Comparing The Use Of Multimedia Animations And Written Solutions In Facilitating Problem Solving

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MOTIVATION

Examine the extent to which multimedia animation compared to written worksheet solutions improve students' ability to appropriately set up and compute integrals in physics problems.

RESEARCH QUESTIONS

- Does viewing multimedia animations improve students' ability to set up the integral?
- Does viewing multimedia animations improve students' ability to compute the integral?
- How do multimedia animations compare with written solutions in these regards?

RESEARCH DESIGN

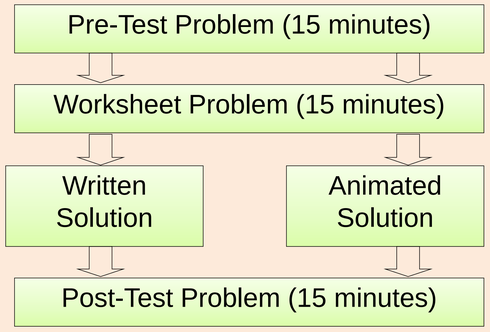
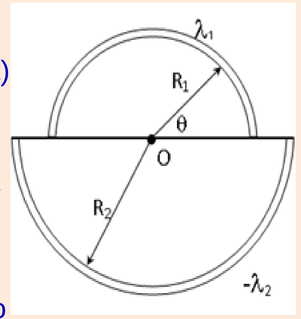


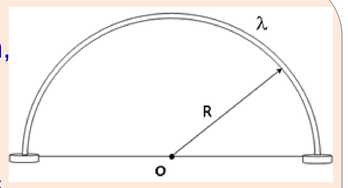
FIGURE 1. Research design for each task used in the study

	Brief description of each task
1	Calculating electric field at the center of semicircular arch with constant linear charge density
2	Calculating the resistance of rectangular-shaped resistance with non-uniform resistivity
3	Calculating the magnetic field at a certain point around a current carrying wire with non-uniform current density
4	Calculating the magnetic flux through a rectangular wire loop due to current in an infinitely long wire placed at a distance from the wire loop

A semi-circular arch of radius R_1 and charge density λ_1 (+ive constant) is placed concentrically with another semi-circular arch of radius R_2 and charge density λ_2 (+ive constant). Find the magnitude and direction of the electric field due to these two arches at O.

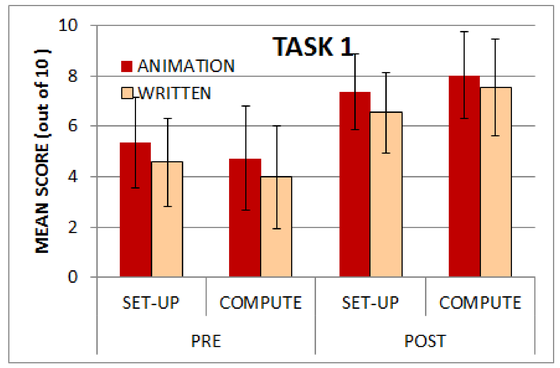


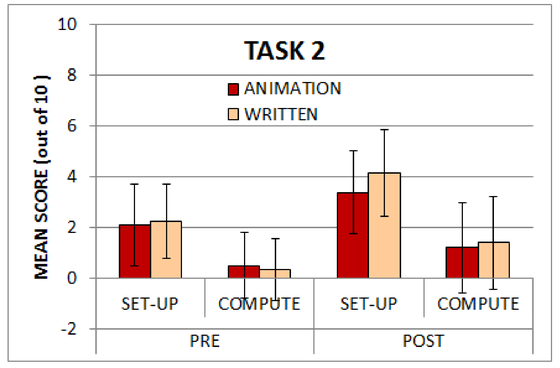
You are standing at point O under an arch, radius R, electrically insulated from the ground, as shown in the figure. The arch is charged with a constant positive charge density λ.

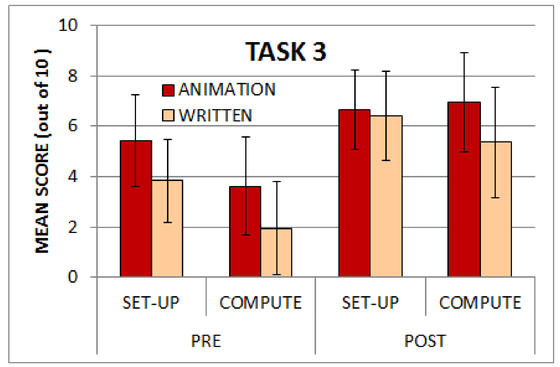


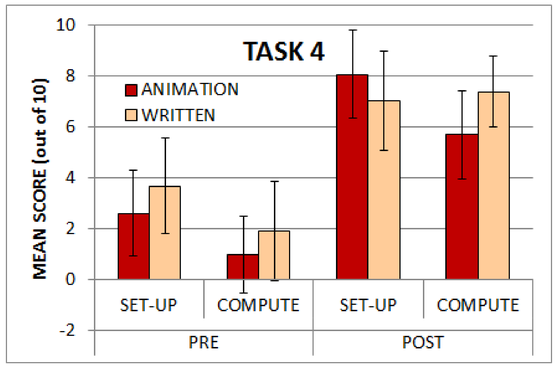
Worksheet Problem on Task 1

RESULTS









CONCLUSION

- Students in both groups demonstrated difficulties in setting up the integral, specifically with recognizing the variable of integration and constructing the integrant on both pre-test and worksheet problems.
- Both the 'animation' and 'written' solution were equally effective in improving students' scores in setting up and computing an integral. However, there was no significant interaction between the two treatments.

ANALYSIS

Repeated measures ANOVA shows.

- Statistically significant ($p < \alpha = 0.05$) main effect for setting up mean scores on all four tasks and computing on three of four of the tasks.
- No significant interaction with treatment for any of the tasks for either setting up or computing.