

# **Immune Defense's Impact on Students' Vocabulary Knowledge in Diverse Biology Classrooms**

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# ***Science Scores***

***Personal***

***State EOC: ME 58% 3 and Above  
313 Student***

***Florida: Spring 2018 Retakes 21% 3 and Above***

***Florida: ALL 65% 3 and Above***

**National Assessment of Educational Progress (NAEP)**

**12<sup>th</sup> grade mean science scores**

***Proficient and Above***

**2009= 21%**

**2015= 22%**



# Literature Review

**Students at-risk and with disabilities lack the ability to “keep up” in Biology courses because of the rigorous language**

**Yager, 1983; Wandersee, 1985; Groves, 1995, Taraban, Box, Myers, Pollard, & Bowen, 2007**

**The primary source of knowledge dissemination in science classrooms is the text book, as much as 85% of all districts employ text-based curriculums**

**Cawley, Foley & Miller, 2003; Brownell & Thomas, 1998**

**When observing 54 inclusive science lessons, researchers found 72% of the lessons were language-based where students were expected to do some sort of reading and writing as the primary demonstration of science knowledge**

**Moin, Magiera, and Zigmond, 2009**



# Literature Review

**Gaming in education presents an opportunity for students who are traditional unsuccessful to engage and feel success in our classrooms**

**Dede, 2004**

**Students who played *Immune Attack* reported higher self-confidence and had higher test scores on an Immunology assessment than their comparison group**

**Stegman, 2014**



# Not Enough Time!



**Teachers are unsatisfied with the volume of time allotted to planning for the delivery of curriculum in secondary settings.**





# Purpose

Based upon the need for **foundational vocabulary development in Biology** for students who struggle, the purpose of this research study is to examine the **effect of a technology-based intervention** on students' ability to gain **Biology content specific, Immunology, word knowledge.**





# Research Design

The research methodology that will be used for this study will be a **quasi-experimental design with analysis of variance of gain scores** for both word learning and Biology course grades

**Cook & Campbell, 1979**





# Research Questions

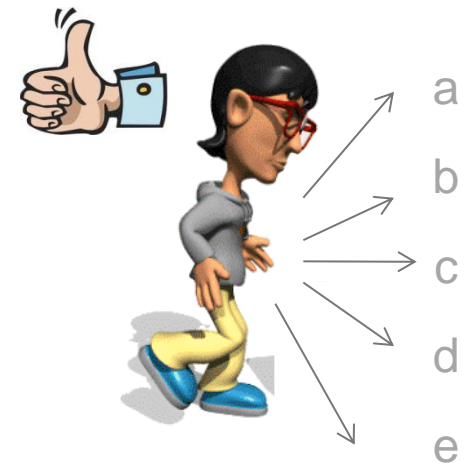
- (1) Is there a difference in vocabulary assessment scores between students learning content Biology 1 terms using Immune Defense (gaming) versus students who do not play Immune Defense?
- (2) Is there a difference in Biology 1 course grades between students learning content biology terms after using Immune Defense gaming versus students who do not play Immune Defense?





# Participant Criteria

- (a) be identified as having had science failure, school failure, and/or a language need,**
- (b) be assigned to 10<sup>th</sup> grade**
- (c) have completed parental consent forms to participate in the research study**





# Variables



**DV-**

- 1) pretest/posttest exam (CBA)**
- 2) Biology Course grades, terms 1-2**

**IV-**

**Immune Defense, open source educational game**

by Molecular Jig Games, LLC.






# ***Through Technology Mediated Teaching***

Molecular Jig Games

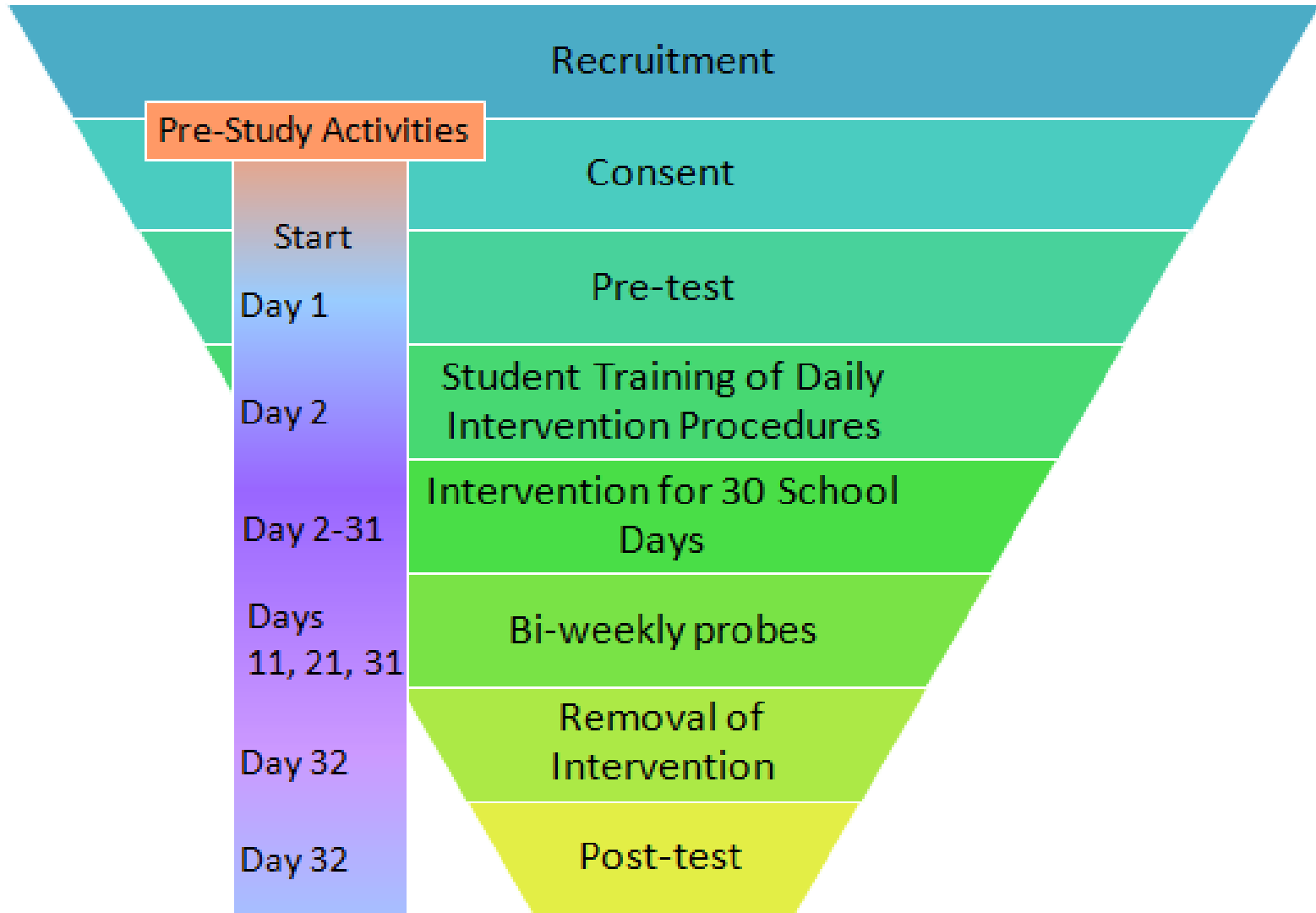


# Procedures

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1. Obtain consent, randomly assign conditions control or experimental, assign non-name ID.
  2. Day one all students will take a pre-test.
  3. Day two each group will receive training.
  4. Using the Training Protocol, Students will be instructed in all of the intervention procedures including:
    - (a) data/time tracking protocol,
    - (b) timer protocol,
    - (c) engagement protocol,
    - (d) self-reflection, and
    - (e) data storage protocol.



# Study Timeline





# Reliability

Suen (1988) defined reliability of research data in two ways

- (a) as the “general trustworthiness of obtained data” and
- (b) the “mathematical relationship between an observed test score and the test-taker's “true” score on that test”



# Analysis



**Analysis of variance of gains scores will be analyzed for both pre-test/post-test and Biology course grades.**

**Post-hoc analysis of data will be conducted to ensure statistical reliability of reported outcome measures.**



# Limitations

**Generalizability-**

**Mortality risk-**

**Technology as a novelty-**





I know it's difficult not being able to see each other as often as you'd both like. I've been trying to get through it by realizing all those great times we do have when we finally manage to be in the same place at the same time. I was just telling Andrew this week I've made up here - actually, he forgets a little but after your older brother, only he's much taller and with darker hair. And his hair isn't as curly. So I guess that means he doesn't really look like your brother at all. Anyway, I was telling him about the time you and I tried that car on holiday in Paris and thought it'd be a good idea to try and drive out to the countryside for a weekend of course that was more of the largest and most confusing roads in the world and I was driving around before the Old de Triangle is ten times of those - a leader - but I was driving around in a straight direction that neither of us could read? Still one of the proudest moments of my life. Maybe it was all a big mistake but I reckon we'll still be driving around asking for directions for a long time. I don't know what made me think of that. I was what I've been thinking about here. Remember how we drove along the way while we were there. I don't know what happened to you? Yeah, I know what you were probably thinking. With us, the car came out of the top after a long drive among jaggedly through. Can you make a map to the happy place? These - these were never want to talk about for a big family reception that he had about the end of the year - it's actually planned my son's wedding - I was with three of the brides and he couldn't even see that not just the joy was great. I'd promise back through water out the plastic cups.

So in your last house I saw a photo that the way you and I had changed what kind of thinking for the next thing you thought about we take some memories down the road. We can't come down on the ground with the rest of us looking down and I can get the chance to write off now. I know you had all kind of fun and I was trying to offer you a personally reassuring that only one here was a experience here that on that way - all that and we'll. I told it to you for that. But the more having to live with an experience that he found as soon as we were told about the holiday.



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**Questions?**