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THE ELIMINATION OF MISCONCEPTIONS OVER PERIODIC SYSTEM OF THE STUDENTS THROUGH NEW METHODS

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Abstract

The purpose of this study was to investigate the effects on student's achievement and misconceptions of new teaching method developed for the periodic system. The new material included worksheets based on the conceptual conflict strategy. The sample consisted of 120 students. The research was carried out with an experimental/control group design, and lasted for four weeks. The Concept Achievement Test was used to collect data before and after the study as pre-tests and post-tests. The results from the post-tests indicated that the students in the experimental group, taught with the new teaching method, showed significantly greater achievement in the unit than did the students in the control group. This shows that the misconceptions in experimental group were less than the control group.

Keywords: Periodic system, misconceptions, experimental and control group.

1. Introduction

Teachers must always be inspired to be constantly creative during the classroom by implementing constructive and principled methods. Teacher inspiration often has to be improvised at certain moments in creative practice that may arise from the students' initiative or idea, and the same can be realised individually or in groups. Teacher's creativity and innovation is a fundamental condition for progressive and constructive activity, because of the fact that the classroom should be applicable and followed by an atmosphere that promises positive climate, mood and creativity.

A priority in their professional work each teacher should realize activities that incite creativity, good atmosphere, critical thinking models as well as and applicability of classroom teaching appropriation and meaningful process of learning.

The moral value of inspiration should focus on elements of model lessons, with student worksheets, with projects initiated by students, so that they are not to be only creative, but the same to realize the practical initiatives of their learning. The very nature of the teacher's profession obliges some of the conditions of responsibility of a moral nature, social and human nature. These responsibilities shape the personality of each teacher, therefore the activity of the teacher is conditioned by the responsibility of a moral nature for the fact that the student before all is a human factor, who must be educated in the spirit of moral virtues, because he must be positively educated, and then be a creature that applies, radiates and demonstrates the character of positive morality in the circle and social space in which he lives and acts.

During the work activity, the teacher can have complications and various concerns even very surprising, but there may be activities of which can very often be an objective obstacle to the planned realization of the lesson.

In such situations, the teacher must always be prepared in order to eliminate all obstacles timely, by planning well for the realization of the lesson. The teacher must constantly search his / her challenge in applying creative methods of the model lessons, in aim to permanent commitment which focuses on the values of scientific achievement, moral and professional. The teacher should always be engaged in the practical research of the most up-to-date forms and methods so that the scientific achievements to be transmitted and applied in a timely manner and to be as practical as possible on the part of the students.

At the beginning of the new millennium, the science, technology and society as a whole are subject to the major changes. The rapid growth of knowledge across a wide range of different sciences, initiate numerous scientific and technological achievements which will profoundly influence our lives and will transform everyone's culture, therefore it can rightly it is said that every innovation in any field whether in information or communication technology can bring about radical change.

The changes are a consequence of the development of science in many fields and as a result of these changes bring constant growth in each domain. In the past, the evolution of knowledge has been performed at a rapid and measured rate, with time scales of the order of magnitude of one generation, whereas with today's time of technological development, the period of double magnification of knowledge is five or less years (Bardhyl Musai, 2005).

On the one hand, the rapid development of science and technology gives hope for the improvement of life on a global scale, on the other hand, the rapid development of knowledge creates a challenge not only for society as a whole, but also for the individual who is obliged to fulfil, but not infrequently, to change what he or she has learned before, and to adapt to new developments. Unforeseen situations and the need for quick response can cause concern for the individual and society at large.

Found in such a situation estimated as a time of rapid change, the quality of science teaching has become a central theme in many countries around the world. Adequate educated students as prospective citizens are counted as the main source of preparation for the future of a country (Anderson, 2001)

For many researchers, it is important to research from which teaching methods the students gain more knowledge of new concepts that naturally contribute to the teaching and learning the subject of chemistry.

Ozmen in his research has found misconceptions and valuable in students' understanding of chemical bonding (Haluk Ozmen, 2004),while Michal in his studies has researched the impact of books and teaching methods for understanding reactions of the acids and bases (Schmidt, 2005). Referring to studies always done in this field, we learn that the researcher Inci has also studied some factors that may affect students, such as their abilities using the computer simulations (Inci Morgila, 2003). Over the last three decades or so, various teaching models have been developed to change learners' misconceptions into scientific conceptions. This type of studies has been phrased as conceptual change models (Posner G.J., 1982). In general, conceptual change has been described as part of a learning mechanism that requires the learners to change their conceptions about a phenomenon or principle either through restructuring or integrating new information into their existing schemata (Hewson, 1981). The best-known conceptual change model has been that of Posner, Strike, Hewson, and Gertzog (1982). Based on conceptual change theory, cognitive conflict is known as an important factor in conceptual change (Posner et al., 1982;(Hewson H. P., 1984); (Hewson P.W. and Thorley N.R., 1989); (Niaz, 1995), even though there are still questions about its positive and negative effects on science. Several researchers have shown that instruction based on conceptual change can be effective at changing students' chemistry conceptions (Basili P.A. and Sanford J.P., 1991); (Ebenzer P. and Gaskell J., 1995). Hewson and Hewson (1983) employed a conceptual change approach to promote conceptual change in students regarding density, mass and volume concepts. This study showed that the use of instructional strategies taking students' misconceptions into account results in better acquisition of scientific conceptions. Basili and Sandford (1991), however, have found that most students retain their misconceptions, and teachers may have difficulty teaching for conceptual change. Moreover, many strategies have been suggested for facilitating conceptual change in the literature (Driver R., 1989); (Dykstra D., Boyle C. and Monarch I., 1992); (Guzzeti B., Snyder T., and Gamas W., 1993); (Smith C. Blakeslee E. and Anderson T., 1993). Through the chemistry education process many remaining pending controversies are resolved, such as students moving from a state of ignorance to a state of knowledge or from a state of incomplete knowledge to complete knowledge, or from the state of knowing the content of knowledge to a certain degree, until the maximum immersion in the content of occurrences.

Such a characteristic of the educational process enables us to conclude that through the educational process students' knowledge of chemistry is realized, specifically considered as a good opportunity to discover their individual abilities rapidly to acquiring the knowledge that humanity knows.

The process by which humanity throughout its existence has been fulfilled with knowing is called knowledge. This process is primarily accomplished through scientific research aiming at new results and discoveries that are unknown to both the researcher and all mankind.

Clarifying the learning process, its main principles and laws, solving problems for active learning students are considered some of the educational problems in learning, therefore teaching methods should be used to solve such problems which provide quality discourse in order for all students to fairly apply, to remember and use knowledge by aiming that through acquired naturally knowledge to be created the necessary habits. By using different teaching methods during the learning process, students will increase their expressive and intellectual abilities always in line with existing norms. Proper application of teaching methods enables students to gradually adapt to the observation of knowledge and to scientifically explain them through acquired studies.

For a successful fluidity in the way of new perceptions that are conceived, it is essential that the researcher fairly chooses the teaching method of lecture of the new teaching content and should not always use it, because each method is useful to a particular place.

Recent studies point out that scientific efforts have been made constantly for the most effective application of chemistry teachings, focusing mainly on the questions:

- *What should we lecture to students?*
- *How to teach them?*

While studies have concluded that students must constantly:

- *Think like scientists*
- *Have knowledge of any scientific content.*

In this regard, the computer presents a high potential advantage by becoming an irreplaceable instrument for scientific research in the science of chemistry, creating the opportunities for improving the learning process to a high level more sophisticated than the traditional way of teaching.

The main goals of this research are:

- To present the most suitable method for better and easier grasp of doubts over the periodic abstract system.
- Let's look at other books that have literature - much more understandable to students.
- To be realized the questions and activities that encourage high-level scale assessment knowledge, based on Bloom's Taxonomy levels.

2. Methods and sample

2.1 Research methodology

The research was conducted in three first year classes (age 15) with 30 students in High School "Hysni Zajmi" - Gjakova where two experimental groups were selected. In one of the experimental groups, the learning units were implemented using computerized simulations, with additional literature, therefore the appendix that we think - should have been present at the same time where different activities took place. While in the other group the learning process was developed using the same traditional method. The same teaching content was realized without any experiment based on the traditional method and with ordinary gymnasium textbooks.

2.2 Activities

In the classroom where the lesson unit was realized with the appendix and literature, the tables are very clearly visible and the lesson units are very well demonstrated, while in the summary and assignments there are enough concrete examples. The students were divided into 5 groups where each group consisted of 6 students. The group work was realized in a period of 30 days, since the students have one hour per week. As a measuring instrument in the research section an assessment test is planned where we will be oriented for our learning outcomes. The students were provided with all the conditions to understand the physical and chemical properties of the periodic system as well as the characteristics of the elements within groups and periods. The activities of each group were, according to the questions compiled in the test. After the end of the activities, the students presented and discussed the results. In the classroom where the simulation experiments were conducted, the students worked and discussed using a concrete way ready table and the instructional units provided by the teacher through the PDF program.
After the end of the activities, the students presented and discussed the results.

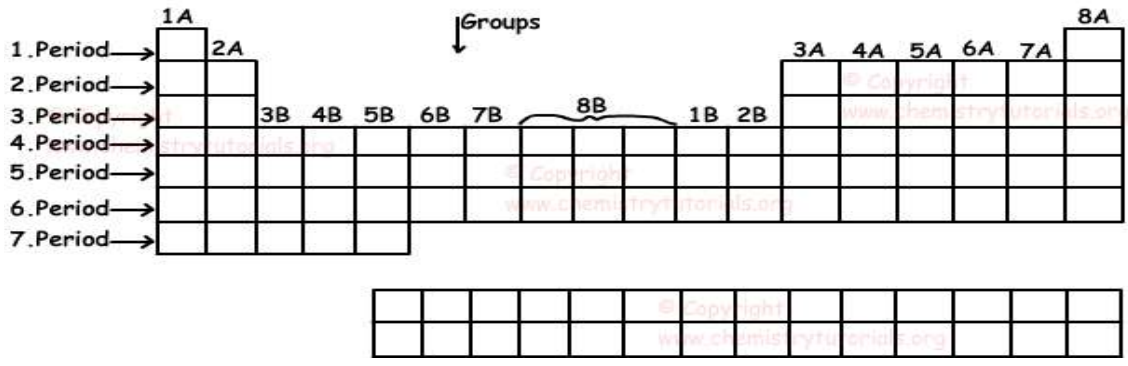


Figure 1. The periodic table

2.3 Research methods

The paper entitled "Eliminating doubts about the periodic system of students through new methods" was implemented based on two methods: Computerized methods and the classic method.

Through the use of the above-mentioned methods we have tried to highlight some data on the effectiveness of the above methods in relation to students.

2.3.1 Computerized method

The computerized method represents a data management model based on a computer or software system, which is used to process data and convert it into relevant information for students.

ICT means all kinds of technology, which are used to exploit and manipulate information, so we have interplay of technology with information and communication.

ICT in education is understood as an implementation of technological devices and tools in the learning process aiming to record and process information digitally. The use of technology in our schools has changed significantly in recent years. Thus, to equip learners with the necessary technological skills, we must use new learning methods as opposed to the methods used in traditional learning.

(http://elisareci.weebly.com/) Technology and technological tools have become part of school education, and each teacher's goal is to use technology in the classrooms as a tool that develops and incites further the learning process. Applying this new technological tool, students have acquired the computational skills, which they can use in their working places in the future. The schools in Kosovo education system have created a technological infrastructure that optimizes the integration of technology into the educational process. (http://elisareci.ww.ebly.com/).

Here are some of the technology's teachers should use:

- The Computer is estimated as one of the most needed technologies in the field of 21st century teaching. Until recently it was considered an innovation, now it is indispensable due to the technological orientations that have involved teaching.
- USB is one of the most advanced technologies for storing and transmitting various information. They exist in various sizes and are now an integral part of the educational reality.
- CDs / DVDs - are the old ways of transmitting and storing materials, but are very fruitful in the case of various presentations.
- Multi functional digital cameras - considered to be very important equipment in the field of foreign language teaching that enables and realized the registration and presentation of each student's language skills.
- Internet - is the technology that has revolutionized teaching in every corner of the world. On the other hand, the teacher is now not the only point of reference, but rather is the coordinator of new entrants to the student's educational culture.
- Interactive table - is a very advanced technology that has not yet been massively introduced into the Albanian educational system, but due to the simplicity, innovations and advantages it presents, are enough desirable for the benefit of his or her work by any teacher.
- Video Projector - is a technology very much present in the Kosovo education system. Through this it is realized the presentation of various works in the didactic and scientific field. In fact, it is the forerunner of the interactive table, but for the very conditions of our education system, it remains as the most advanced technology used in teaching. (http://elisareci.weebly.com)

To illustrate more the impact of the computerized method of development, we are illustrating some of the data obtained from the test regarding to the subject in question, which includes the chemical elements together with the chemical reactions.

Software engineering is the study of software design, implementation and modification in order to ensure that it is high quality, affordable, maintainable and fast to build. This is a systematic approach to software design, involving the application of software engineering practices.

Software engineering is concerned with organizing and analyzing software. It does not only deal with the creation or production of new software, but its internal maintenance and adjustment. (https://sqwikipedia.org/)

Russian chemist Dimitry Mendeljev was the first scientist to make a periodic chart similar to what is used today. Mendeljev arranged the elements with atomic mass, corresponding to the relative molar mass. It is sometimes said that he played "chemical diamond" on long train journeys, using letters of varying facts about known elements. In 1869, the table was published in a dark Russian magazine and republished in a German magazine, Zeitschrift für Chemie, in which Mendeljev stated that: (https://sq.wikipedia.org/)

"Elements, if arranged according to their atomic mass, exhibit a noticeable periodicity of properties. Elements that are similar in terms of their chemical properties have atomic weights which are about the same (e.g. Pt, Ir, Os) or that are regularly increased (e.g., K, Rb, Cs).
"The arrangement of elements, or groups of elements, in the order of their atomic masses, corresponds to their so-called valence, and, to some extent, to their distinctive chemical properties; as is evident among other series in that of Li, Be, B, C, N, O, and F. Elements that are more widely distributed have small atomic weights". The size of the atomic weight determines the character of the element, just as the size of the molecule determines the character of a complex body. We should expect the discovery of many elements still unknown such as aluminum and silicon analog elements, whose atomic weight will be between 65 and 75. The atomic weight of an element can sometimes be changed by the recognition of its approached elements. Therefore, the atomic weight of tellurium must lie between 123 and 126 and cannot be 128. Certain characteristic properties of the elements may be predicted by their atomic masses. (https://sq.wikipedia.org/)

2.3.2 The Classical method:

The classical method as the method that implies the accession process of data and administration, collection in classical (non-computerized) form, such as simple survey, meetings, etc. In order to collect information for the development of the particular result to the particular student. The following we will present an example - *Definition of the research subject and the research question*

In the first phase, it is decided what will be the focus of the action research, so that from the general problem expressed to reach the concrete research question. This is not an easy road, especially for beginners, because there are many problems you want to solve and ideas for possible solutions. However, if concrete and well-researched research questions are not reached, there are numerous difficulties in the further stages of action research. (http:/www.mcgo.org.mk/).

Identifying the problem begins with internal reflection in order to set the focus of the research. It is necessary to be thought about the individual practice, any important situation while working with students or any changes involved. (new curriculum, teaching methods, techniques) for which we would like to see its impact on students. First of all, the questions, ideas, areas to be browsed, it is necessary to select one that meets the criteria for a well-formulated research question:(http://www.mcgo.org.mk/).
The graph below shows the course of the classical research process as the difference between the classical and the computerized method. As for the chemical element system we can say that the computerized method is much more advanced and faster in the work processing for the chemists, while in the classical method we have a slower and destructive approach regarding the factor of accuracy and speed.

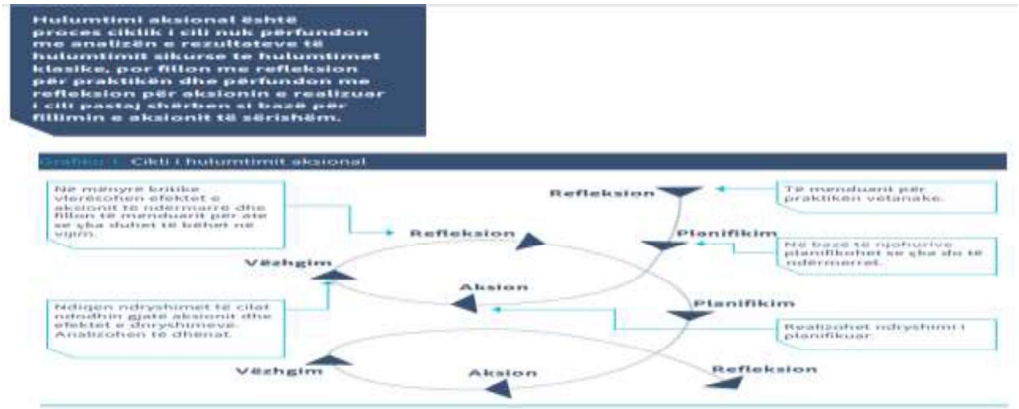


Figure 2. Illustrative table for research

Also, of importance are debates on processes related to classical and computerized methods which then lead to defining results. Debates based on animated films, fostering debate through films is a spontaneous method of engaging participants in a very sincere debate.
As is often known, the classical methods of organizing debates have in most cases become stereotyped and do not yield real results over an issue and also lack sincerity in response. Often participants hesitate to speak, but even when they speak, they are almost within the illustrated frames of expression. The methods we have used has helped the participants, driven by the film, become an active part of the debate, which has resulted much more candid because they naturally have become a real part of the debate and also this method does not allow designed questions so that the answers are to be known in advance. Promoting children's rights through this method has become very effective. (https://www.childrights-ks.org/)

2.4 About the test:

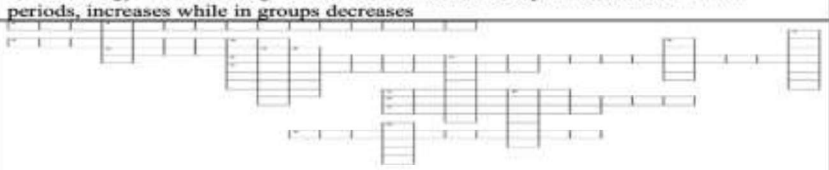
The research conducted with high school students compares in detail all the efficiencies created around the two learning methods for gaining the knowledge during the research time, whereby the students are evaluated for all the results achieved in the tests. The whole test has always been carried out with reference to Bloom's Taxonomy rules in order to achieve the best research efficiency. The use of Bloom's Taxonomy criteria enables the classification of various goals that are useful for researchers to set for students in testing.

It should be noted that Bloom's Taxonomy was proposed in 1956 by Benjamin Blum, known as Taxonomy for Educational Purposes, (Bloom et. al. 1956) in 2001 under the heading "Taxonomy for Learning, Education and Assessment. According to Bloom's Taxonomy the questions are prepared on several levels:

1) *Knowledge, 2) Understanding, 3) Application, 4) Analysis, 5) Evolution and 6) Creation.*

As in other taxonomies, there is also a hierarchy in Bloom's taxonomy, which means that the highest level of education depends on the knowledge and skills acquired at the preliminary lower levels. The test consists of 15 questions related to the teaching topic that has been treated throughout the paper (periodical system). The questions are divided into three categories A, B and C. The results of both methods are also presented in graphs.
The test that was given to the students with the questions asked is shown in table 1.

Table 1. Chemistry test

1.	Atoms of chemical elements of the same period have	1
2.	*Fill in the names of groups A, thus the special names - their characteristic.*	2
3.	How are the elements arranged in the Periodic System?	1
4.	Why the noble gases are in Group VIII-A?	2
5.	What elements to which group in the periodic system give strong basis when reacting with water?	6
6.	Determine the group number and the period of these elements: a) Hydrogen having this configuration 1s1 b) Lithium having this configuration 1s2 2s1	6
7.	What elements make up the bulk of the Periodic System?	6
8.	In which group do halogens belong? a) In the group of I b) In group III c) In group VII	2
9.	The metals in the Periodic System are: a) right b) in the middle c) left	3
10.	Nonmetals in the Periodic System are: a) left b) right c) in the middle	3
11.	What does the radius present and how does it vary within periods and groups? a) The length of the nucleus of the last energy level within the periods increases while the groups decrease b) Electro - negativity, increases over the periods and decreases in group c) The number of protons increases over periods and decreases in groups	4
12.	What the electro-negativity represents and how does it differ within groups and periods? a) It shows the increase of enthalpy in the case when the atom receives electrons, increases in periods and decreases in groups. b) Presents the force by which the atom attracts the common electronic pair to form bonds, increases over periods while decreases in groups c) Represents the energy released upon freeing of electrons from the atom, increases in a period of time and decreases in groups.	6
13.	What does the electron affinity represent and how does it differ between groups and periods? a) It shows the increase in enthalpy when the atom or ion receives electrons and within the period increases while decreasing in groups b) The length of the nucleus to the last energy level, decreases within periods as it increases in groups c) The tendency to release electrons within periods increases while in groups decreases	6
14.	What does ionization energy represent and how does it vary within periods and groups? a) Indicates the type of connection, within periods increases while decreases in groups b) It shows the increase in enthalpy when the atom receives electrons within periods decreases while in groups it increases c) The energy that must be given to the atom or ion to expel the electron, within periods, increases while in groups decreases	6
15.	 Horiziontal 1. How do we name the elements of the I-st group ? 2. How do we name the XVII group element? 3. The left side of the periodic system is comprises of? 4. The force at which we determine the type of bonding - what is the name? 5. . The periodic element system is tabulated by the Russian scientist? 6. Elements having the character of metals and non metals? 7. The noble gases otherwise called? 8. Vertical rows in the periodic system are called? 9. On the right side of the periodic system is located? Vertical 1. Which particle is consisted of protons, neutrons and electrons?	6

3. Results

Based on the research done on the subject of chemistry for the 10th grade of high school in the chapter on the "Periodic System", where the content was taught using traditional (classical) and computer-simulated teaching methods, we consider that the differences are relatively large - especially in test results. The research meticulously realized a check on the current state of knowledge and skills of all target school students for the teaching units under the "Periodic System" chapter.

From the graphically presented results we can say that the highest success was achieved with the groups of students who used the computer method, the so-called simulation method, whereas the target group of students who have used the classical method known as the traditional method have significantly lower scores. The data provided by the test checks; we consider being the best signal for all teachers who must constantly have in front of them techniques that produce productive learning as happened with our target research group.

We carefully analyzed each student-made test trying to define the results of the correct and incorrect answers, whereby the results obtained for each question are presented graphically.

Question 1. *Atoms of chemical elements of the same period have?*

From the Figure 1. could be seen that the students of the traditional group have the following results: 26 students or (57.7%) gave correct answers, 19 students or (42.2%) incorrect answers, while partially correct answers or that not answered - we have no students.

The same question was realized through the simulation method whereby these results were obtained: 34 students answered correctly or (75.5%), while 11 students answered incorrectly or (24.4%).

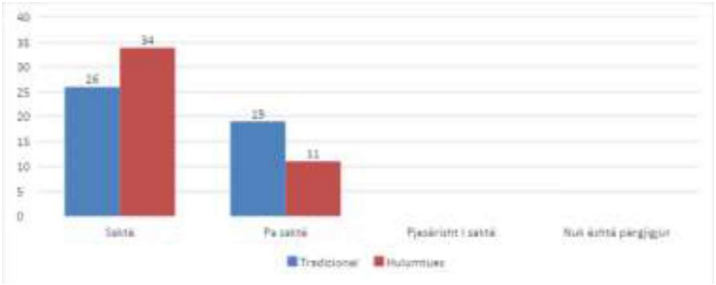


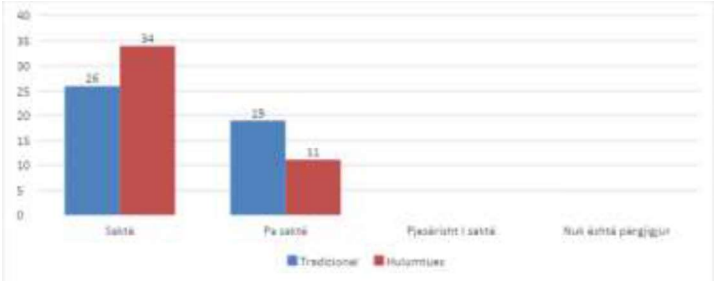
Figure 1. Results of first question

Question 2. *Fill in the names of groups A, that is, their special - characteristic names.*

Figure 2. shows that the students of the traditional working group who gave the correct answer are 26 students or (57.7%), 19 students or (42.2%) were incorrect, whereas no students have partial and such responses that have not been answered at all.

Meanwhile the same figure in the simulation - research method has obtained the following results:

40 students or (88.8%) are correct and only 5 students or (11.11%) were incorrect. In the other two alternatives - we have no students.



Graph 2. Results of second question

Question 3. *Fill in the names of groups A, that is, the special names - characteristic of them.*

The answers to the third question were resulted as follows: The traditional method has the following conclusions: 26 students or (57.7%) were correct, 15 students were incorrect or (33.3%), while in the other two alternatives there were no students left. While the research method has drawn the following conclusions: 36 students or (80%) were correct, 9 students or (20%) were incorrect. Here too in the other two options we have no students.

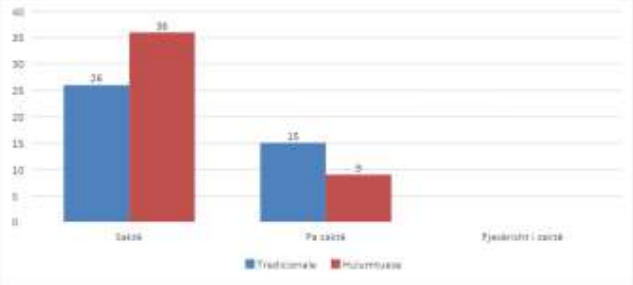


Figure 3. Results of third question

Question 4. *Why noble gases are in group VIII-A*

In the fourth question the research results provide these data: 24 students (53.3%) responded to the traditional correct method, 10 students (22.2%) did not correct, and 10 students (22.2%) were partially correct. The second group with the research method reached the following conclusions: Accurate 39 students or (86.6%), Incorrect 6 students or (13.3%). Even on this question we did not have students listed in options 3 and 4.

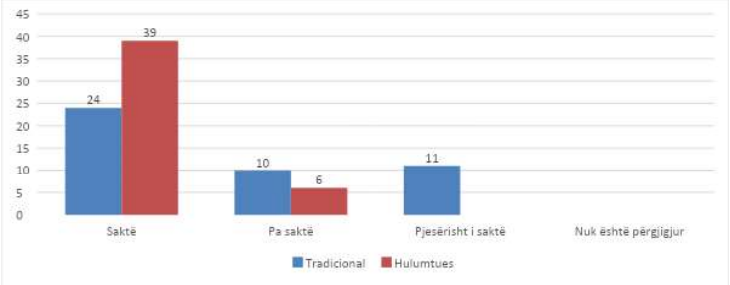


Figure 4. Results of fourth question

Question 5. *What elements to which group in the periodic system gives a strong basis when reacting with water?*

In Figure 5. which relates to the fifth question in the traditional method, 22 or (48.8%) students answered correctly, 23 students or (51.5%) were incorrect while in the other two options there was no significant difference. The result in the research group was correct 31 or (68.8%), incorrect 13 or (28.8%), partially correct 1 or (2.2%).

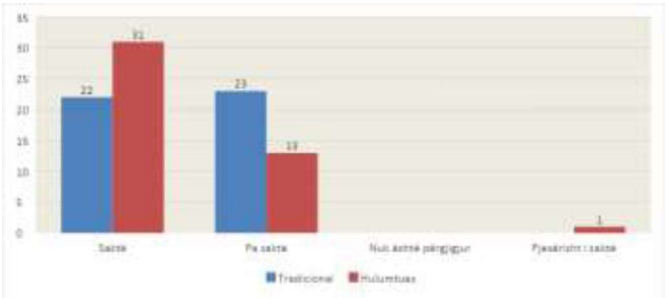


Figure 5. Results of fifth question

Question 6. *Determine the group number and the period of these elements: a) Hydrogen having this configuration* $1s^1$

b) Lithium which has this configuration $1s^2\ 2s^1$

Figure 6. clearly shows that the students from the traditional method group in this question were more accurate, with 23 of them or (51.1%) giving the correct answer, while 22 students or (48.8%) were incorrect. Based on the results of the research method we conclude that only 1 student gave correct answer or (2.2%), 29 others were partially correct or (64.4%), while only 15 students were incorrect or (33.3%).

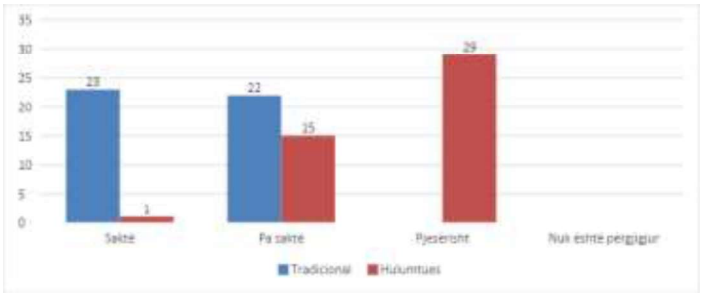


Figure 6. Results of sixth question

Question 7. *What elements make up the bulk of the Periodic System?*

In question number 7 all students from the traditional group were resulted in this success as follows: 23 pupils gave correct answer or (51.1%), 22 others were incorrect or (48.8%), while in the other two options no students are listed. The research method this time proved to be more successful because 36 students (80%) answered correctly, while only 9 or (20%) of them were incorrect.

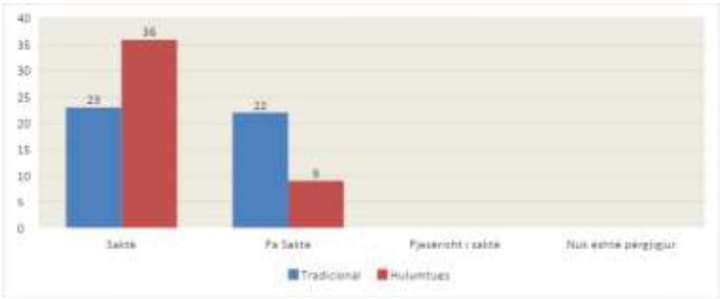


Figure 7. Results of seventh question

Question 8. *In which group do halogens belong? a) In the group I b) In group III c) In group VII*

The results obtained by both groups graphically represent that even in question 8 we consider they were significantly different from each other. In the traditional Work group correct answers were given by 24 students or (48.8%) who were enrolled, while 21 students or (46.6%) were assessed as incorrect.
Based on our findings even in this question there is no student listed in the other two options.
Whereas the research work group has higher accuracy because 36 students or (80%) were evaluated with correct answers, while only 9 or (20%) of them showed inaccuracy in answer.

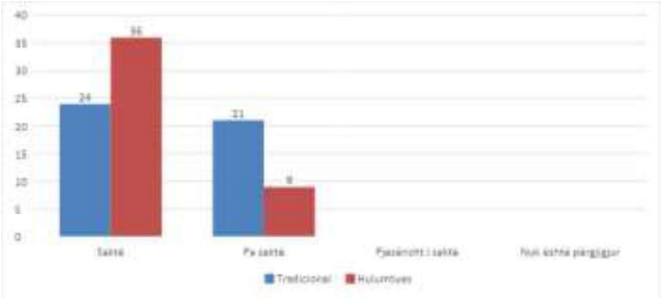


Figure 8. Results of eight question

Question 9. *The metals in the Periodic System are: a) right b) in the middle c) left*

In Figure 9, there are also differences in the accuracy of students' answers. In the traditional group of students, 30 students were correct or (66.6%), while 15 others were assessed as incorrect or (33.3%). Based on the results of the

second group we find that the accuracy of the answers is increasing because 37 students were evaluated with the correct answers or (82.2%) while 8 others or (17.7%) gave incorrect answers.

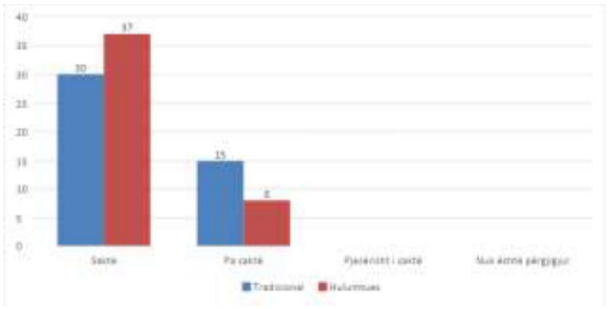


Figure 9. Results of ninth question

Question 10. *Nonmetals in the Periodic System are: a) left b) right c) in the middle*

In Question 10 we consider that the students of the traditional method were significantly better off. This is due to the fact that in these questions 30 students were correct or 66.6%, while 15 others gave incorrect answers (33.3%). The second group performed better on the partially correct answer, with 39 of them ranking in this field or (86.6%), 1 student has given the correct answer or (2.2%), while 5 other students or (11.1%) had given the incorrect answers.

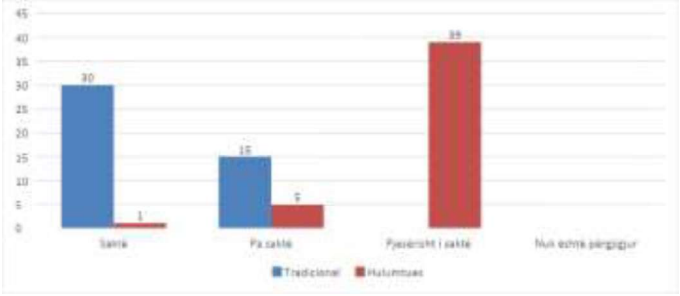


Figure 10. Results of tenth question

Question 11. *What does the radius represent and how does it vary within periods and groups?*
a) The length from the nucleus to the last energy level within the periods increases while in groups it decreases
b) Electro-negativity within periods it increases and in groups decreases
c) The number of protons, increases within the periods and decreases in groups
Question 11 was also answered, by all students in which 25 students or (55.5%) that were in the traditional working group were correct, while another 20 students were assessed as incorrect or (44.4%). Always referring to the research we find that in this question 42 students from the research group were assessed with the correct answer or (93.3%), 1 student gave partially correct answer or (2.2%), while only 2 students were incorrect or (4.4%).

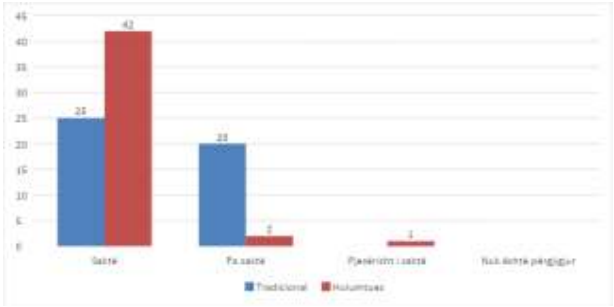


Figure 11. Results of eleventh question

Question 12. What does electro-negativity represent and how does it differ within groups and periods?
a) It shows the increase of enthalpy in the case when the atom receives electrons, within the periods it increases while it decreases in groups
b) Presents the force by which the atom attracts the common electronic pair to form bonds, increases over periods as it decreases in groups

c) Represents the energy released upon release of electrons from the atom, increases over periods and decreases in groups.

In question 12 the results of the research show that with the traditional work group 10 students answered correctly or (22.2%), 11 students or (24.4%) partially correct, while 24 students or (53.3%) gave incorrect answers.
Whereas from the research group we have the following results: 35 students or (77.7%) answered correctly, while 10 students or (22.2%) gave incorrect answers.

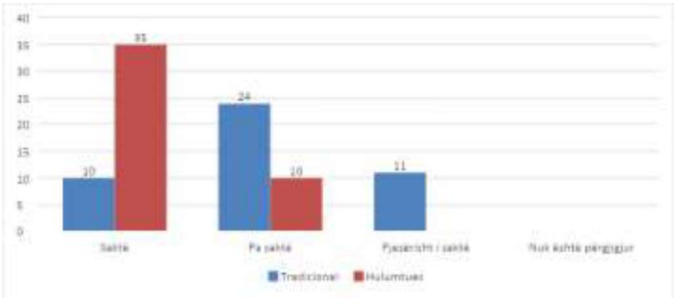


Figure 12. Results of twelvequestion

Question 13. *What does affinity for the electron represent and how does it vary within periods and groups?*
a) It shows the increase of enthalpy when the atom or ion receives electrons within the period increases while decreases in groups
b) The length of the nucleus to the last energy level decreases over periods as it increases in groups
c) The tendency to release electrons within periods it increases while in groups it decreases

In Figure 13. we note that the answers of the questions were as follows:
In the traditional method group, we find that 24 students answered correctly or (53.3%), 4 others answered partially correct or (8.8%), while 17 students did not give an incorrect answer or (37.7%). Whereas with the research method group we find that 35 students or (77.7%) were correct in the answer, while 10 other students gave incorrect answer or (22.2%).

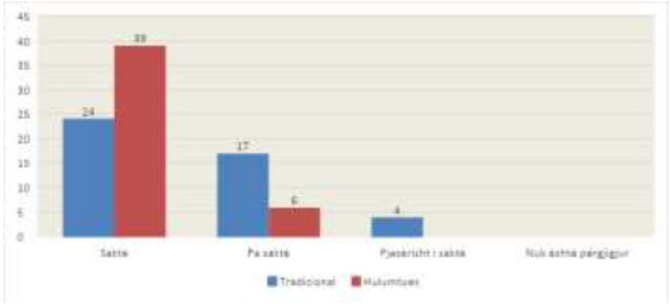


Figure 13. Results of thirteen question

Question 14. What does ionization energy represent and how does it vary within periods and groups?
a) Indicates the type of connection, within periods increases, while decreases in groups
b) It shows the increase of enthalpy when the atom receives electrons within the periods - decreases, while in groups it increases
c) The energy that must be given to the atom or ion to expel the electron, within periods it increases, while in groups it decreases
Always referring to the results of question 14, we note that even in this answer we have differences of accuracy in both groups. Students of traditional technique have lower accuracy in response because only 23 of them answered correctly or (51.1%), while 22 other students gave incorrect answer or (48.8%).Whereas in the research group the accuracy of the answer was higher because 32 students were evaluated with correct answer or (71.1%), while 12 others gave incorrect answer or (26.6%).

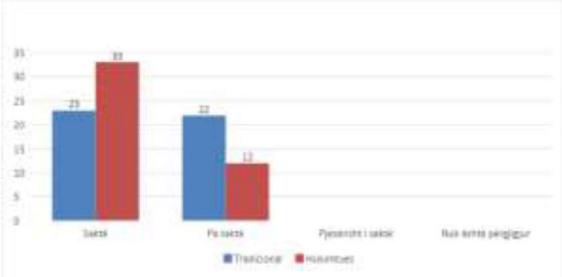


Figure 14. Results of fourteenth question

Question 15.

In question 15, we realize that from the traditional methods answered correctly 28 students or (62.2%), while 17 other students or (37.7%) gave an incorrect answer.
Referring to the same questions, but from the research method we can see that the number of students with correct answers has been high, specifically 36 students or (80%), while the other group evaluated 9 students with incorrect answers or (20%).

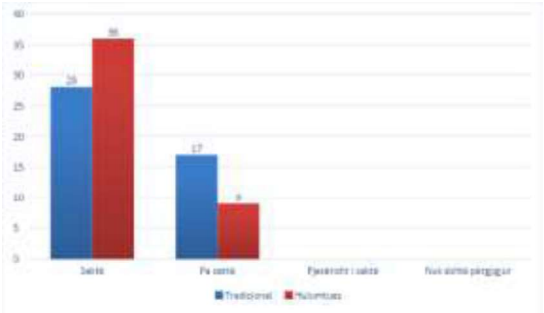


Figure 15. Results of fifteenth question

4. Conclusion

Technological and computer advances have influenced on the perception and realization of the approach of the periodical system in a digitized manner, eliminating some disadvantages when the system was not previously available. From this point of view in the illustrations of the first and second test questions, we note that in many of the answers to the questionnaire, the students have mistaken but on the main part they were accurate.
Each element in this approach has its own significance and the work has in some cases included methods that appear to have emerged from the topic, such as the case with the development of technology in communication methods, but the essence is that we cannot completely escape from the global approach and to focused on specific science in the 100% premise, therefore we saw reasonable to at some point make a general illustration.

4.1 Recommendations

- As a recommendation from this paper, could highlight some important points where the students should be focused:
- Increasing specific knowledge based on technology and not just to depend on classical methods;
- Their impact to be massively increased, by contributing to the external environment;
- Advancing the work dynamic within the frameworks or required limits;
- To be efficient on knowledge development
- To link the periodic system with other sciences and apply it to coordinate, for the benefit of scientific and social contribution;
- Being sober in knowledge;
- Be efficient in managing the data and their conversion into information regarding the matter in question;

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