Extended Summary

Purpose

When we hear the names’ of the concepts or think about the concepts, the pictures constructed in our minds are images. The common way of explaining the images are converting them to mental pictures (Atasoy, 2004, p. 23). Students put forward their mental pictures by the use of drawings. This method makes students less limited (Novick and Nussbaum, 1978). But when a researcher interprets students’ drawings, it’s a validity problem whether the researcher interpret the student’s drawing coherent with his or her mental picture or not. To cope with the problem, the researcher can do interviews with the students in order to understand their mental pictures more properly (Özmen, 2005).

In this research, it is aimed to determine pre-service science teachers’ images about ionic and molecular dissolutions and to explore their alternative conceptions through images by the use of drawings and semi-structured interviews.

Method

In this qualitative design, the participants were 107 pre-service science teachers studying at a public university in 2011-2012 academic year. Worksheets that make teachers to draw and explain the concepts about dissolution and semi-structured interview forms for supporting the drawings were used as data collecting devices. Three researchers checked data collecting devices’ validity and reliability. And content analysis was used for data analysis.

Results

After analyzing the data, it was found that 61 percentages of teachers had wrong scientific images and 39 percentages of teachers had partly correct scientific images about ionic dissolution, on the other hand 59 percentages of teachers had wrong scientific images and 41 percentages of teachers had partly correct scientific images about molecular dissolution. It is important to determine that there wasn’t any scientifically correct images hold by the teachers about ionic or molecular dissolution. It was also found nine alternative conceptions about ionic dissolution and seven alternative conceptions about molecular dissolution such as ‘NaCl melts in water; NaCl forms molecular dissolution with water; When NaCl dissolves in water, HCl and NaOH form; In a NaCl and H2O dissolution, Na+ and Cl- ions go to the furthest points according to each other; Salt’s ions disappear in water in course of time; The ions settle down in water according to their density; In the dissolution, according to density Cl– is upwards, Na+ dissolves and water is everywhere; When the substance dissolves in dissolution, it sinks; The molecules of NaCl and the molecules of water form new molecules; Sugar melts in water; Sugar forms ionic dissolution with water; When sugar dissolves in water, CO2 and H2O form; Sugar doesn’t dissolve in water because it doesn’t form ions; The molecules of sugar and the molecules of water form new molecules; Sugar’s density is higher in the bottom of water; Sugar dissolves in water because it forms C, O and H ions in water.’
Discussion and Conclusion

As a conclusion it can be said that pre-service science teachers’ images about ionic and molecular dissolutions are insufficient. This conclusion is coherent with Ebenezer and Erickson’s (1996), Coştu, Ayas, Açıkkar and Çalık’s (2003), Tezcan and Yılmazel’s (2004), Demirbaş, Tanrıverdi, Altımsık and Şahintürk’s (2011) and Uluçınar Sağır, Tekin and Karamustafaoğlu’s (2012) research’s conclusions. In addition to this conclusion it can also be said that pre-service science teachers have lots of alternative conceptions about ionic and molecular dissolutions just as Blanco, Prieto and Rodríguez’ (1989), Haidar and Abraham’s (1991), Ebenezer and Erickson’s (1996), Martin’s (2001), Ayas, Açıkkar and Çalık’s (2003), Tezcan and Yılmazel’s (2004), Çalık, Ayas and Ünal’s (2006), Demirbaş, Tanrıverdi, Altımsık and Şahintürk’s (2011) and Şen and Yılmaz’s (2012) research’s conclusions.

As a suggestion it can be said that teachers must organize teaching environments that enable students to construct concepts properly in their minds without alternative conceptualize.