



# New Trends and Issues Proceedings on Humanities and Social Sciences



Volume 4, Issue 4 (2017) 100-104

ISSN 2421-8030

[www.prosoc.eu](http://www.prosoc.eu)

Selected Papers of 6th Cyprus International Conference on Educational Research (CYICER-2017), 04-06 May 2017, Acapulco Hotel and Resort Convention Center, North Cyprus.

## Pre-Service science teachers' images and misconceptions about diffusion, allotropy and ionic structure concepts

**Gulseda Eyceyurt Turk**<sup>a\*</sup>, Department of Chemistry Education, Faculty of Health Sciences, Cumhuriyet University, 58200, Sivas, Turkey.

**Ummuye Nur Tuzun**<sup>b</sup>, Department of Chemistry Education, Faculty of Health Sciences, Cumhuriyet University, 58200, Sivas, Turkey.

### Suggested Citation:

Turk, Eyceyurt, G. & Tuzun, N. U. (2017). Pre-Service science teachers' images and misconceptions about diffusion, allotropy and ionic structure concepts. *New Trends and Issues Proceedings on Humanities and Social Sciences*. [Online]. 4(4), pp 100-104. Available from: [www.prosoc.eu](http://www.prosoc.eu)

Selection and peer review under responsibility of Assoc. Prof. Dr. Cigdem Hursen, Near East University  
©2017 SciencePark Research, Organization & Counseling. All rights reserved.

---

### Abstract

The purpose of this study is to determine pre-service science teachers' images and misconceptions about diffusion, allotropy and ionic structure concepts. 68 pre-service science teachers from a public university participated in this study in 2015-2016 academic year. In this qualitative design, worksheets that make teachers draw and explain the concepts about diffusion, allotropy and ionic structure concepts were used as data collecting devices. Content analysis was used for the gathered data. The results of the study showed that pre-service science teachers' images about diffusion, allotropy and ionic structure concepts are insufficient and they have various misconceptions about diffusion, allotropy and ionic structure concepts.

Keywords: Image, misconception, diffusion, allotropy, ionic structure.

---

\* ADDRESS FOR CORRESPONDENCE: **Gulseda Eyceyurt Turk**, Department of Chemistry Education, Faculty of Health Sciences, Cumhuriyet University, 58200, Sivas, Turkey.

E-mail address: [geyceyurt@cumhuriyet.edu.tr](mailto:geyceyurt@cumhuriyet.edu.tr) / Tel.: +90 507 941 82 31

### 1. Introduction

Properly constructed science lessons make students able to think critically, solve daily problems and compete in business with the others. So it's so important to educate science teachers capable of constructing well-designed educational environments. This is possible if only science teachers have scientifically proper images about scientific concepts without misconceptions.

When we look at the literature; it can be said that science teachers' images about alkenes, astronomy, atom, circulatory system, diffusion, dissolution, electrical circuits, electricity, environment, fermentation, gases, light, mixtures, proteins, solutions, relocation, science, sound, velocity and work are insufficient and they have various misconceptions about the concepts (Ayvaci & Senel-Coruhlu, 2012; Degirmenci, Bacanak & Karamustafaoglu, 2012; Duman & Avci, 2014; Erduran-Avci, Kara & Karaca, 2012; Eyceyurt-Turk, Akkus & Tuzun, 2014; Khalid, 2001; Kirbaslar, Cingil-Baris & Unal, 2009; Turk, Kalkan, Bolat, Akdemir, Karakoc & Kalkan, 2012; Yildirim, Nakiboglu & Sinan, 2002; Yip, 1998).

So the purpose of this research was to determine pre-service science teachers' images and misconceptions about three main science concepts in order to give advice for organizing higher education to bring up more qualified science teachers.

### 2. Method

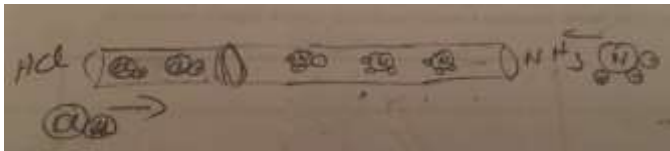
Qualitative research can be identified as trying to picture the things and their stories and the connection between them (Glesne, 2012).

In this qualitative research, pre-service science teachers' images and misconceptions were researched. Participants were 68 pre-service science teachers studying at a public university in 2015-2016 academic year. Worksheets that make teachers draw and explain the diffusion, allotropy and ionic structure concepts were used as data collecting devices. Data was gathered throughout a week. Each of the pre-service science teachers were given 60 minutes in order to complete the worksheets. Content analysis was used for the gathered data. Two researchers checked data collecting devices for validity. And the same research categorizing consistency was used for reliability.

### 3. Results

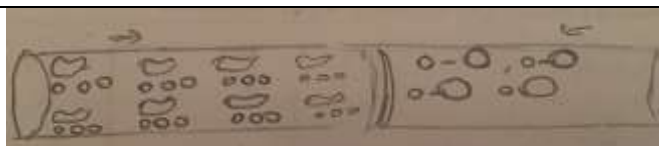
After analyzing the data, it was found that 63 percent of teachers had wrong scientific images and 37 percent of teachers had partly correct scientific images about diffusion as can be seen at table 1.

**Table 1. Pre-service science teachers' images about diffusion**

Categories	Frequency (f) Percentages (%)	Example form the pre-service science teachers' images
Scientifically correct images	0	-
Partly correct scientific images	25 %37	

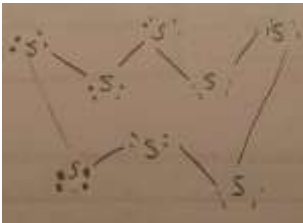
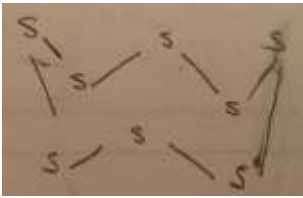

Turk, Eyceyurt, G. & Tuzun, N. U. (2017). Pre-Service science teachers' images and misconceptions about diffusion, allotropy and ionic structure concepts. *New Trends and Issues Proceedings on Humanities and Social Sciences*. [Online]. 4(4), pp 100-104. Available from: [www.prosoc.eu](http://www.prosoc.eu)

Wrong or irrelevant images 43 %63



For allotropy, 60 percent of teachers had wrong scientific images, 25 percent of teachers had partly correct scientific images and two percent of teachers had scientifically correct images as can be seen at table 2.

**Table 2. Pre-service science teachers' images about allotropy**

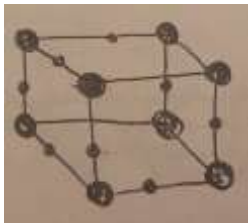
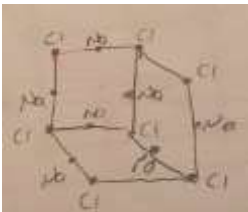
Categories	Frequency (f) Percentages (%)	Example form the pre-service science teachers' images
Scientifically correct images	1 %2	
Partly correct scientific images	17 %25	
Wrong or irrelevant images	41 %60	

*\*Nine pre-service science teachers couldn't draw and explain the concept*

For ionic structure, 98 percent of teachers had wrong scientific images and two percent of teachers had partly correct scientific images as can be seen at table 3.

Turk, Eyceyurt, G. & Tuzun, N. U. (2017). Pre-Service science teachers' images and misconceptions about diffusion, allotropy and ionic structure concepts. *New Trends and Issues Proceedings on Humanities and Social Sciences*. [Online]. 4(4), pp 100-104. Available from: [www.prosoc.eu](http://www.prosoc.eu)

**Table 3. Pre-service science teachers' images about ionic structure**

Categories	Frequency (f) Percentages (%)	Example form the pre-service science teachers' images
Scientifically correct images	0	-
Partly correct scientific images	1 %2	
Wrong or irrelevant images	67 %98	

It's important to highlight that pre-service science teachers don't have scientifically correct images about the main science concepts according to this research's findings. It was also found out that they had misconceptions such as:-

- 'Molecular mass and molecular weight were same (f: 34)',
- 'Chemical reaction means adjunction (f: 5)',
- 'Electron and atom are same (f: 5)',
- 'Elements form ionic structure (f: 27)'.

#### 4. Conclusion and Discussion

As a conclusion it can be said that pre-service science teachers' images about main science concepts are insufficient and they also have various misconceptions about the main topics.

So in order to bring up more qualified science teachers, academicians must be aware of the pre-service science teachers' insufficiency and then construct their educational environment according to that need. When qualified science teachers are brought up, so the students are.

Turk, Eyceyurt, G. & Tuzun, N. U. (2017). Pre-Service science teachers' images and misconceptions about diffusion, allotropy and ionic structure concepts. *New Trends and Issues Proceedings on Humanities and Social Sciences*. [Online]. 4(4), pp 100-104. Available from: [www.prosoc.eu](http://www.prosoc.eu)

## References

- Ayvaci, H. S. & Senel-Coruhlu, T. (2012). Fen ve teknoloji ogretmen adaylarinin bilim ve fen kavramlari ile ilgili sahip olduklari goruslerin arastirilmesi. *Dicle Universitesi Ziya Gokalp Egitim Fakultesi Dergisi*, 19, 29-37.
- Degirmenci, S., Bacanak, A. & Karamustafaoglu, O. (2012). *Fen bilgisi ogretmen adaylarinin isik konusundaki kavram yanilgilari*. Paper presented at 10<sup>th</sup> National Life Sciences and Mathematics Education Congress, Omer Halisdemir Universitesi, Nigde.
- Duman, M. S. & Avci, E. (2014). Fen ve teknoloji egitiminde kavram yanilgilari uzerine 2003-2013 yillari arasinda yapilmis calismalarin degerlendirilmesi. *Fen Bilimleri Ogretimi Dergisi*, 2(2), 67-82.
- Erduran-Avci, D., Kara, I. & Karaca, D. (2012). Fen bilgisi ogretmen adaylarinin is konusundaki kavram yanilgilari. *Pamukkale Universitesi Egitim Fakultesi Dergisi*, 31, 27-39.
- Eyceyurt-Turk, G., Akkus, H. & Tuzun, U. N. (2014). Fen bilgisi ogretmen adaylarinin cozunme ile ilgili imajlari. *Erzincan Universitesi Egitim Fakultesi Dergisi*, 16(2), 65-84.
- Glesne, C. (2012). *Nitel arastirmaya giris*. Ankara: Ani Yayincilik.
- Khalid, T. (2001). *Pre-service teachers' misconceptions regarding three environmental issues*. *Canadian Journal of Environmental Education*, 6, 102-120.
- Kirbaslar, F. G., Cingil-Baris, C. & Unal, M. (2009). Fen bilgisi ogretmen adaylarinin fermantasyon konusundaki yanlis ogrenmelerinin arastirilmasina yonelik bir calisma. *Hacettepe Universitesi Egitim Fakultesi Dergisi*, 36, 158-168.
- Turk, C., Kalkan, S., Bolat, M., Akdemir, E., Karakoc, O. & Kalkan, H. (2012). Fen ve teknoloji ogretmen adaylarinin temel astronomi kavramlarini kavrama duzeyleri uzerine bir durum calismasi. *Egitim ve Ogretim Arastirmalari Dergisi*, 1(2), 202-209.
- Yildirim, O., Nakiboglu, C. & Sinan, O. (2002). *Fen bilgisi ogretmen adaylarinin difuzyon ile ilgili yanlis kavramlari*. Paper presented at 5<sup>th</sup> National Life Sciences and Mathematics Education Congress, Orta Dogu Teknik Universitesi, Ankara.
- Yip, D. Y. (1998). Teachers' misconceptions of the circulatory system. *Journal of Biological Education*, 32(3), 207-215.