

THE CONCEPTUAL PERCEPTIONS OF CLASSROOM TEACHER TRAINEES ABOUT THE BOILING SUBJECT

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Aim of the Research

The aim of this research is to reveal the conceptual perceptions of teacher trainees. By this research;

“What are the conceptual perceptions of teacher trainees about boiling subject” is sought.

Method

Case study model which is one of the qualitative research models is used for the research.

Study Group

The research was carried out with 153 teacher trainees from Kırıkkale University, Faculty of Education, Primary Classroom Teaching, who are in their third year of education.

Table 1. The distribution of teacher trainees according to gender

Sex	f	%
Female	126	82.4
Male	27	17.6
Total	153	100.0

Data Gathering Instrument

A measurement instrument was developed which has content validity with expert opinions and it consists of 2 semi-structured questions.

The themes created by the researchers were broached to qualitative research professionalist academicians and asked to give opinions about the appropriacy of created structure in order to provide reliability for the research datum.

Data Gathering Instrument

The categories which are created by researchers and specialists are compared and the number of agreement of opinions and split in opinions are specified.

Data Collection

The datum of the research was gathered in September, 2012 by applying 2 semi-structured questions to teacher trainees.

The answers were gathered in written way.

Data Analysis

The data gathered was analyzed with content analysis.

Data Analysis

Primarily the data collected from teacher trainees were separated into meaningful sections and the conceptual meaning of each section were specified.

During this process the sections which constituted a meaningful whole were coded, the similarities and differences between codes were assessed and interrelated codes are gathered and themed.

Afterwards, the specified themes were supported with the citations taken directly from the teacher trainees. In citations teacher trainees are coded as S1, S2, S3,

1st Question: Explain boiling.

Table 2. The meanings that teacher trainees attributed to the concept of boiling

Themes	F
1. The gasification of the liquid and change of state	40
2. The reach of the liquid to the highest heat	15
3. The liquid's duration of evaporation	14
4. The reaching of the liquid to the boiling point	12
5. The movement of molecules with the effect of heat	11
6. The change with the increase of the heat	10
7. The equation of liquid vapor pressure with open air pressure	7
8. The intense moment during which evaporation is seen in every part of the liquid	6
9. The situation observed before the phase of evaporation	4
10. The phase of liquids when they reach to 100 C	4
11. The occurrence of bubbles on the surface of the liquid	3
12. The liquid's beginning to create bubble noise	3
13. The heat in which the liquid evaporates	3
14. The reaching of kinetic energy to the highest point.	2
15. The condensation of the liquid	2
16. The action of liquid molecules become loose	2
17. The transformation of molecular energy to kinetic energy	1
18. The liquid molecules' approach to each other	1
19. The rise of the liquid molecules to the surface	1
20. The dilation of the liquid molecules	1
21. The separation of air molecules with the help of heat	1
22. The decondensation of liquid	1
23. The reach of the liquid to specific heat	1
24. The movement of the substance through itself	1
Total	146

Findings

The meanings that teacher trainees attributed to the concept of boiling can be gathered in 4 groups.

- The first one is about the fact that the boiling is a change of state
- The second group of opinions is about molecular movements and change
- The third group of opinions are about the pressure association
- Opinions of the fourth group is consisted of liquid's reaching to a certain degree of heat and the state occurs afterwards.

Views of Participants

The first group: *Boiling is a change of state*

S61 Boiling is gasifying a liquid by giving heat, it is right the opposite of condensation.

S31 it is a change in the state of a substance in a specific heat.

S94 It is a phase of a liquid substance before evaporation.

Views of Participants

The second group: *Molecular movements and change*

S65 boiling occurs by the movement of whole molecules of water when it reaches a certain heat.

S6 It is the movement of particles in a substance when specific amount of heat is applied.

S131 It is the dilatation of molecules with the heat.

S45 It is a conversion of some particles from potential energy to kinetic energy as a result of increasing the heat of liquid substances.

Views of Participants

The third group: *The pressure association*

S50 It is an instance that occurs when the pressure of a liquid at highest heat with external pressure.

S127 When heat is applied to a liquid and if the open air pressure and evaporation pressure are equal it is called boiling.

S27 Internal pressure raises if heat is applied to a liquid, as the external pressure is static boiling occurs (In order to equalize external pressure with internal pressure).

Views of Participants

The forth group: *Liquid's reaching to a certain degree of heat and the state occurs afterwards (liquid's reaching of the highest heat, liquid's reaching to boiling point, the state of the liquids in 100 C)*

S116 Boiling is the liquid's reaching to the maximum amount of heat it could have.

S150 It is the heat in which the substance is gasified.

S142 It is the saturation of heat of a liquid.

S13 It is the liquid's reaching to boiling point in a specific heat.

S2 It is the state of liquids in 100 C.

Findings

2nd Question: Is it possible to boil a glass of water in room temperature (25 C) without addition of heat?

Table 3. Categories related to 2nd question

Categories	f
1. Boiling water is not possible	99
2. Boiling water is possible	46
Total	145

Findings

2nd Question: Is it possible to boil a glass of water in room temperature (25 C) without addition of heat?

Table 4 . The reasons of impossibility of boiling the water without additional heat

Themes	f
1. The need for heat for boiling	45
2. Room temperature is not enough for boiling process	31
3. The fact that the water needs to reach 100 C in order to boil	8
4. The lack of an instrument which changes the heat of the water	5
5. The fact that water has density	1
6. Nonfulfillment of condensation	1
Total	91

Views of Participants

S2 because of the lack of additional heat, boiling is not observable.

S23 Room temperature is 25C, the water can't be boiled.

S81 the boiling of water occurs only in 100 C.

S12 We can't boil the water because the water has density.

S20 It doesn't boil because the water has an amount of condensation. In the same degree of heat condensation doesn't occur and water can't be boiled.

Findings

2nd Question: Is it possible to boil a glass of water in room temperature (25 C) without addition of heat?

Table 5 . The states of boiling water in 25 C without additional heat

Themes	f
1.By decreasing ambient pressure	20
2. With the occurrence of evaporation	6
3. Decreasing boiling point by adding another substance to the water	5
3.With the change of location	4
5. With sun energy	3
6 By increasing pressure	2
7 With the help of light sources placed around the glass	2
8.By giving electric current to the water	1
Total	43

Views of Participants

The first group: *The possibility of this action with the change in the pressure and location (The decrease, increase in the ambient pressure, change in the location are the themes under this section.)*

S46 *If I decrease the pressure of the room the heat doesn't change, I decrease the boiling heat point.*

S41 *As far as I know when we go down to the sea level boiling of the water would be possible.*

S40... *Water can't boil at 100 C in any location for this reason we can boil the water at 25 C heat by calculating the level of height*

Views of Participants

The second group :Vaporization. *Some of the teachers assume that as vaporization occurs, boiling comes with it.*

S123....if we consider boiling as evaporating from liquid form, as there will be evaporation in room temperature even if it isn't visible we can take it as boilable.

S49 although it doesn't boil profusely there is invisible vaporization.

Views of Participants

The third group: *Adding something. Dropping the boiling point of the water by adding something else is also in the theme*

S90by adding a substance boiling at a lower boiling point to the water we can lower the boiling point of the water to the room temperature.

The fourth group: *Transferring energy to the water.*

S112 we can boil the water by placing light sources around the water.

Results and Discussion

Most of the teacher trainees do not have a clear and accurate perception about boiling.

Most of them take boiling as gasifying of the liquid with heat or in other words changing states. This depicts that boiling and vaporization concepts are mixed up.

Most of the teacher trainees think that heat is necessary to make liquids boil and without heat there will be no boiling. Very few teachers expressed that any change in the pressure helps boiling process.

Thank you for your attention...

