

The Effects of a Web-Based Application on the Cognitive Processing of Students

Part of a Three Year Study on the Implications of Adding Technology
into the Traditional Classroom Environment

Caitlyn Ralph

WHY?

- The twenty-first century's change in learning
 - Online testing (FCAT, EOC)
 - Online classes (FLVS, SCVS)
- Need to test and analyze these alterations effect on learning

Florida Virtual School : Virtual School Administrator

Student Records Dashboard Messages Request

Student Dashboard

Upcoming Events and Announcements

From school holidays to student events,
find it all on the **FLVS School Calendar!**

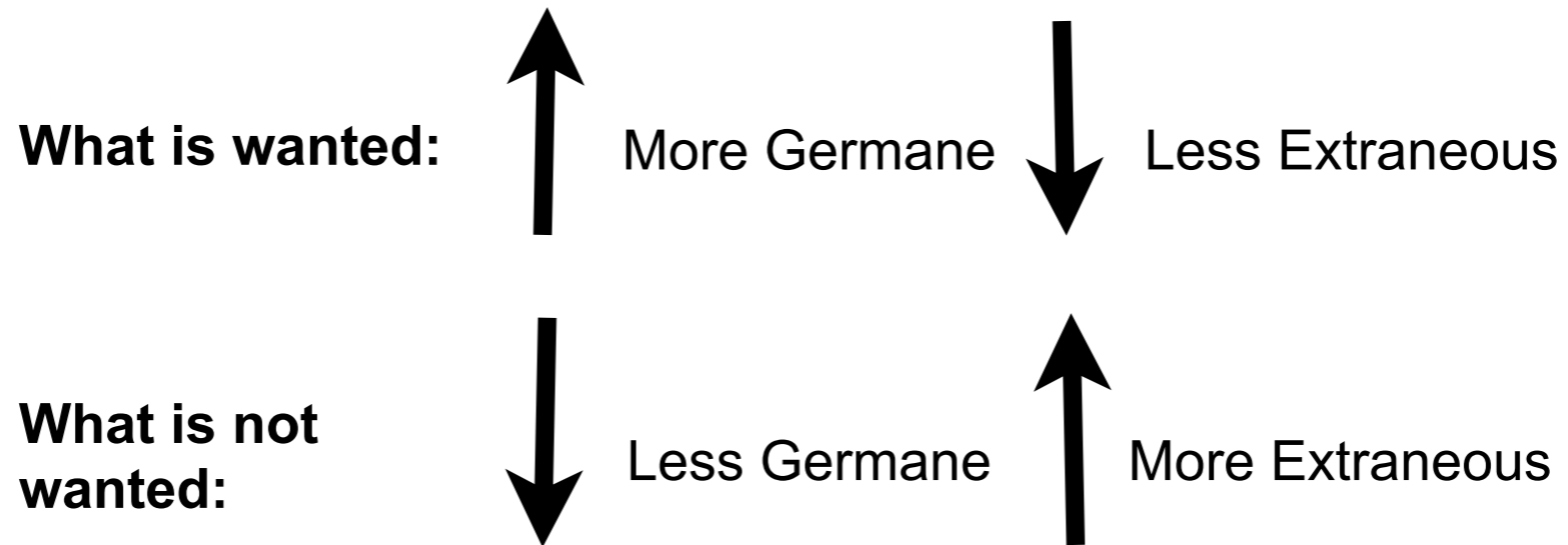
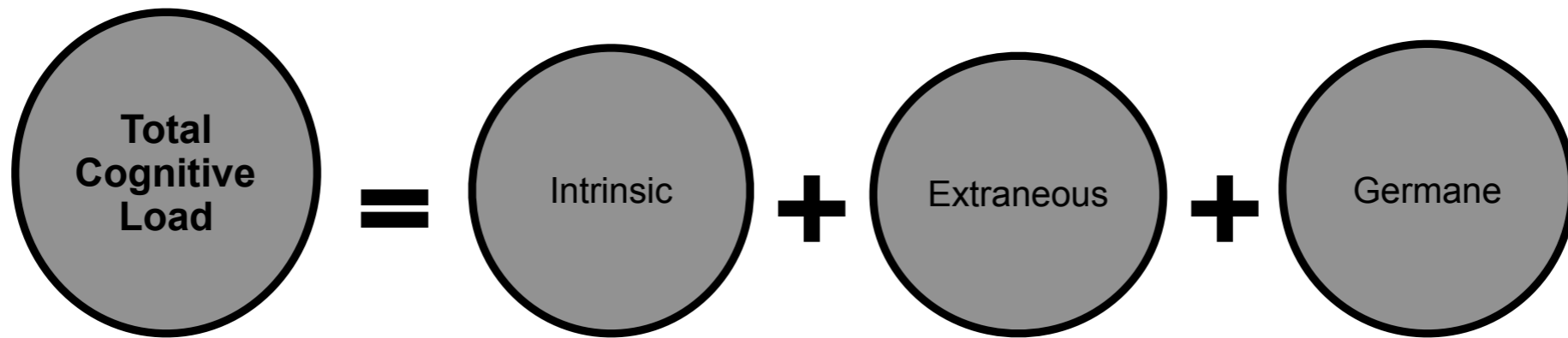
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New Messages

Date	New Messages
02/08/2013	School Counseling Week - Final message
02/07/2013	Survey: What new FLVS courses would you ...
02/07/2013	School Counseling Week - day 4
02/05/2013	School Counseling Week - Day 2
02/04/2013	National School Counseling Week - Day 1
01/11/2013	New Download Link for FREE App Opp!
01/10/2013	FLVS Celebrates Literacy in BIG Way... Pl...

Previous Years' Studies

- 9th grade: Face-to-face (traditional) vs. webcam (technological) tutoring
- 10th grade: Face-to-face vs. webcam immediacy (group working interactions)
- Elementary/middle school students
- Traditional environment more efficient



Cognitive Diagrams

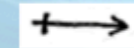
How?

- Paper-based comic activity (traditional method)
 - Redesigned with four parts
- Web-based application (technological method)
- Information is identical (intrinsic cognitive load)
- 130 students (32 traditional/98 technological)

Designed and Produced by:
Caitlyn Ralph
Coded by:
Murphy Walden

Character/Object Page

Click the picture of each character/object to find out what it scientifically represents.



****Click the blue stars in the following pages to receive tips and information that are helpful to completing the comic.****

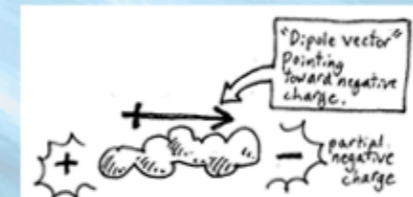


Web-Based Application

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The BARE ESSENTIALS of POLARITY

You don't have to go to the ends of the earth to find POLAR MOLECULES. They're all over the place. A polar molecule is just a molecule with a difference in electrical charge between two ends.



Questions

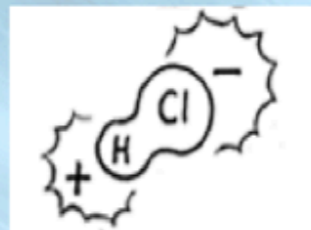
1. How does the comic book define a "polar molecule"?



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The electrical imbalance of polarity is caused by differences in **ELECTRONEGATIVITY** between atoms. Electronegativity is the ability of an atom/nucleus to attract bonding electrons toward itself.



In HCl, the bonded pair of electrons spends more time near the chlorine's nucleus because chlorine is more electronegative than hydrogen.

The periodic table shows a general trend in the electronegativity of the elements. Electronegativity tends to rise as you move "northeast" on the periodic table, and fall as you move "southwest."



Web-Based Application

ed by:

Vocabulary

Partial Negative Charge= The atom with more electronegativity and more electrons.

Partial Positive Charge= The atom with less electronegativity and less electrons.

Polar Bond= If the bond has a partial negative charge and a partial positive charge.

Polarity= Function of the difference between the electronegativity values of two bonding atoms.

Nonpolar= The bond has no difference in electronegativity.

Questions From Page 2

is the artist trying to represent when there are two polar bears arm wrestling together, or two penguins arm wrestling together? Explain your answer using the concept of electronegativity as you understand it, after reading the first two pages the comic book.



Web-Based Application

Unpaired T-Test P-Values

	P-Value	Significant?
Accuracy	0.0017	Yes
Survey	0.2836	No
Mental Effort	0.936	No
Training Efficiency	0.9695	No

Means and Standard Deviations

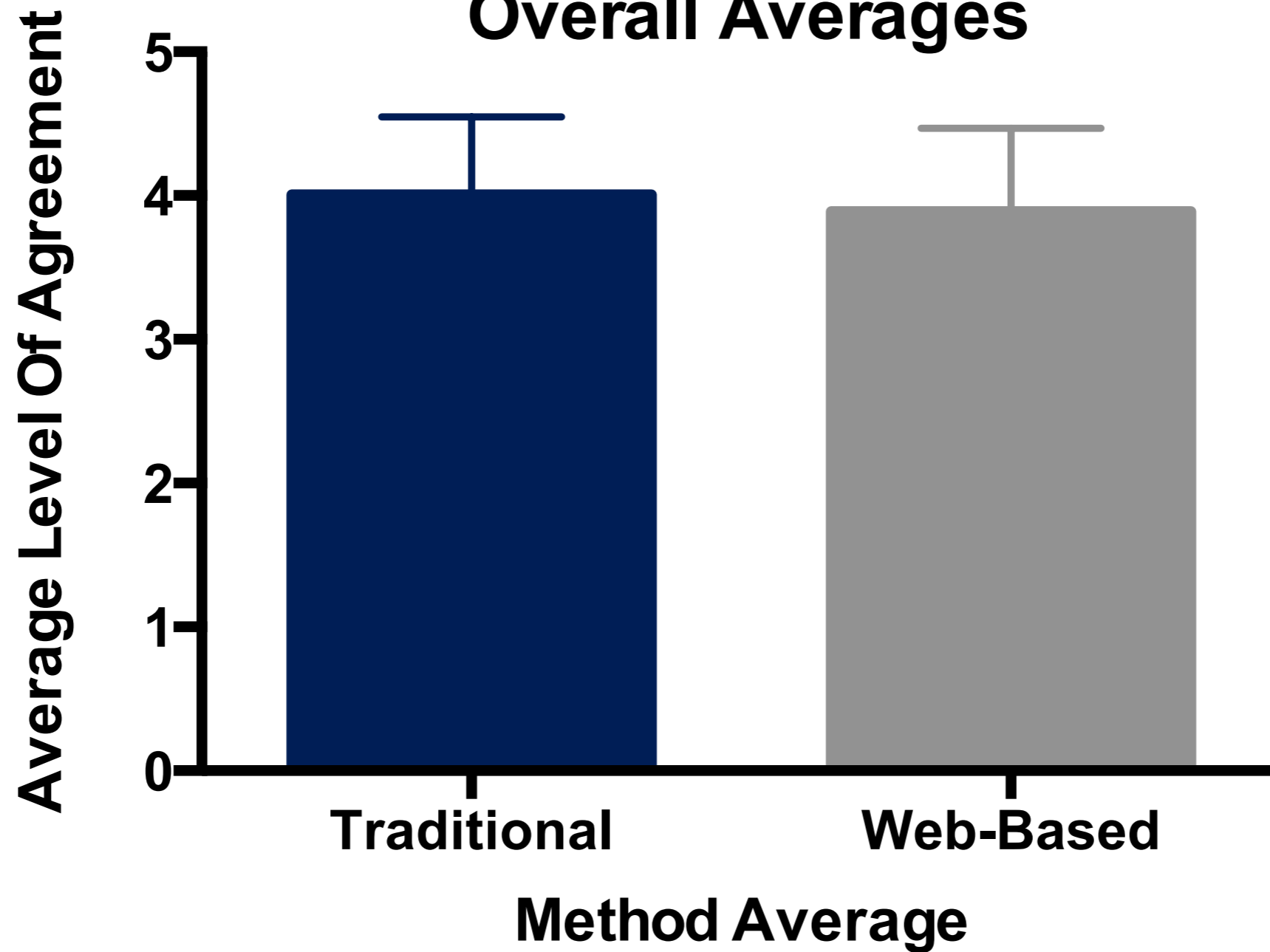
	Mean	Standard Deviation
Traditional Accuracy	86.96	16.54
Web-Based Accuracy	76.34	17.57
Traditional Survey	4.005	0.5412
Web-Based Survey	3.89	0.5768
Traditional Mental Effort	5.579	1.536
Web-Based Mental Effort	5.555	1.561
Traditional Training Efficiency	-0.00000004549	1.052
Web-Based Training Efficiency	0.007711	1.01

Training Efficiency Formula

Efficiency (E) is positive when **performance (P)** > **mental effort (M)**, negative if **P** < **M**, and zero if **P** = **M**. Ideally, **M** < **P**, therefore the more efficient a strategy, the higher **E** value.

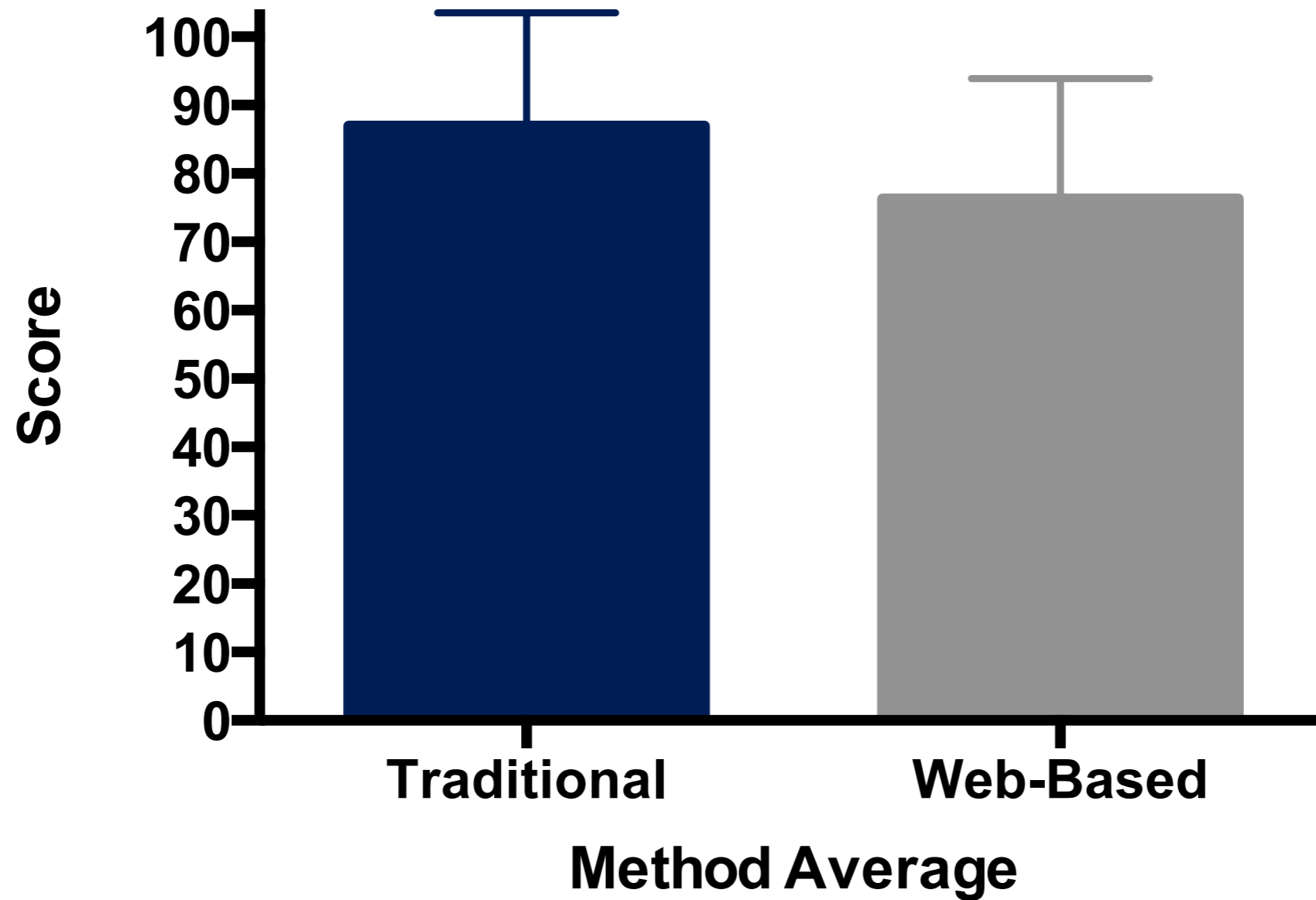
$$E = P - M / 2$$

Traditional vs. Web-Based Survey Overall Averages



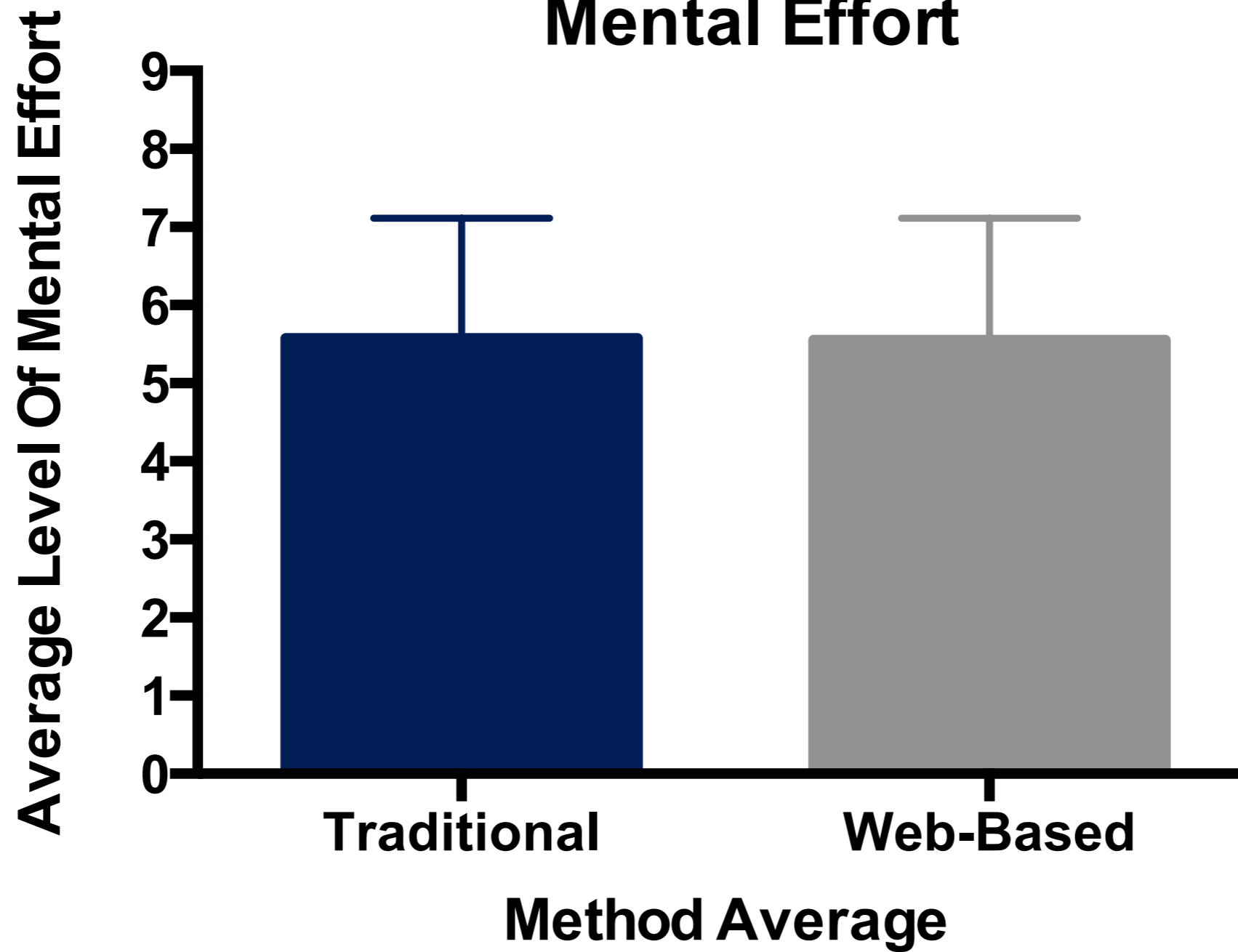
Graphs

Traditional vs. Web-Based Accuracy



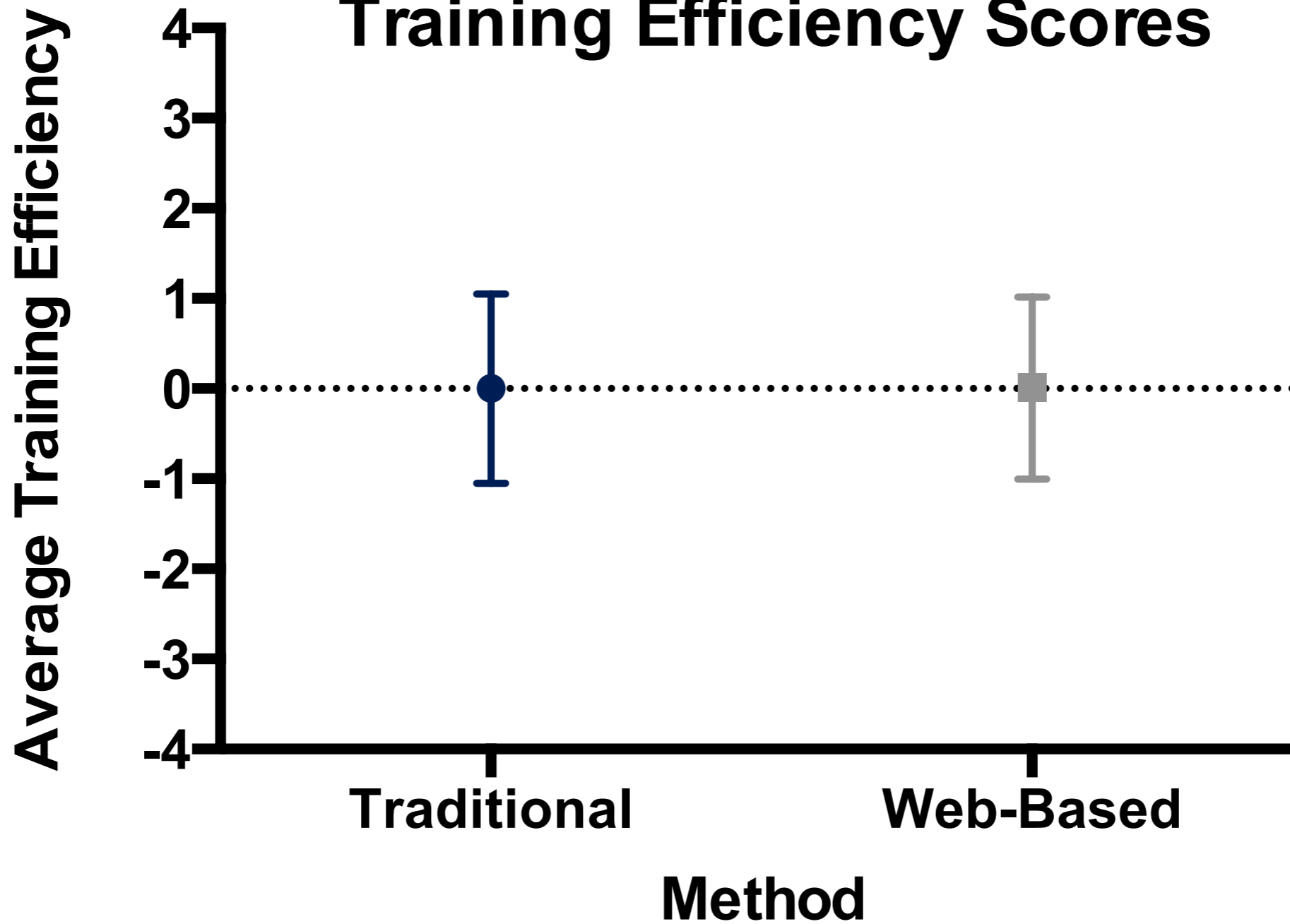
Graphs

Traditional vs. Web-Based Average Mental Effort



Graphs

Traditional vs. Web-Based Average Training Efficiency Scores



Graphs

Conclusions and Discussion

- Activity was successful (based on the means)
- Limited difference between traditional and technological methods
- Relationship with previous studies
 - Inverse relationship
 - Younger students: Gradual incorporation
 - Older students: More rapid
 - All ages: Progressive exposure (increase experience/accuracy)
- Other ramifications

Acknowledgments

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