

Exploring Pakistani Students' Alternative Conceptions about Composition of Matter in Chemistry

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Abstract

This study develops an awareness of the existence of high frequencies of alternative conceptions in science students at secondary level. The sample of the study was consisted of 120 subjects of class 10th randomly selected to explore students understanding in the concept composition of matter. Total seven instances or non-instances were developed as interview about instances (IAI) instrument about this concept to explore student's misconceptions of each subject. The reliability of the instrument was determined by Cohen Kappa through inter-rater reliability. Content validity was established by experts. High frequencies of alternative conceptions and lower frequencies of scientific responses were obtained from the boys and girls subjects. Although, there is relatively low frequency of alternative conceptions in girls than boys, but overall high proportion of alternative conceptions in boys/girls at secondary level indicates a big challenge for science educators. Further, categorical analysis revealed five categories of alternative conceptions. In which many alternative conceptions were found in category-3 (self-centered/human-centered view) and category-5 (scientific term but incorrect explanation) as compared to other three categories. This will guide to apply some interactive approach of teaching for conceptual understanding at secondary level, as these subjects were taught for two years through traditional textbook approach but hold huge alternative conceptions.

Keywords: Alternative conceptions, content validity, composition of matter, student's misconceptions, conceptual understanding, Interview about instances (IAI), Self-centered/human-centered view, textbook approach, interactive approach