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ABSTRACT

This study primarily aimed to identify students' misconceptions/alternative conceptions and their sources; the effect of computer-assisted instruction on the Human Circulatory System (HCS) on students' conceptual change, learning transfer and durability of learning; and students' motivational beliefs and response to anomalous data as factors influencing conceptual change.

The hypotheses that there were no significant differences in students' conceptual change, transfer of learning and durability of learning between the computer-assisted instruction (CAI) group and the traditional instruction (TI) group were tested.

The respondents of the study were on the section of first-year BS Development Communication students. The class was randomly divided into the CAI group and the TU group. The CAI group underwent instruction in the HCS using CAI while the TI group was taught using the chalk and board method. The study was divided into two phases: (1) design and development of HCS-CAI); and (2) tryout of CAI.

The data were gathered using the multiple-choice pretest/posttest 1 (P1), Posttest 2 (P2) with free response questionnaires, students' pre-instruction concept maps, students' diaries and worksheets, unstructured interview, observations of students' behavior and audio recordings of verbal interactions in the classroom. Data gathering started in December 2000 and ended in March 2001.

Results show that students coming into the learning environment hold a variety of misconceptions/alternative conceptions on the HCS. These misconceptions/alternative conceptions focus on the heart functions, heart structure and functions, blood structure, blood components, blood flow, the effect of diet on blood circulation and beliefs and practices related to the HCS.

The sources of the emerging misconceptions/alternative conceptions are kinesthetic and sensory, casual usage of language in conversations, indiscriminate use of technical terms related to the HCS, socialized forms of explanations influenced by family, peers and people whom students are in constant contact with, mass media, inaccurate drawings in books and inaccurate instructions by the teacher.

Posttest 1 scores show that the use of CAI improves students' conceptual understanding more than the TI.

Analysis of students' conceptual understanding based on their distribution into the five categories of conceptions shows that the CAI group has most responses falling under the Best Understanding (BU) category in the Posttest 1, while in the TI group the most frequent response is in the Worst Understanding (WU) category. A comparison of gain scores of students in CAI and TI shows CAI group to have the largest gain in the BU category. Classifying students' (pretest to posttest 1) responses into *No change, Change for the Better* and *Change for the Worse* shows that more of the CAI students' responses remain the BU category while more of

the TI students' responses remain in the WU category. Under the *Change for the Better* conception, CAI results to more answers going into this change than TI. Results also show that in CAI, more of students' conceptions are classified as *Best Understanding* compared to TI when students' posttest 1 responses are categorized into *Best Understanding* and *Others.* Therefore, there is greater positive effect of instruction on students' conceptual understanding in CAI than in TI.

As for students' motivational beliefs influencing conceptual change students who have task-oriented beliefs perform better in posttest 1 than the other students. Those who have ego-oriented beliefs are not necessarily among the top performers in the posttest 1. CAI students with whom they share the same motivation. Some students learn for career options and for personal interest. They are most likely to undergo conceptual change. CAI students are effectively motivated to learn. This is not observed in TI students.

As for how students respond to anomalous data, fewer responses from both CAI and TI groups fall under *ignoring or rejecting data, excluding or compartmentalizing data, holding data in abeyance* and *reinterpreting data* compared to *accepting data and changing existing conception.* More students in the CAI than in the TI respond to anomalous data by *accepting data and changing their existing conception.*

In the learning transfer test, CAI students outperform the TI students. This means that CAI results to more students being able to transfer learning into another context than the TI.

As for the durability of learning, the mean score of CAI students in Posttest 2 is higher than the mean score of TI students. The mean score of CAI students in P2 decreased from P1 while those of TI remained almost the same, but CAI students will have a higher P2 mean than the TI students. However, P2 – P1 *t*-test result shows that the difference in the mean score of CAI and TI students is significant in favor of the TI.

This study provides evidence of the effectiveness of CAI based on constructivism in enhancing the transfer of learning in college biology students.