K20 CENTER
THE UNIVERSITY OF OKLAHOMA

MISSION PRIME OFFERS A RICH INTERACTIVE ENVIRONMENT AND A UNIQUE WAY FOR STUDENTS TO VISUALIZE AND INTERACT WITH CALCULUS OPTIMIZATION PROBLEMS.

Mission Prime focuses on identifying, modeling, selecting tools, and setting up functions to solve word problems. Performing calculations has been de-emphasized in favor of understanding the problem conceptually.

In the not-too-distant future, the people of Earth have decided to undertake a great project: Mission Prime, sending a few brave scouts across the cosmos to explore areas of a potentially habitable world, light years away. When they awaken after their trip, the mission of these lonely space travelers is to prepare a safe, habitable environment for the colonists who will follow a few years behind them.

The student takes on the role of one such astronaut after arriving on the planet. With only a rudimentary AI assistant as company, the player must mathematically work out the best way to use their limited resources to survive and build a colony in this alien environment.

Mission Prime includes four scenarios dealing directly with optimization problems. In the game, students will be asked to find the answer to an optimization word problem in the context of the objects present in the world. Students will manipulate certain objects in the world to better understand the context of the problem. Students will determine the 'tools' necessary to solve the problem from a given selection, arranging them, and then applying variables found in the game environment. Once the function is built from these components, students will be able to perform various operations on it and finally select the correct answer to the problem from the given outputs.

In an empirical study of 132 students, Mission Prime was shown to be more effective than traditional instructional techniques in conceptual understanding of optimization, $F(2, 113)=5.22$, $p=.007$. Mission Prime was also more immersive than the control condition or a practice quiz $F(2, 122)=4.77$, $p=.010$, eta squared=.07.

Lee, Y.-H., Dunbar, N., Kornelson, K., Wilson, S., Ralston, R., Savic, M., Stewart, S., Lennox, E., Thompson, W., & Elizondo, J. (2009). Digital Game for Undergraduate Calculus Education: Promoting immersion, calculation, and conceptual understanding through game affordances. International Journal of Gaming and Computer-Mediated Simulations.(2009, July-September).

To access all K20 educational games at no cost to your school, go to k20.ou.edu/getgames

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