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) 12th grade mean science scores *Proficient* and Above 2009= 21% 2015= 22%



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



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 <u>Immune Attack</u> reported higher self-confidence and had higher test scores on an Immunology assessment than their comparison group

Stegman, 2014





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 used for this study will be a quasiexperimental 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 <u>vocabulary assessment</u> <u>scores</u> 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 <u>Biology 1 course grades</u> 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 10th grade
- (c) have completed parental consent forms to participate in the research study





Variables



DV-

pretest/posttest exam (CBA)
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



- 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.





Generalizability-

Mortality risk-

Technology as a novelty-

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Questions?

