

PROSPECTIVE ELEMENTARY TEACHERS' MISCONCEPTIONS IN BIOLOGY LESSON: URINARY SYSTEM SAMPLE

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ABSTRACT

The aim of this study was to investigate misconceptions of prospective elementary teachers in biology lesson. The sample of the research consists of 45 prospective teachers in Bartın University Education Faculty. Urinary system which was Biology unit was selected as the research subject. Before the application, the students were asked 5 open-ended questions which were about urinary system. The lessons were treated with computer animations and presentations which were prepared in cooperative learning groups. After the applications open-ended questions were asked to students as a post-test. In the result of the research, it was concluded that the students confused the urinary system with digestive system. It was revealed that students have lots of wrong information about urinary system which was taught in 5th and 7th class. They have misconceptions about diseases and organs of urinary system. They said diseases of digestive system instead of urinary system. The findings of the study proved that the most of the misconceptions of the students were removed.

Key Words: Misconceptions, Urinary System, Primary School Teaching, Computer Animations, Cooperative Learning.

INTRODUCTION

Concept is the word, which occurs when living creatures, things and incidents are classified according to their similarities. Individuals make generalization as to common features of the 3 things above and then they compose their concepts according to their other common features. Concepts have differences form individual to individual in terms of their perceived property, so they have subjective property. Because of its subjectiveness, concept mistakes occur. They are difficult to uncover it's because students compose them in their mind and also they are not able to observe directly.

Because of the concepts' subjective qualities, they cause some complications for teachers and students. Some materials are done in order to decrease these complications. With the help of these activities such as; "Meaning resolution table", "concept Networks", "Conceptual change texts", "Concept maps" and "concept games", it is aimed to teach concept correctly. At the researches, it is recommended to use different methods to teach concepts. Some of these are predict-observe-explain (Bilen and Aydoğdu, 2010), concept maps (Yılmaz and Çolak, 2012), multi-stimulant educational environments (Hayran, 2010), multiple intelligence, (Köksal, 2006), animation, simulation, video and multimedia (Pekdağ, 2010). It is also important to determination of the concept mistakes to correct concept teaching for the desired level.

Different methods are used to determine the concept mistakes. Some of these methods are concept maps (Altın and Aslan, 2006; Roth and Roychoughury,1992),) predict-observe-explain (Köse, Coştu and Keser, 2003), V- diagrams (Nakiboğlu and Arık, 2006), Documan usage (Coştu, Aysal and Ünal, 2007), Concept test (Artun Coştu, 2011; Atasoy and Akdeniz, 2007; Değirmenci, Bacanak and Karamustafaoğlu, 2012; Gülçiçek and Yağbasan, 2004; İsen and Kavcar, 2006; Koray, Özdemir ve Tatar, 2005; Kutluay, 2005), Semi-structured interview forms (Anıl and Küçüközer, 2010), and Games (Genç, Genç and Yüzüak, 2012).

At the concept teaching, some different methods are use to establish the concept mistakes. And in order to find solutions to these mistakes, different methods can be used. In order to find solutions to concept mistakes; researchers do some researches such as, predict-observe-explain method (Aydın, 2010), worksheets (Demircioğlu, Demircioğlu and Ayas, 2004), Conceptual change texts (Demirbaş Tanrıverdi, Altınışik and Şahintürk, 2011), and Know-want-learn strategy (Yurd, 2007, Yurd and Olğun, 2008).

Thanks to the last differences teaching programme students try to research, direct, arrange the course time and durations and improve the classrooms (Hurd, 2000). It is especially researched how the different methods affect the student success (Genç, 2007; Tosun and Taşkesenligil, 2013). In addition, classrooms are decorated and researches for improving student success are done. (Akyol and Fer, 2010; Güneş, 2005; Kalem and Fer, 2003; Usta and Mahiroğlu, 2008; Yılmaz and Akkoyunlu, 2006).

It is also needed to dwell upon the teachers who are important to teach concepts in addition to these researches, teachers who are one of the most important elements of education, are able to be component and assume the program. It is important to make the education effective, teachers needed to do their roles best. (Arslan, 1996; Güven, 2001). Teachers have big roles to students acquire, build and learn the information. Teachers have such an effective roles that the problems they face are handicaps for arriving the aims. For this reason, teacher training is also started to take importance. Teachers are tried to give some various education both university and working periods. During this education, different feedbacks are taken and program corrections are done. Anyway, information about the practices in the courses are taken and recommendations are given.

In order to estimate the effect situation of activities especially in the lesson, it is needed to teachers' and students' points of view (Altunoğlu and Atav, 2005; Kaya and Gürbüz, 2002; Öztürk, 2004; Yeşilyurt and Gül, 2008). In this research paper, the concept mistakes of the teachers in their branches before courses and removal of the problems after the practice are researched.

Aim of Study

The aim of this study is to define the mistakes of candidate class teachers about the biological concepts. According to this aim, urinary system sample is exemplified.

METHOD

The pattern of the research is pretest and posttest model (Karasar, 2012). At this model, argument model is done and results are compared. Data of the research are gathered via an open-ended questionnaire and commented on.

Working Group

In this research paper, participants are from biology course of first grade, Bartın University Education Faculty Elementary Teacher Education Department. Total 45 which were 12 male and 33 female prospective teachers participated the study. Participants take part in research for the subject urinary system in biology course in 2012-2013.

Data Collection Tool

Researcher collect data via a questionnaire form. 5 open-ended questions are asked to the participant. In spite of their deficiency, open-ended questions are preferred because they give chance to participants to say their real thoughts. Except from the researcher, two experts also review the form and they give their recommendations.

Practice of the Work

Work is done in the urinary system in biology course at first term in Elementary Teacher Education class. 5 open-ended questions are asked to the participant before the practice. This subject is run twice at the 5th and

7th grades. The subject is run for two weeks. For the cooperation group -5 students- research urinary, urinary organs, urinary products, urinary system illnesses and urinary system health. They use animations.

FINDINGS

5 open-ended are asked to the candidate teachers in order to get information. Before and after practice answers are at the table.

Table 1: "Why human body needs urinary?" Pretest, posttest distribution.

	Pretest distribution.	Posttest distribution.
To be thrown the useless products	27	38
To continuation of life	15	35
To save the body health	12	37
To save the body balance	9	41
To work the systems regularly	5	26
To health of inside	1	15

For the Table 1, pretest answers are dominant to be thrown the useless products. The interviews with the students show that they give this answer but they do not know the exact meaning of urinary. For example, student 2 (S2) said that: "... Urinary means excrete something. That is to say, our body excretes something so we say urinary. It excretes harmful things." Similarly, (S4) "... I don't know the whole definition but I think urinary means to throw. Waste from what we eat shouldn't stay in the body. They are waste anymore."

After the practice, students say that urinary should be done in order to save the body health and balance, continuation of life and also throw the harmful waste. (S3) "... while we are going our life, some extra products occur at the end of the metabolic activities of the body. They are harmful for the health and the balance of the body. For this reason they should be thrown out of the body. That's why disposal through urine is done..." (S4) "... As I guess, this is done to protect the balance and health of the body. Actually beforehand I supposed that the throwing digestion product was urinary. But the point was different.

Table 2: "Which organs are there in the Urinary System?" Pretest, posttest distribution.

	Pretest distribution.	Posttest distribution.
Kidney	43	45
Intestines	37	10
Sudoriferous glands	9	0
Urine bag	7	42
Urinary tract organ	4	38
Urinary channel	3	11
Gallbladder	3	0
Liver	2	26
Skin	1	32
Ureter	0	43
Urethra	0	42
Lung	2	34
Anus	0	36

When we look at Table 2, we see that students give very different examples about the urinary system. Urinary tract organs like Sudoriferous glands, Gallbladder and Intestines are not able to exist, so the other helping organs are liver, skin and lungs. S6 "...I thought and write lung and skin as urinary tract organ. They also throw something out of the body. But they were the kidneys doing the real job...". S5 said that "...first of all I thought that our meals are just the urinary substance. However I thought that Intestines are urinary tract organ, too. But I didn't think excreting substances through cells.

It is defined that students wrote both urinary tract organs and urinary system after the practice. They talked generally in their speech about urinary tract organs and helping organs. Anyway, they declared which organs excrete which urinary substance.

Table 3: "Which substance can be thrown out of the body through urinary system?" Pretest, posttest distribution.

	Pretest distribution.	Posttest distribution.
Harmful substances	17	36
Excess and waste substances	16	42
Urea and uric acid	16	36
Water	9	42
Salt	8	25
Ammonia	14	3
Carbohydrate	3	0
Sweat	1	15
Urine	1	38
Glucose	0	5
Vitamin	0	5
Mineral salts	0	16
Carbon dioxide	0	22
Amino-acid	0	5

When Table 3 is examined, it takes attention that urinary substance is very much. Before the practice, students said that the substances after the digestion are urinary substance and they are harmful, much and waste for the body. The ones who said Ammonia is thrown as a urinary substance changed their sayings and said "... I didn't know that Ammonia is less harmful for the liver...". Vitamin, Amino-acid and Glucose shouldn't be in a healthy human's urine but it can be excrete from an unhealthy human's urine. It is because they are urinary system substance. S34 said that "...anyway the Glucose can be seen in the urine of the human who are diabetes, has vitamins and eats fruit. ...". Most of the student speeches show us that they said urinary substance such as urea, uric acid and ammonia which include harmful and waste substance are thrown out of the body through urinary". Students sometimes said the general names of the substances or they talked about their contents. For instance, some students said for the sweat that "salt and water".

Table 4: "Write Urinary System Diseases." Pretest, posttest distribution.

	Pretest distribution	Posttest distribution
Diarrhea	28	5
Constipation	28	5
Prostate	10	29
Urinary tract diseases	7	32
Kidney stone	5	45

Intestines cancer	17	2
Hemorrhoid	14	2
Renal failure	3	36
Kidney diseases	5	26
Pancreatic cancer	3	0
Diabetes	0	3
Cystitis	0	35
Albumin	0	36
Reproductive	0	42
Nephritis	0	43
Ulcer	9	2

When we examine Table 4, students said urinary system diseases to their digestion system diseases such as Diarrhea, Constipation, Hemorrhoid and Renal failure before the practice. After the practice, less student write urinary system diseases for this kind of diseases. Therefore the diseases such as cystitis, reproductive and nephritis aren't known before the practice but they are talked about after the practice.

Table 5. "What should or shouldn't be done for the health of Urinary system?" Pretest, Posttest distribution.

	Pretest distribution.	Posttest distribution.
Consume water	40	45
Healthy nutrition	12	44
Balanced nutrition	8	44
Attention to cleaning	10	36
Regular urinary	5	29
Not eating hot, acidic and salty	6	39
Warm feet	16	2
Chew well	13	0
Consume fruit and vegetable	3	14
Do regular sports	1	25
Having shower regularly	0	15
Attention to mouth and teeth	0	39
Using regular pills and completing the cure	0	26
Saving kidneys from cold	0	22
Cure of throat inflammation	0	12
Not holding the urea	0	38

When we look at Table 5, we see that recommended substances which are needed to health of urine system are increase after the practice. Before the practice, participant wrote usual recommendations about the health. S5 wrote that "doctors recommend drinking more water, balanced nutrition do not swallow the food without chewing well". So I wrote these thanks to doctors' recommendations. I did not know how much these affect the urinary system. But now I know the urinary system and my recommendations are fit with it". These are common healthy rules we can see this. After the practice, recommendations are focused on urinary system health. S2 declared that "I especially learned what we should do to protect ourselves after I learned the diseases. This kind of diseases decreases the life standards of human. We should be careful". And S4 explained that "my animation was related to urinary system health. For this reason, I remember all these

recommendations. Anyway I presented my subject in the classroom effectively; hence my friends also remembered them too”.

CONCLUSION AND DISCUSSION

It is aimed to define mistakes of participants about biology in this research which is done with candidate class teachers. Also it is expected from candidate teachers to know the basic subjects of most sources because they are in the curriculum. Teachers are expected to acquire basic level Maths, Sciences, Social Science, etc. Teachers use this branch information to direct students and presentation of subjects. They present their knowledge to students through pedagogic formation. The mistakes occur in the presentation of the knowledge affect the student's life.

It is expected that concept mistakes at the biology subjects will be more in the future. It is because that biology as a branch of Sciences is taught incorrectly or students shouldn't be internalized correctly. In the research, the candidate class teachers' mistakes about the urinary system which is one of the systems in the human body, are defined. It is appeared that participants confuse this system with especially digestion system, they do not know the urinary system diseases and they do not know what should be done. Also it is seen that the participants who are taught to teach this subject, forget what they learned.

Urinary system is at the 5th and 7th grade curriculum. The participants gave answers thinking the concept “urinary”. Their answers about urinary system organs, urinary substances and urinary system diseases show that they have wrong manners for so common daily life issues.

Various ways are used to correct the concept mistakes. Courses were done with computer animations and presentations through collaborative learning groups. Students prepared suitable animations about the topic and presented in the classrooms. The question and answer part at the end of the course helped the students to understand the topic. Constructive learning is used in our country and this helps candidate teachers to learn these other methods.

It is defined that the concept mistakes seen at the teachers are also seen at the students (Barrass, 1984). At this condition, in order to prevent concept mistake of students, the mistakes of the teacher who will educate them should be determined. There are various recommendations for more effective concept teaching. Pekdağ (2010) recommends information and communication technology in order to increase the effectiveness of concept teaching.

Eraslan (2009) declared after examining the Finland sample which is successful in the competition that teacher training needs much more importance. It is also recommended that teacher training programs should be improved in terms of teaching team and substructure, teachers should renew themselves with the help of universities and in-service course should be organized, also schools should be decorated, successful teachers should be rewarded.

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