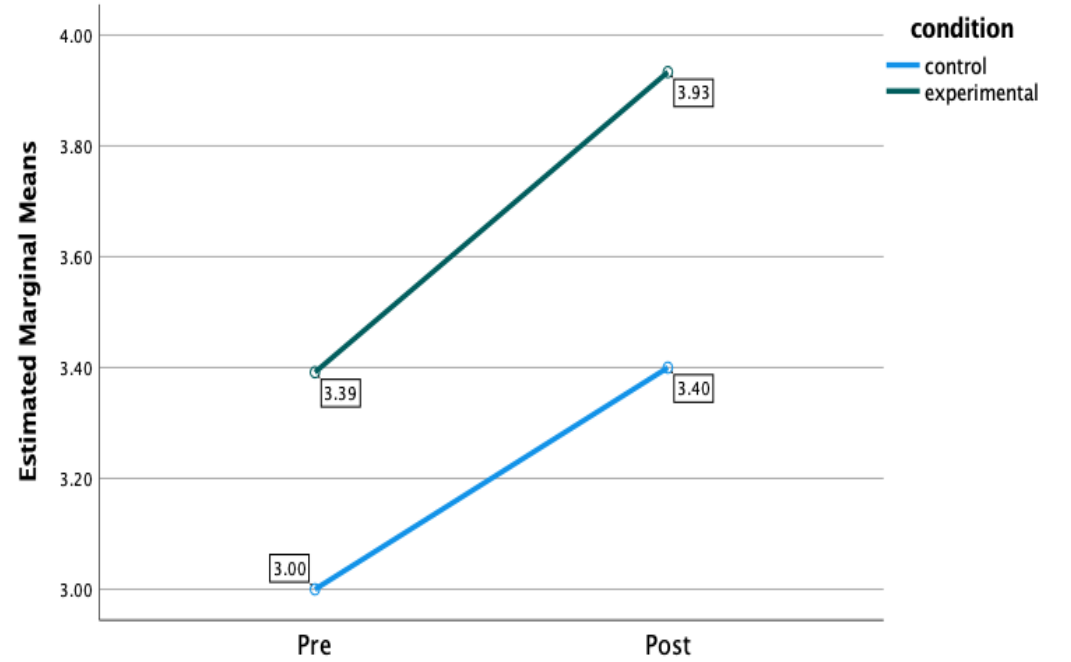
Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	factor1	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
factor1	Linear	.338	1	.338	.266	.624	.043	.266	.072
factor1 * condition	Linear	.569	1	.569	.449	.528	.070	.449	.088
factor1 * Race	Linear	.055	1	.055	.043	.842	.007	.043	.054
factor1 * condition * Race	Linear	.399	1	.399	.315	.595	.050	.315	.076
Error(factor1)	Linear	7.601	6	1.267					

a. Computed using alpha = .05

Tests of Between-Subjects Effects

Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Intercept	102.010	1	102.010	273.930	<.001	.979	273.930	1.000
condition	.014	1	.014	.038	.852	.006	.038	.053
Race	3.190	1	3.190	8.567	.026	.588	8.567	.686
condition * Race	.847	1	.847	2.274	.182	.275	2.274	.247
Error	2.234	6	.372					

a. Computed using alpha = .05

Academic Engagement – No Race Split Graph

Academic Engagement
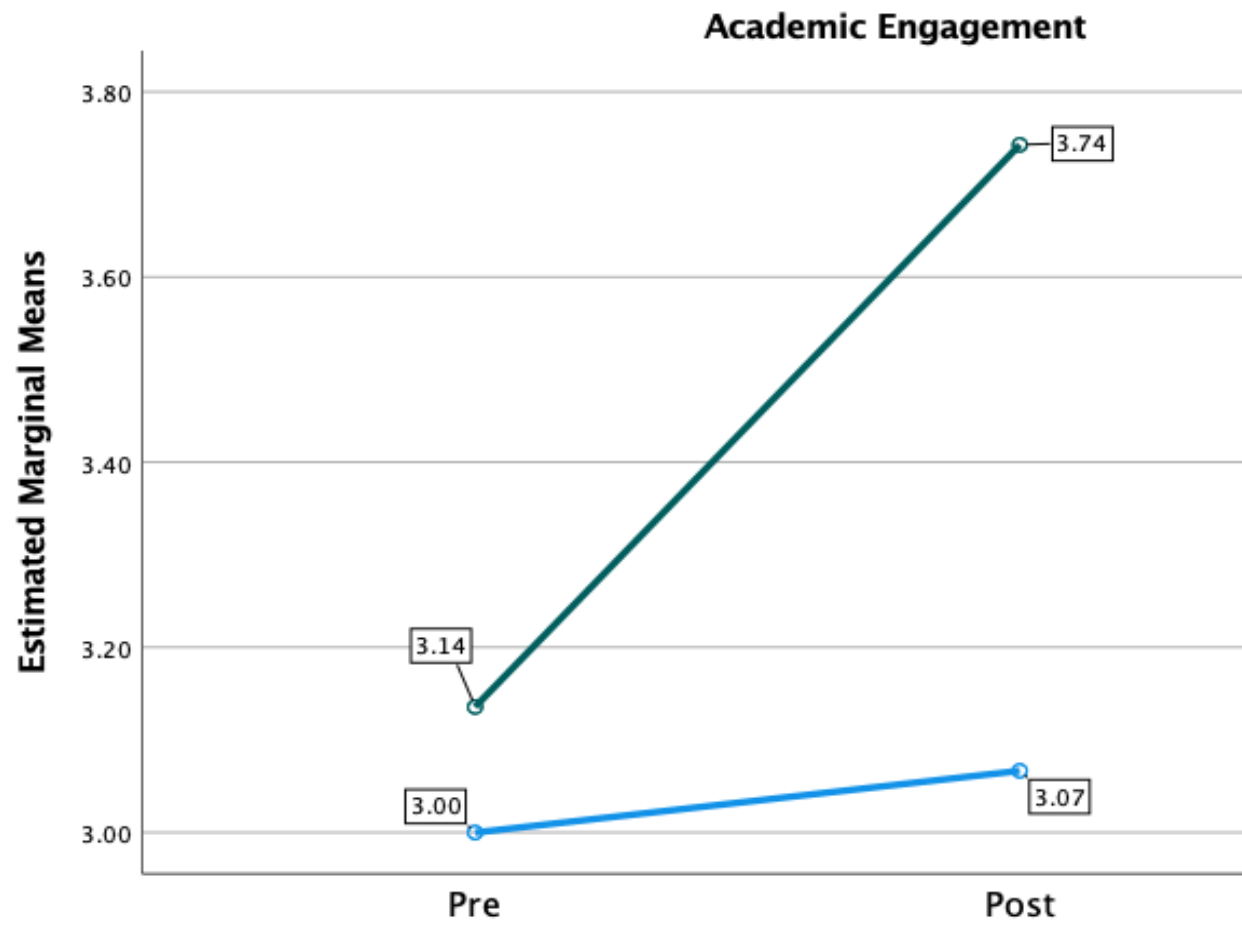
condition
- control
- experimental

Between-Subjects Factors

		Value Label	N
condition	1	control	3
	2	experimental	7

Descriptive Statistics

	condition	Mean	Std. Deviation	N
acadengagepre	control	3.0000	.20000	3
	experimental	3.1357	1.33501	7
	Total	3.0950	1.09607	10
acadengagepost	control	3.0667	.61101	3
	experimental	3.7429	.73679	7
	Total	3.5400	.74267	10

Tests of Within–Subjects Contrasts

Measure: MEASURE_1

Source	factor1	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
factor1	Linear	.477	1	.477	.475	.510	.056	.475	.094
factor1 * condition	Linear	.307	1	.307	.306	.595	.037	.306	.078
Error(factor1)	Linear	8.024	8	1.003					

a. Computed using alpha = .05

Tests of Between–Subjects Effects

Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Intercept	175.958	1	175.958	208.451	<.001	.963	208.451	1.000
condition	.692	1	.692	.820	.392	.093	.820	.126
Error	6.753	8	.844					

a. Computed using alpha = .05

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Self Efficacy – with Race Data

Between-Subjects Factors

		Value Label	N
condition	1	control	3
	2	experimental	7
Race	1	Majority	2
	2	URM	8

Descriptive Statistics

	condition	Race	Mean	Std. Deviation	N
selfeffpre	control	Majority	3.2500	.	1
		URM	3.2917	.05893	2
		Total	3.2778	.04811	3
	experimental	Majority	3.7273	.	1
		URM	4.0707	.46974	6
		Total	4.0216	.44803	7
	Total	Majority	3.4886	.33748	2
		URM	3.8759	.53680	8
		Total	3.7985	.51327	10
selfeffpost	control	Majority	3.5000	.	1
		URM	3.2083	.53033	2
		Total	3.3056	.41107	3
	experimental	Majority	3.5833	.	1
		URM	4.1427	.46566	6
		Total	4.0628	.47476	7
	Total	Majority	3.5417	.05893	2
		URM	3.9091	.61817	8
		Total	3.8356	.56710	10

Self Efficacy – with Race Graph
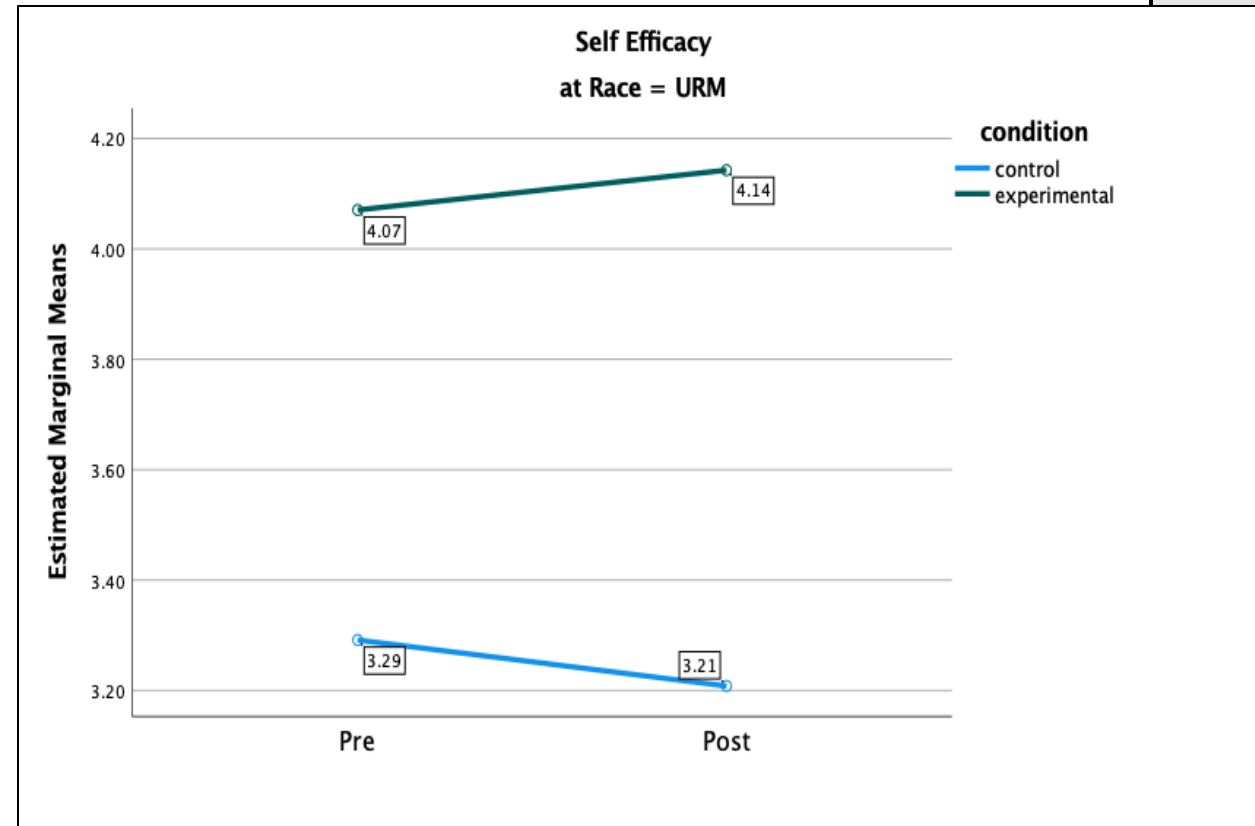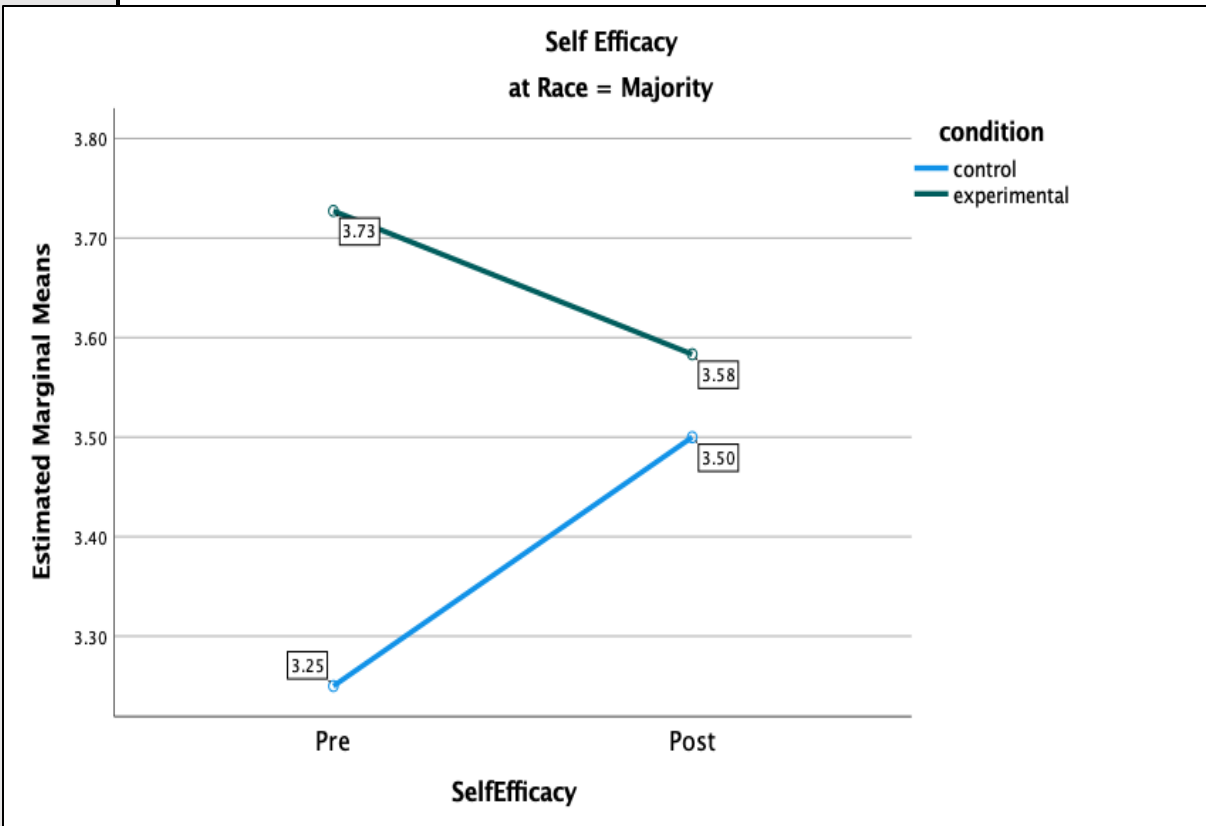
Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	factor1	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
factor1	Linear	.002	1	.002	.039	.851	.006	.039	.053
factor1 * condition	Linear	.011	1	.011	.245	.638	.039	.245	.071
factor1 * Race	Linear	.003	1	.003	.059	.816	.010	.059	.055
factor1 * condition * Race	Linear	.057	1	.057	1.297	.298	.178	1.297	.162
Error(factor1)	Linear	.262	6	.044					

a. Computed using alpha = .05

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Intercept	155.239	1	155.239	421.350	<.001	.986	421.350	1.000
condition	.970	1	.970	2.632	.156	.305	2.632	.278
Race	.080	1	.080	.217	.658	.035	.217	.068
condition * Race	.249	1	.249	.676	.442	.101	.676	.107
Error	2.211	6	.368					

a. Computed using alpha = .05

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Self Efficacy – No Race Split Graph
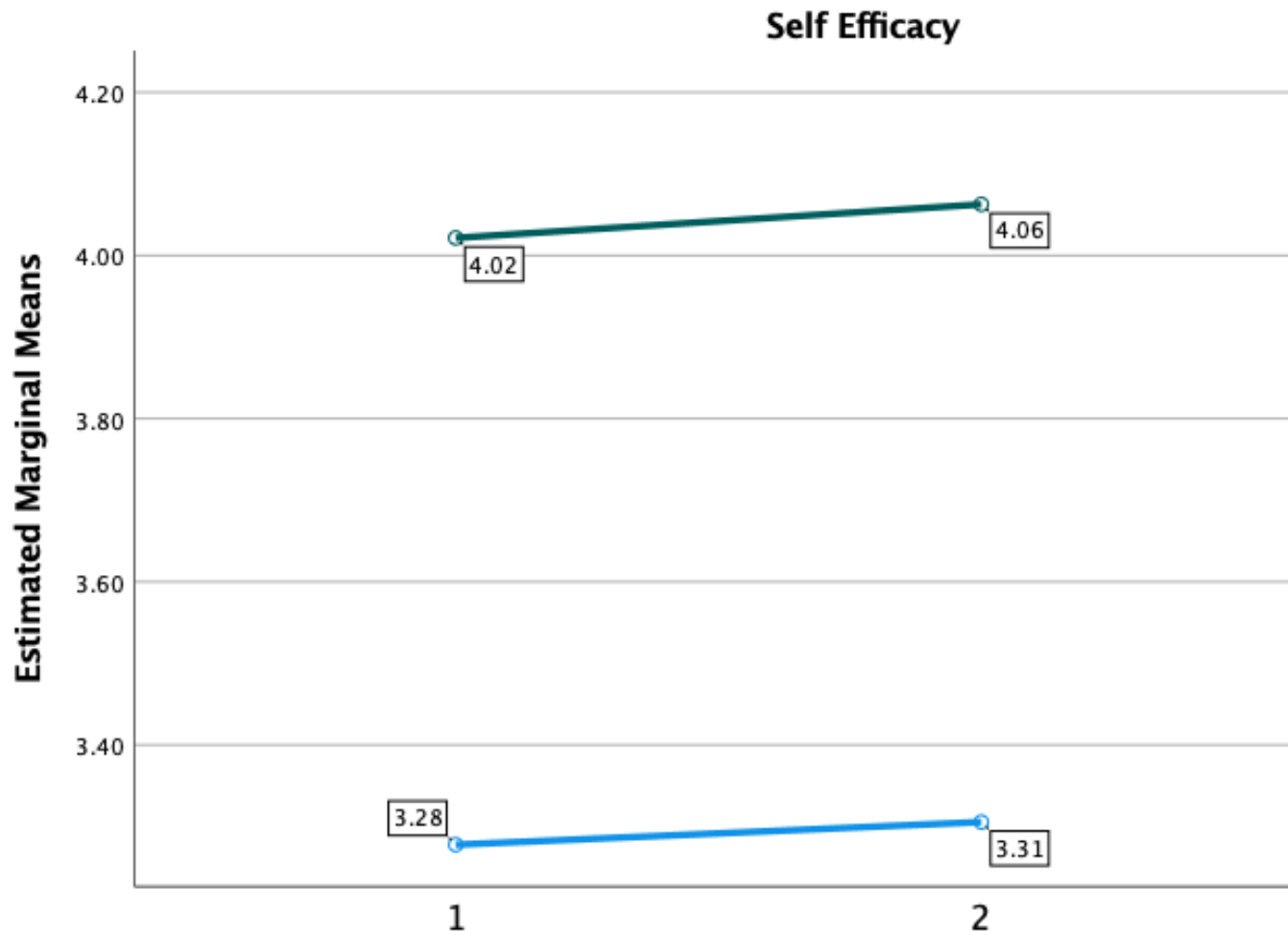
Self Efficacy

condition
— control
— experimental

4.02   4.06

3.28   3.31

Estimated Marginal Means

4.20
4.00
3.80
3.60
3.40

1   2

Between–Subjects Factors

		Value Label	N
condition	1	control	3
	2	experimental	7

Descriptive Statistics

	condition	Mean	Std. Deviation	N
selfeffpre	control	3.2778	.04811	3
	experimental	4.0216	.44803	7
	Total	3.7985	.51327	10
selfeffpost	control	3.3056	.41107	3
	experimental	4.0628	.47476	7
	Total	3.8356	.56710	10

Self Efficacy – No Race Split Data

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	factor1	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
factor1	Linear	.005	1	.005	.125	.733	.015	.125	.061
factor1 * condition	Linear	.000	1	.000	.005	.947	.001	.005	.050
Error(factor1)	Linear	.319	8	.040					

a. Computed using alpha = .05

Tests of Between-Subjects Effects

Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Intercept	225.900	1	225.900	700.270	<.001	.989	700.270	1.000
condition	2.366	1	2.366	7.334	.027	.478	7.334	.661
Error	2.581	8	.323					

a. Computed using alpha = .05

Expectancy – with Race Data

Between–Subjects Factors

		Value Label	N
condition	1	control	3
	2	experimental	5
Race	1	Majority	1
	2	URM	7

Descriptive Statistics

	condition	Race	Mean	Std. Deviation	N
expectpre	control	Majority	4.0000	.	1
		URM	5.0000	1.41421	2
		Total	4.6667	1.15470	3
	experimental	URM	5.6000	.89443	5
		Total	5.6000	.89443	5
	Total	Majority	4.0000	.	1
		URM	5.4286	.97590	7
		Total	5.2500	1.03510	8
expectpost	control	Majority	4.6667	.	1
		URM	5.5000	.70711	2
		Total	5.2222	.69389	3
	experimental	URM	5.8000	.98883	5
		Total	5.8000	.98883	5
	Total	Majority	4.6667	.	1
		URM	5.7143	.86984	7
		Total	5.5833	.88641	8

Expectancy – with Race Graph
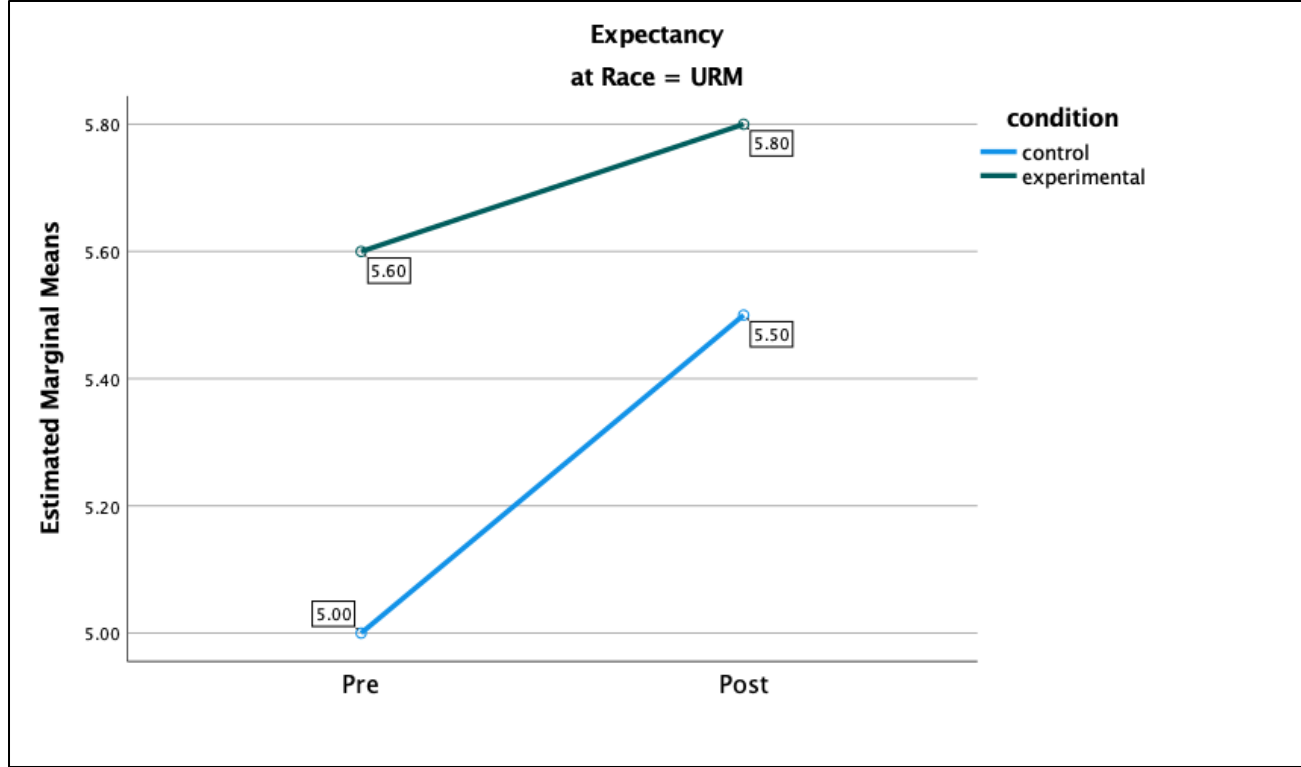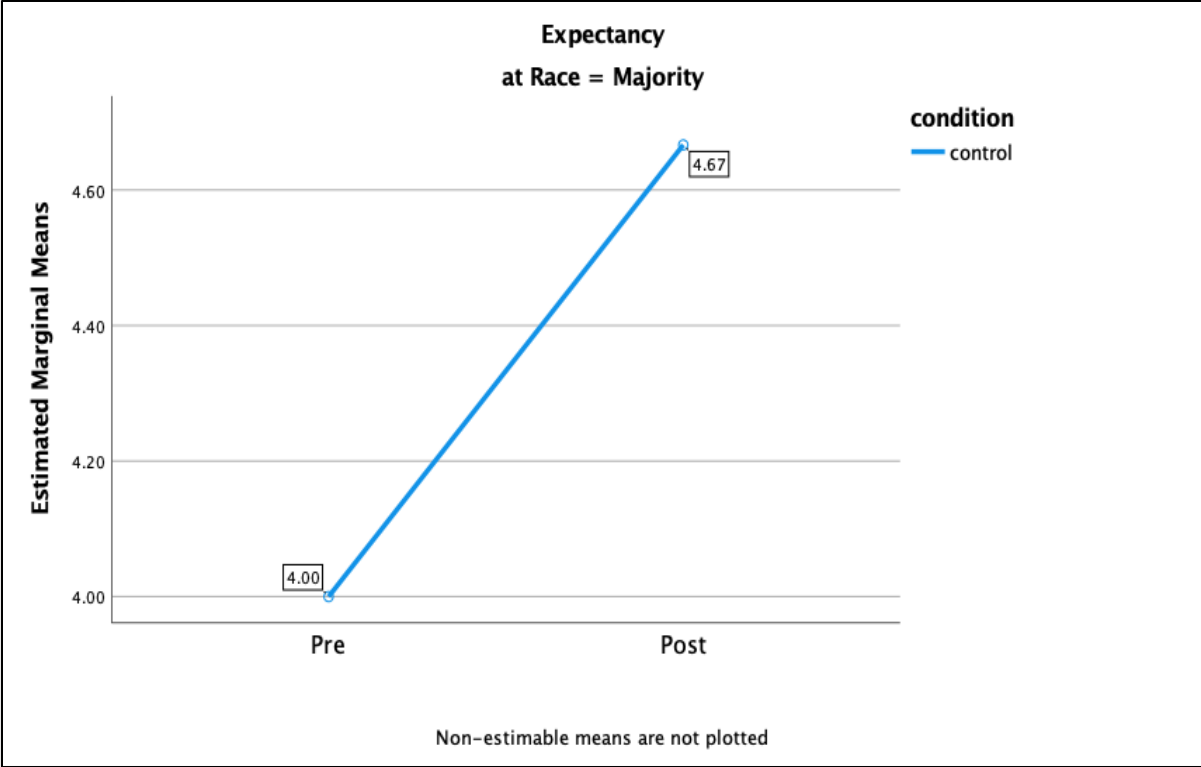
Expectancy – with Race Data

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	factor1	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
factor1	Linear	.471	1	.471	1.257	.313	.201	1.257	.151
factor1 * condition	Linear	.064	1	.064	.172	.696	.033	.172	.063
factor1 * Race	Linear	.009	1	.009	.025	.881	.005	.025	.052
factor1 * condition * Race	Linear	.000	0	.	.	.	.000	.000	.
Error(factor1)	Linear	1.872	5	.374					

a. Computed using alpha = .05

Tests of Between-Subjects Effects

Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Intercept	241.862	1	241.862	156.264	<.001	.969	156.264	1.000
condition	.579	1	.579	.374	.568	.070	.374	.079
Race	1.120	1	1.120	.724	.434	.126	.724	.108
condition * Race	.000	0	.	.	.	.000	.000	.
Error	7.739	5	1.548					

a. Computed using alpha = .05

Expectancy – No Race Split Graph

Expectancy

condition
— control
— experimental

Estimated Marginal Means

	Pre	Post
experimental	5.60	5.80
control	4.67	5.22

Between–Subjects Factors

		Value Label	N
condition	1	control	3
	2	experimental	5

Descriptive Statistics

	condition	Mean	Std. Deviation	N
expectpre	control	4.6667	1.15470	3
	experimental	5.6000	.89443	5
	Total	5.2500	1.03510	8
expectpost	control	5.2222	.69389	3
	experimental	5.8000	.98883	5
	Total	5.5833	.88641	8

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Expectancy – No Race Split Data

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	factor1	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
factor1	Linear	.535	1	.535	1.707	.239	.221	1.707	.198
factor1 * condition	Linear	.119	1	.119	.378	.561	.059	.378	.082
Error(factor1)	Linear	1.881	6	.314					

a. Computed using alpha = .05

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Intercept	424.891	1	424.891	287.760	<.001	.980	287.760	1.000
condition	2.141	1	2.141	1.450	.274	.195	1.450	.175
Error	8.859	6	1.477					

a. Computed using alpha = .05

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Value – with Race Data

Between-Subjects Factors

		Value Label	N
condition	1	control	3
	2	experimental	5
Race	1	Majority	1
	2	URM	7

Descriptive Statistics

	condition	Race	Mean	Std. Deviation	N
valuepre	control	Majority	2.6667	.	1
		URM	3.6667	.47140	2
		Total	3.3333	.66667	3
	experimental	URM	6.0667	.79582	5
		Total	6.0667	.79582	5
	Total	Majority	2.6667	.	1
		URM	5.3810	1.35303	7
		Total	5.0417	1.57800	8
valuepost	control	Majority	2.0000	.	1
		URM	4.0000	.00000	2
		Total	3.3333	1.15470	3
	experimental	URM	5.8667	1.21564	5
		Total	5.8667	1.21564	5
	Total	Majority	2.0000	.	1
		URM	5.3333	1.34715	7
		Total	4.9167	1.71594	8

Value – with Race Graph
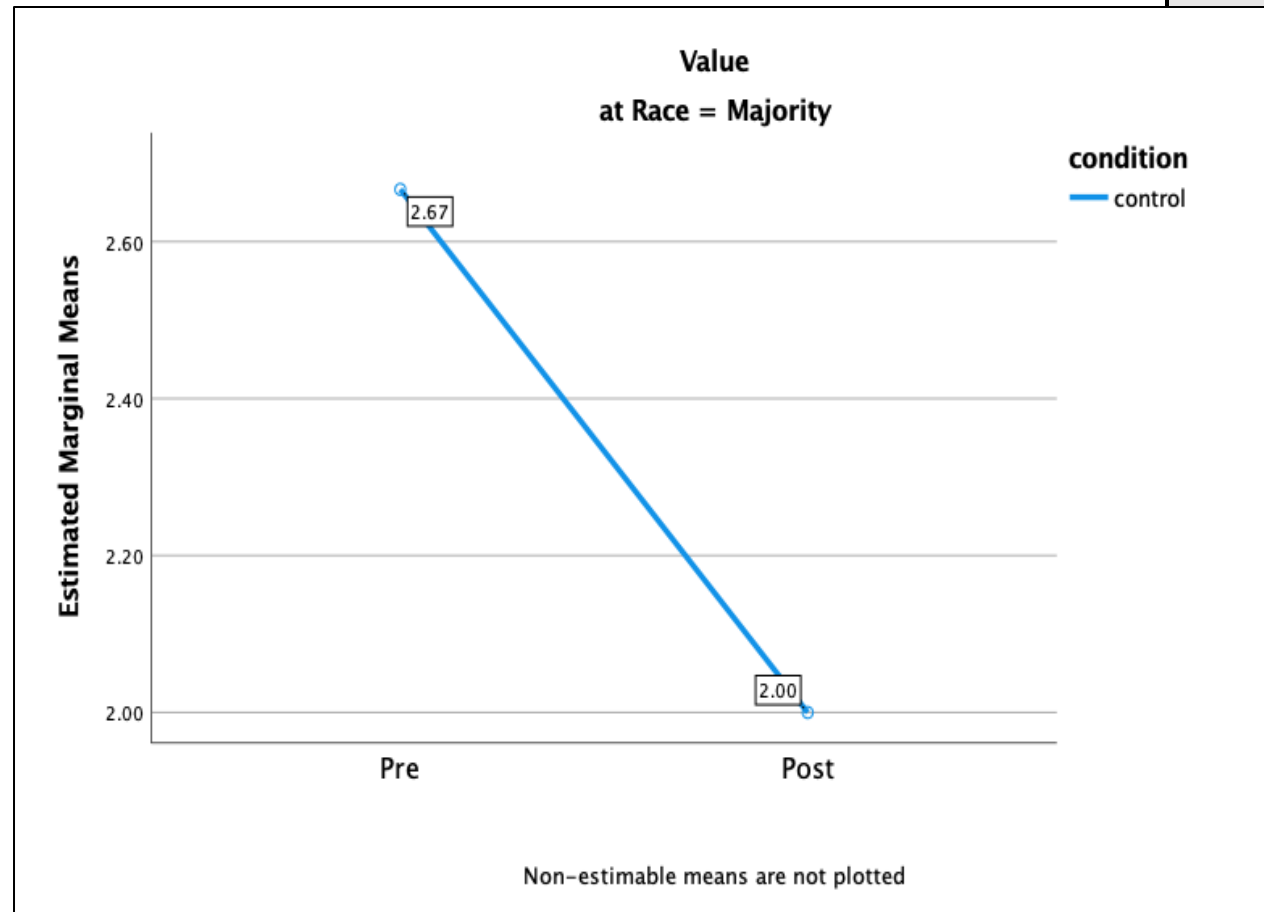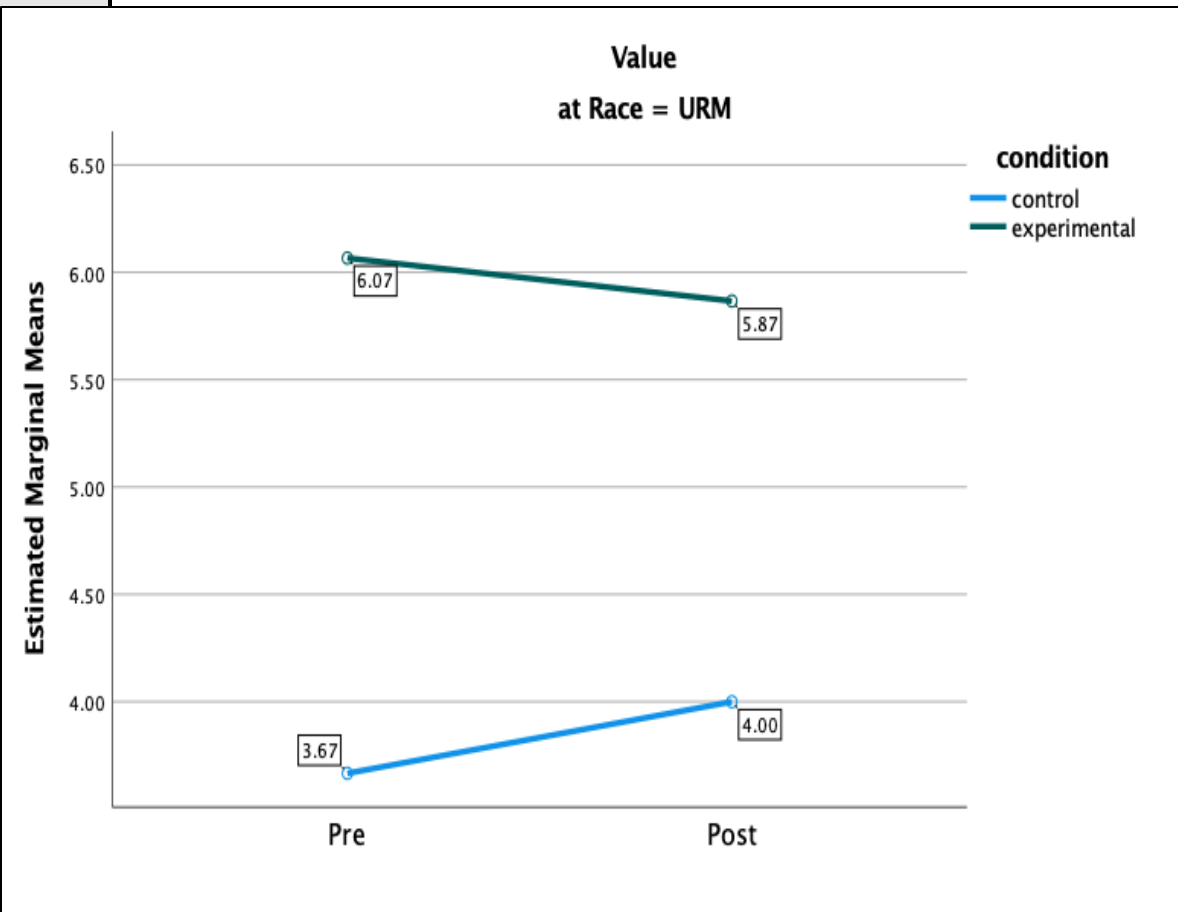
Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	factor1	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
factor1	Linear	.185	1	.185	.533	.498	.096	.533	.092
factor1 * condition	Linear	.203	1	.203	.586	.478	.105	.586	.096
factor1 * Race	Linear	.333	1	.333	.962	.372	.161	.962	.127
factor1 * condition * Race	Linear	.000	0	.	.	.	.000	.000	.
Error(factor1)	Linear	1.733	5	.347					

a. Computed using alpha = .05
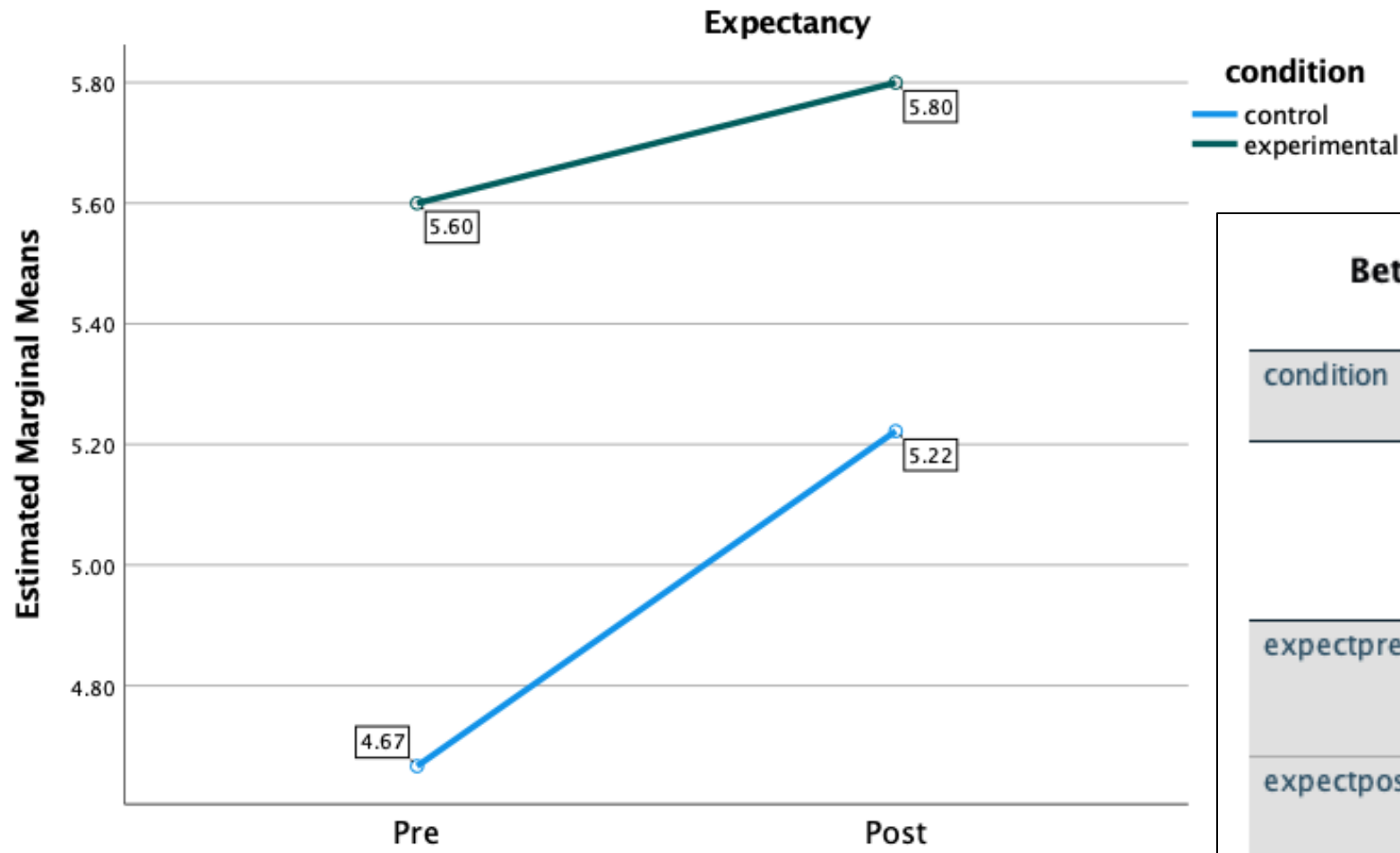
Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Intercept	157.555	1	157.555	113.621	<.001	.958	113.621	1.000
condition	13.003	1	13.003	9.377	.028	.652	9.377	.689
Race	3.000	1	3.000	2.163	.201	.302	2.163	.225
condition * Race	.000	0	.	.	.	.000	.000	.
Error	6.933	5	1.387					

a. Computed using alpha = .05

Value – No Race Split Graph
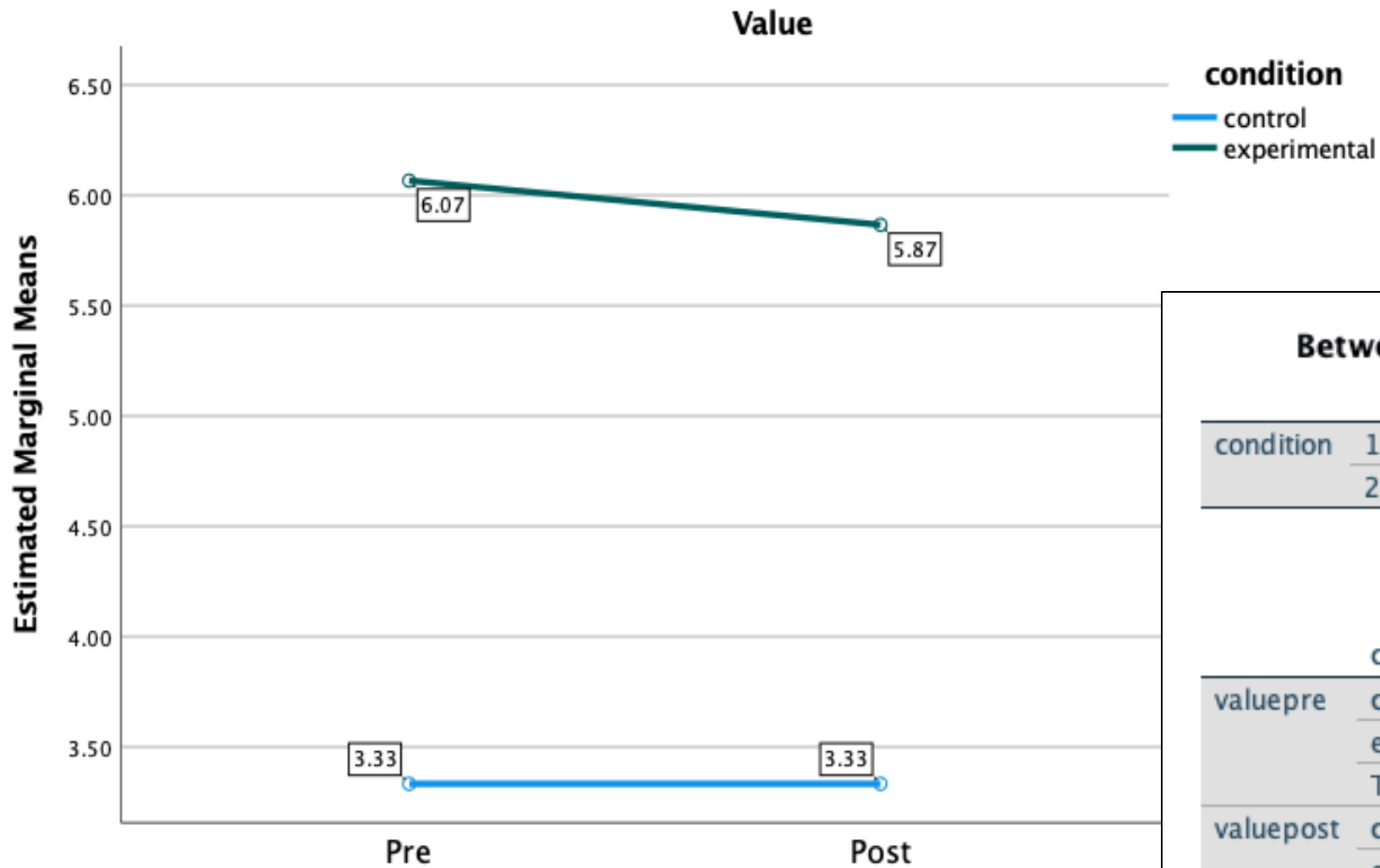
Value

Estimated Marginal Means

condition
— control
— experimental

- 6.07
- 5.87
- 3.33
- 3.33

Pre   Post

Between−Subjects Factors

		Value Label	N
condition	1	control	3
	2	experimental	5

Descriptive Statistics

	condition	Mean	Std. Deviation	N
valuepre	control	3.3333	.66667	3
	experimental	6.0667	.79582	5
	Total	5.0417	1.57800	8
valuepost	control	3.3333	1.15470	3
	experimental	5.8667	1.21564	5
	Total	4.9167	1.71594	8

Value – No Race Split Data

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	factor1	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
factor1	Linear	.037	1	.037	.109	.753	.018	.109	.059
factor1 * condition	Linear	.038	1	.038	.109	.753	.018	.109	.059
Error(factor1)	Linear	2.067	6	.344					

a. Computed using alpha = .05

Tests of Between-Subjects Effects

Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Intercept	324.338	1	324.338	195.909	<.001	.970	195.909	1.000
condition	26.004	1	26.004	15.707	.007	.724	15.707	.907
Error	9.933	6	1.656					

a. Computed using alpha = .05

Cost – with Race Data

Between-Subjects Factors

		Value Label	N
condition	1	control	3
	2	experimental	5
Race	1	Majority	1
	2	URM	7

Descriptive Statistics

	condition	Race	Mean	Std. Deviation	N
costpre	control	Majority	3.7500	.	1
		URM	4.1250	.17678	2
		Total	4.0000	.25000	3
	experimental	URM	5.3500	.80234	5
		Total	5.3500	.80234	5
	Total	Majority	3.7500	.	1
		URM	5.0000	.88976	7
		Total	4.8438	.93482	8
costpost	control	Majority	3.7500	.	1
		URM	3.6250	.53033	2
		Total	3.6667	.38188	3
	experimental	URM	4.5000	2.01556	5
		Total	4.5000	2.01556	5
	Total	Majority	3.7500	.	1
		URM	4.2500	1.71391	7
		Total	4.1875	1.59659	8

Cost – with Race Graph
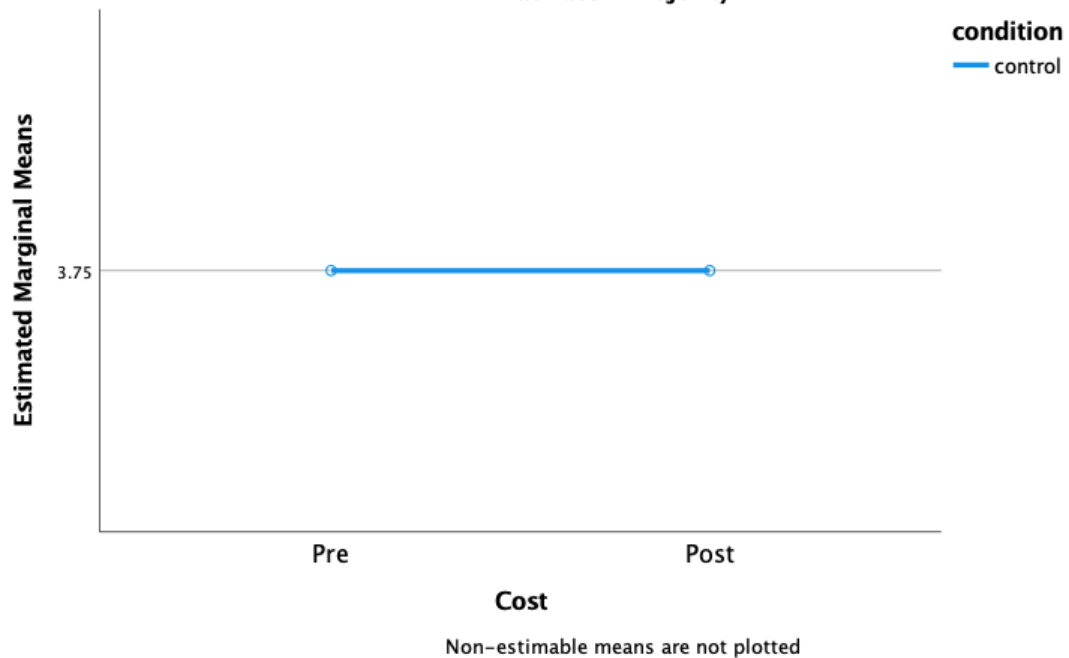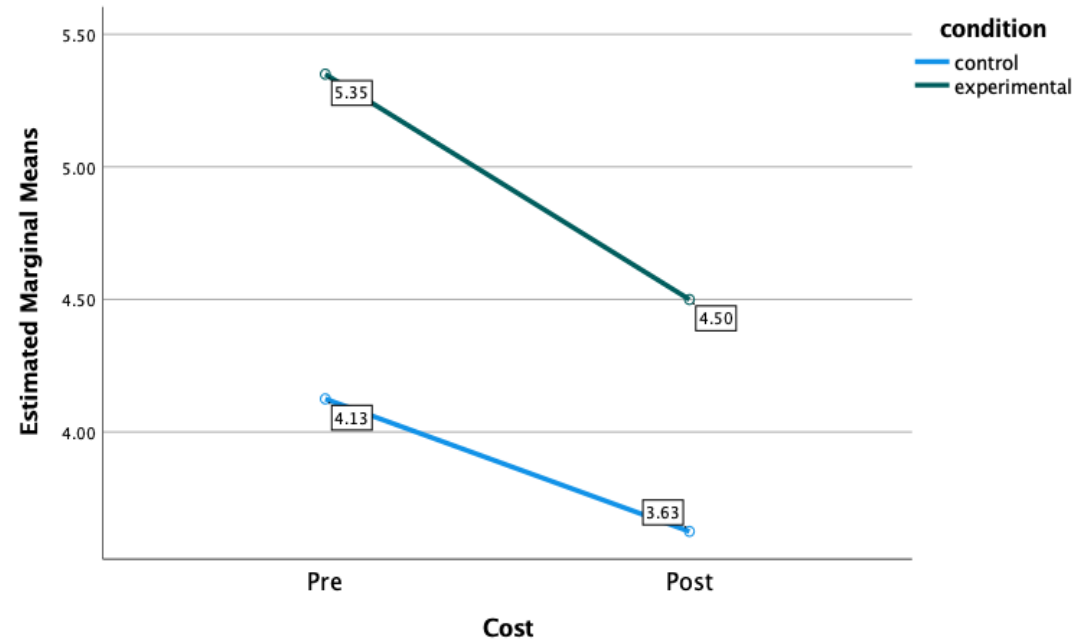
Tests of Within–Subjects Contrasts

Measure: MEASURE_1

Source	factor1	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
factor1	Linear	.457	1	.457	.264	.630	.050	.264	.071
factor1 * condition	Linear	.088	1	.088	.051	.831	.010	.051	.054
factor1 * Race	Linear	.083	1	.083	.048	.835	.010	.048	.054
factor1 * condition * Race	Linear	.000	0	.	.	.	.000	.000	.
Error(factor1)	Linear	8.662	5	1.732					

a. Computed using alpha = .05

Tests of Between–Subjects Effects

Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Intercept	170.000	1	170.000	81.146	<.001	.942	81.146	1.000
condition	3.150	1	3.150	1.504	.275	.231	1.504	.171
Race	.021	1	.021	.010	.924	.002	.010	.051
condition * Race	.000	0	.	.	.	.000	.000	.
Error	10.475	5	2.095					

a. Computed using alpha = .05

Cost – No Race Split Graph
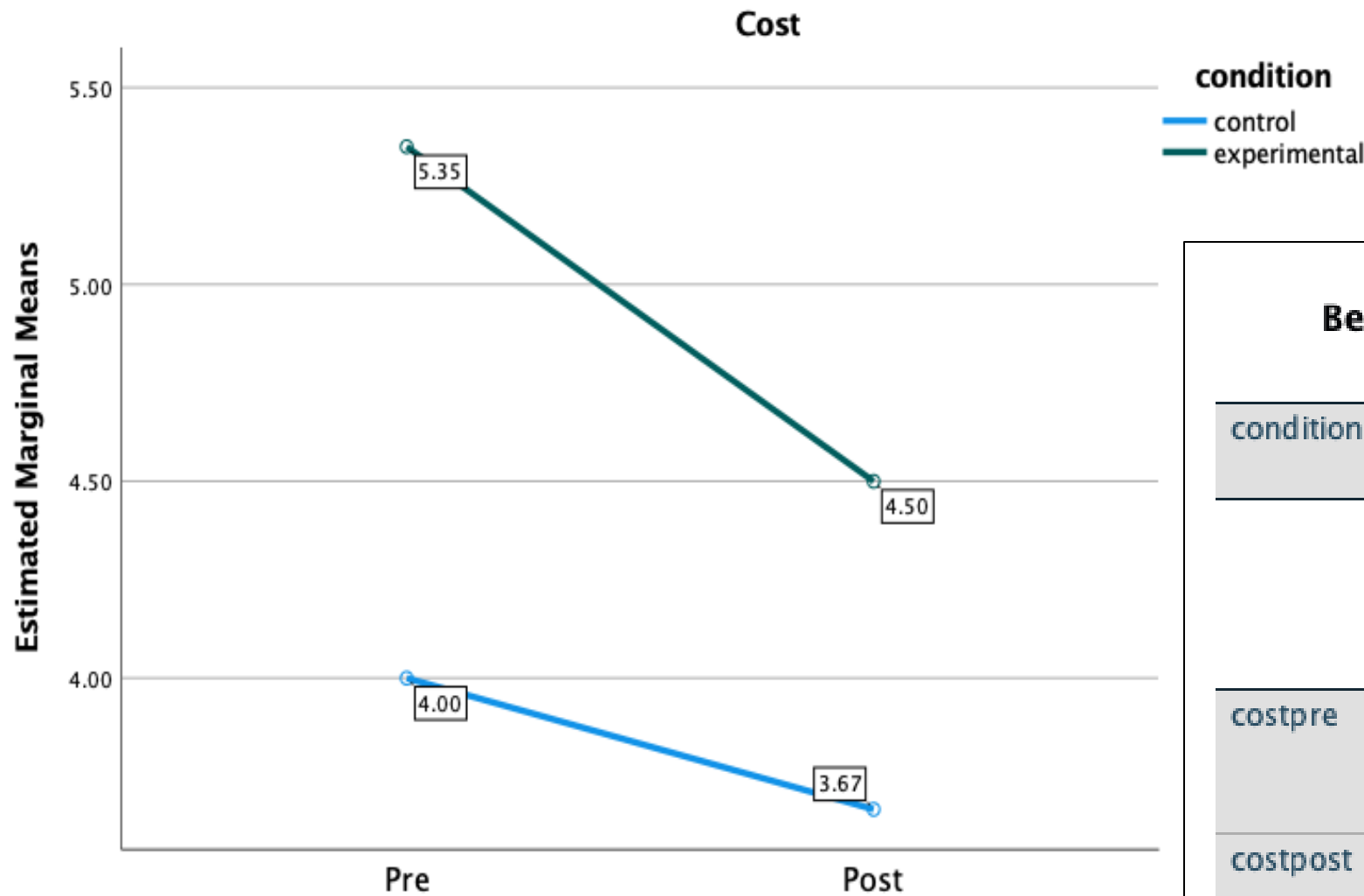
Cost

Between–Subjects Factors

		Value Label	N
condition	1	control	3
	2	experimental	5

Descriptive Statistics

	condition	Mean	Std. Deviation	N
costpre	control	4.0000	.25000	3
	experimental	5.3500	.80234	5
	Total	4.8438	.93482	8
costpost	control	3.6667	.38188	3
	experimental	4.5000	2.01556	5
	Total	4.1875	1.59659	8

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Cost – No Race Split Data

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	factor1	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
factor1	Linear	1.313	1	1.313	.901	.379	.131	.901	.127
factor1 * condition	Linear	.250	1	.250	.172	.693	.028	.172	.064
Error(factor1)	Linear	8.746	6	1.458					

a. Computed using alpha = .05

Tests of Between-Subjects Effects

Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Intercept	287.657	1	287.657	164.440	<.001	.965	164.440	1.000
condition	4.469	1	4.469	2.555	.161	.299	2.555	.271
Error	10.496	6	1.749					

a. Computed using alpha = .05

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