

POSTER PRESENTATIONS

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The effects of problem-based learning on students' achievements in primary school chemistry

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Abstract: Specific applications of cognitive and constructivist theories in problem-based learning (PBL) include connecting prior knowledge and skills with new information. This prominent instructional method is widely accepted in higher education around the world, but it also shows good results when applied in primary education of various disciplines. This paper presents effects of PBL application in primary school chemistry when learning chemical compounds in 8th grade, using questionnaires and tests of knowledge in pretest-posttest study with control (CG) and experimental (EG) groups. Students in CG were taught in usual way with teacher-centered approach, while in EG the PBL materials designed for the purpose of this study were applied. Results showed (1) significant improvement of students' achievements in EG, (2) these students are not used to this teaching method so they encountered with certain difficulties they have overcome with the help of the teacher, (3) overall interest and engagement in chemistry has increased.

Sažetak

Specifične primjene kognitivnih i konstruktivističkih teorija u problemskom učenju uključuju povezivanje prethodnog znanja i vještina s novim informacijama. Ova nastavna metoda, široko prihvaćena u visokom obrazovanju širom svijeta, pokazuje dobre rezultate i u osnovnom obrazovanju. U ovom radu prikazani su efekti primjene problemskog učenja u nastavi hemije u 8. razredu osnovne škole, prilikom obrade nastavnih sadržaja iz cjeline "Hemijski spojevi". Ispitanici su podijeljeni u kontrolnu (KG) i eksperimentalnu (EG) grupu, a podaci su prikupljeni korištenjem anketnih upitnika i testova znanja u pred-post-test okruženju. U KG je primijenjen uobičajeni frontalni oblik rada, dok su u EG primijenjeni materijali za problemsko učenje dizajnirani za ovo istraživanje. Rezultati su pokazali (1) značajno poboljšanje postignuća učenika u EG u odnosu na KG (2) da učenici nisu navikli na ovakav način učenja te su se susretali s određenim poteškoćama koje su prebrodili uz pomoć nastavnika, (3) da su interes i zalaganje učenika u nastavi hemije povećani.



The effectiveness of inquiry-based learning on students' achievements in secondary school chemistry

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Abstract: Inquiry-based learning (IBL) requires learners to involve in the learning process so they can search for knowledge by questioning and investigating. It is characterized by development of problem-solving skills and ability for inductive reasoning, increase in motivation and interest for the school subject. This paper presents results of the study on effectiveness of IBL in teaching Properties of solutions in 1st grade secondary school chemistry. Study was conducted in two secondary schools, each with one control (CG) and one experimental (EG) group. In CG teacher-centered approach, in EG IBL were used. The results showed: (1) IBL is more effective than teacher-centered approach, (2) students rather search for information individually than receive them from teacher, (3) students in EG were motivated in higher extent than students in CG, (4) application of IBL does not require additional technical and laboratory equipment, but an important role plays teachers' professional competence and creativity.

Sažetak

Učenje istraživanjem (UI) zahtijeva aktivno uključivanje učenika u proces učenja i angažiranje u potrazi za znanjem kroz postavljanje pitanja i istraživanje. Karakterizirano je razvijanjem vještina rješavanja problema, sposobnosti induktivnog zaključivanja, povećanjem motivacije za učenje i interesa za nastavni predmet. U ovom radu predstavljeni su rezultati istraživanja efikasnosti metode UI prilikom poučavanja Vrsta rastvora u prvom razredu srednje škole. Istraživanje je provedeno u dvjema srednjim školama, u svakoj s kontrolnom (KG) i eksperimentalnom (EG) grupom. U KG je primijenjen uobičajeni frontalni oblik rada, a u EG metoda UI. Rezultati su pokazali: (1) metoda UI je efikasnija od frontalnog oblika rada, (2) učenici radije tragaju sami za informacijama nego da ih primaju od nastavnika, (3) učenici EG su motiviraniji od učenika KG, (4) primjena metode UI ne zahtijeva dodatnu tehničku ni laboratorijsku opremu ali važnu ulogu ima profesionalna osposobljenost i kreativnost nastavnika.



Students with disabilities and chemistry education: Possibilities and difficulties

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Abstract: Education of students with disabilities in B&H is regulated by law for primary and secondary education of responsible institutions (ministries). It can be implemented in regular schools with or without adopted curriculum, and in special centers for their education. This paper presents results of study conducted in two centers: for secondary school students with visual (CSSDO) and hearing (CSGR) impairments. The aim of the study was to explore their knowledge and interest in studying chemistry at university level. Results showed: (1) there is no significant difference in students' achievements on knowledge test in general chemistry (GC) in CSSDO and CSGR, (2) considering their achievements in GC, they have a chance to enroll university study of chemistry based on earlier entrance exams, (3) majority of students would like to enroll to university after secondary school, (4) but only one student would consider studying chemistry. These results show significant obstacles for students with disabilities to enroll university, especially in studying science, but also the lack of proper education for teaching staff both at university and in secondary school when it comes to education of students with disabilities.

Sažetak

Obrazovanje učenika s teškoćama u razvoju u Bosni i Hercegovini regulirano je Zakonom o osnovnom i srednjem obrazovanju odgovarajućih institucija (ministarstava). Obrazovanje se može provoditi u redovnim školama sa ili bez prilagođenog nastavnog plana i programa, te u specijalnim centrima. U ovom radu prikazani su rezultati istraživanja provedenog u Centru za slijepu i slabovidnu djecu i omladinu (CSSDO) i u Centru za slušnu i govornu rehabilitaciju (CSGR). Cilj istraživanja bio je ispitati mogućnosti i interes učenika za studiranje hemije na fakultetu. Rezultati su pokazali: (1) ne postoji statistički značajna razlika u postignućima učenika ova dva centra na testu znanja iz opće hemije, (2) prema rezultatima testa znanja, postoji mogućnost njihovog upisivanja na studij hemije, prema ranijim kriterijima polaganja prijemnog ispita, (3) većina učenika bi se voljela upisati na fakultet, (4) ali samo jedan učenik bi razmatrao studiranje hemije. Ovo istraživanje ukazuje na problem uključivanja učenika sa oštećenjem vida ili sluha u studijske programe prirodnih nauka na fakultetima, a također i nedostatak potrebnog obrazovanja za nastavno osoblje na fakultetima i u srednjim školama kada se radi o obrazovanju učenika s teškoćama u razvoju.



Atomic Structure Knowledge and Imagination: A Research Results from Questionnaire with First-year Chemistry Students

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Abstract: This research study was conducted in order to assess the students' knowledge and ideas about basic concepts in both general chemistry and general physics courses. The research topic was the atomic structure knowledge and visual models of the atom that students already have. Research examined how students' knowledge of scientific atomic theory has progressed during study year using a questionnaire as pretest and posttest, and several individual interviews given by research participants. The study results showed that students' knowledge about atomic structure has predominantly descriptive and simplified character. Students have had their alternative visions of atomic structure based on their knowledge about Rutherford or Bohr model of the atom instead of the current scientific model of the atoms. That was a case even when they successfully completed the atomic structure questionnaire. We propose different learning sequences to exceed this problem in order to help the freshmen to be prepared adequately for further more complex study. This approach is very important for the students' development of abstract thinking that is necessary for the complete scientific literacy.

Sažetak

Ova studija se odnosi na istraživanje koje je provedeno da se procijeni znanje studenata i ideje o osnovnim konceptima u oba predmeta, općoj hemiji i općoj fizici. Predmet istraživanja je bilo znanje studenata o atomskoj strukturi i njihove predstave o modelu atoma. Istraživano je znanje studenata o naučnoj teoriji o atomskoj strukturi i kako su studenti napredovali za vrijeme prve godine studija, korištenjem pred-testa, post-testa i individualnih intervjuva koji su provedeni s nekoliko učesnika u istraživanju. Rezultati, prikazani u ovom radu, pokazuju da je znanje studenata o atomima i njihovoj strukturi pretežno deskriptivnog i pojednostavljenog karaktera. Studenti su imali alternativne vizije atomske strukture, koje se temelje na njihovom poznavanju Rutherfordovog i Bohrovog modela atoma, umjesto važećeg naučnog modela atoma. To je bio slučaj čak i onda kada su studenti uspješno riješili test o strukturi atoma. Kako bi se pomoglo da studenti prve godine studija hemije prevaziđu probleme razumijevanja atomske strukture predložimo različite sekvence učenja koje bi pomogle studentima da se adekvatno pripreme za mnogo kompleksnije sadržaje studija hemije. Takav pristup je vrlo važan za razvoj apstraktnog mišljenja za cjelovitu naučnu pismenost studenata.