

integrated into the CPU curriculum, where they are used to complement and extend hands-on laboratory activities.

THE CONSTRUCTING PHYSICS UNDERSTANDING PROJECT: INTEGRATING COMPUTER SIMULATORS, HANDS-ON EXPERIMENTS AND GROUP DISCUSSIONS TO PROMOTE MEANINGFUL LEARNING IN PHYSICS

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The Constructing Physics Understanding Project is a National Science Foundation supported project (Grant No. ESI-9454341) aimed at creating laboratory and computer-based materials to support a learning environment where students take primary responsibility for developing valid and robust knowledge in physics. The CPU project has developed a student-centered pedagogy, carefully sequenced sets of activities in several different topical areas of physical science, and a set of pedagogically-designed computer simulators. Rather than depending on the instructor as the source of knowledge, in the CPU classroom students develop, test and modify their own ideas through experimentation and discussion with their peers. The materials have been used successfully with secondary school physics and physical science students, and with prospective and practicing elementary teachers (through workshops and University courses).

THE INFLUENCE OF INSTRUCTIONAL VIDEO MATERIALS ON STUDENT ACQUISITION OF BIOLOGICAL CONCEPTS

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Students' cognitive preferences in using scientific information were analyzed using a paper and pencil inventory. We found strong and weak cognitive components. Strong components ("questioning-preference") predicted higher academic performance ($p = 0.03$, $d.f.=19$) compared to the remaining "weaker" components (more knowledge-based), which were not readily discriminable from one another. Moreover, "questioning"-type students, compared to the "weaker"- component group, achieved better test scores on higher-level cognitive skills (e.g., application and analysis) ($p < 0.02$, $d.f.=18$), but not with basic knowledge, indicating their greater capacity with increasing cognitive demands in learning. Furthermore, use of a video that served as a theme or guiding framework for instruction significantly increased achievement compared to a control group taught in a more conventional way ($p = 0.04$, $d.f.=16$). These results suggest that use of thematic-centered video segments, and due attention to strengthening higher order cognitive preferences, in other instructional settings such as computer-based learning may enhance achievement.

EDUCATION AND THE INTERNET OPPORTUNITY

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