

Monthly Chemistry Newspaper in Vocational High Schools

By

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Abstract

The purpose of this study is to carry out an application that will help them to understand the selected chemistry subjects through extracurricular activities through informal science education on 9th grade vocational high school students. By mainly considering the 9th grade chemistry-teaching-program, chemistry newspapers related to chemistry, technology, the society, and the environment and which were prepared by students were used in chemistry lessons and for informal science education. 78 volunteers took part in this study. As the academic year began, study groups that consisted of experimental and control groups were identified and a study plan was designed in a sense that every month a chemistry newspaper (4 in total) would be produced. Within this process, 3 chemistry achievement tests (CAT-1; CAT-2; CAT-3) developed by the researchers were used three times; once on the experimental and control groups before beginning to use the newspapers (CAT-1), once after two newspapers were produced (CAT-2), and once after all 4 newspapers were produced (CAT-3). In this sense, the impact of the chemistry newspapers, which were related to chemistry, technology, the society, and the environment, on student achievement was examined. The collected data was tested via anova analysis and a significant difference was determined in favour of the experimental group's students.

Keywords: Chemistry Education, Informal Education, Chemistry Newspapers, STSE

1. Introduction

One of the main purposes of education is preparing individuals for real life and enabling them to make sense of events taking place in their daily lives (Coştu, Ünal, Ayas, 2007). Education itself is not a purpose but a tool for enabling economic, social, and cultural development as well as enabling the individuals and society to be peaceful (Vizyon 2023, 2014). If education is a tool, science and related lessons are of great importance in establishing the foundation of this tool. Education is a noteworthy field of service in increasing productivity and quality, and balancing change and continuity. Therefore, transitivity between education levels and providing opportunities to pursuing a career at certain levels are essential. According to this, among the types of schools, this study has been carried out in vocational schools. For this reason, it is essential to shed light on the place of the school the study is applied within the Turkish Education system and to inform the achievement of these students in national and international exams.

Among the formal education levels, secondary education covers all of the 4-year general, vocational, and technical education institutes that depend on primary education. The purpose of secondary education is to provide minimum common general culture, to introduce the problems of the society and find solutions, and to prepare students for real life, occupational areas, and higher education within the perspective of their interest, skills, and talents by having them gain the awareness that will contribute to the country's socio-economic and cultural progress (Turkish Official Gazette, 2009).

The purpose of vocational and technical secondary education is to raise workforce for occupational and professional areas and to prepare the students for higher education as well. In Turkey, when compared to general secondary education institutions, the student profile in regards of achievement is relatively lower

in vocational high schools. Socioeconomic dissociation between secondary schools and school types in Turkey has been identified through studies. In other words, according to their families' socioeconomic status, students range among secondary schools and school types.(Polat, 2009). This is due to some reasons such as the secondary schools being divided according to education types, the quality differences between schools, and the central exam system. Within this dissociation, students that prefer vocational and technical high schools are from groups that are socioeconomically disadvantaged (ERI, 2012 a, b). When the education of the parents are taken into consideration, 40,3% of them are primary school graduates, 3,8% of them are university graduates (Earged, 2008).

In addition, according to a research carried out by the Ministry of National Education, while the achievement rate of technical high schools at the university entrance exam was 37,6% in 2003, it has dropped to 26% in 2005, and the achievement rate of industrial vocational high schools has dropped from 22,7% to 15,7% (EARGED, 2008). Students that continue to vocational schools have almost no **interest for lessons related to science and this has been identified from the exam results that have played a role for school selection and the achievement rate of their chemistry lesson** (ÖBBS, 2009). Also, the socioeconomic and cultural levels of the area the school is located in being low, the students entering the school without any exam, and the existence of environments outside of school that may cause students to acquire bad habits have a negative effect on the students' orientation to the school environment and their achievement (RAM, 2010).

The PISA 2009 results announced in December 2010 also **indicate that within the reading, mathematics, and science skills of vocational high school students**, Turkey's are very below the average and when compared to other high schools they have the lowest achievement rate (Pisa, 2009). In a pilot study carried out at a school with the support of counselling, in the application of chemistry lesson, students also find themselves as unachievementful at science related lessons. In addition, students do not reply to in-class activities and have trouble listening to the lesson. Drawing attention and raising interest of these biased students is quite difficult. It is a known fact that individuals generally have a negative attitude towards science or have an opinion towards science that is not so well. Regarding both business life and university education, the students that continue to these schools are a notable handicap as their Science and Mathetmatics knowledge is quite inadequate. Also, it is a thoughtprovoking fact that at university exams, the vocational highschool graduates' correct answer net average of mathematics and sciences questions is under one (Şencan, 2008). Studies have identified that students are generally bored during science education at school and that the teachers struggle when teaching science (House of Lord, 2000). Moreover, the 2008 report of IIBA (Independent Industrialists and Businessmen's Association) suggests having applications that will bring forward practical skills and capability instead of theoretical information for vocational high school students (Şencan, 2008).

In the area of science, especially when teaching concepts, the importance of relating the related attainments to daily life as well as to science (chemistry), technology, society, and environment is well known (Çınar, 2013; Yörük, 2008; Campbell and Lubben, 2000).

Science literacy is an essential part of science teaching programs (AAAS, 1993). Also, passing on the information that has been gained in order to be a science literate to students by relating it to daily life has also been stated to be convenient in many studies (Yörük, 2008, 2010; Andrée, 2003; Özmen, 2003; Harlen, 2002; Enginaret. al., 2002; Pınarbaşiet. al., 1999; Ayas and Özmen, 1999).

This is because a science literate understands the nature of science and the scientific developments; comprehends basic science concepts, principles, laws, and theories and uses them accordingly; uses scientific processes when solving problems or making decisions; understands the relation between science and technology, and science and environment as well as their interaction with the society; has interests that give way to a fruitful and satisfying lifestyle (Köseoğlu et. al., 2003). Many studies related to the dimensions of science literacy have been carried out. For instance, Shen (1975) designated the

dimensions of science literacy as solving daily issues through science, the society internalizing science, and science being the basic activity of humanity. While Miller (1983) gathered the content of science literacy under three dimensions which are “the nature of science,” “the level of knowledge,” and “the effects of science and technology on human life,” Bybee (1995) conceptualized it multidimensionally as “keyword and concept knowledge,” “awareness of scientific and technological developments,” “efficient use,” and “understanding and discovering the nature of science.”

These studies related to science literacy have caused science education programs to be revised in many countries. In the United States of America, Canada, and the European Union countries, reforms related to increasing science literacy have taken place (Koballa, Kemp & Evans, 1997; Zembylas, 2002; BauJaoude, 2002; Chin; 2005 Liu, 2009).

In developing science literacy among students, in addition to the education provided at schools, informal science education is also quite important. Informal science education is education carried out through various channels outside of school. This education includes activities such as the following (Kavaket. al., 2006; Stockmayer and Gilbert, 2003):

- Watching television,
- Reading extracurricular books, magazines, and newspapers,
- Visiting museums and science centers.

Learning outside of school is also efficient in language learning, reading and comprehension, mathematical operations, gaining social skills, and developing other skills in the field of education (Lave, 1988; Morrison et. al. 1995). Cobernet. al. (1995), identified, except for some popular environmental issues and scientific developments, that the students’ knowledge and understanding of the nature of science and the structure of the universe is low, and that they do not use their science related knowledge outside of school enough and cannot adapt it to their daily lives. Hobson (2001, cited in Özdemir, 2010), stated that students do not know how to overcome complex issues such as global warming, rapid population growth, pollution, and killer or epidemic diseases.

Also in our country, in an additional directive published in 2008 about making use of newspapers in education, the Ministry of National Education stated the plausible attainments for certain lessons that take part within primary education by making use of newspapers in education and it especially stressed the matter that activities that focus on newspapers can be improved (MNE, 2008). Decisions that were made for the primary education science and technology (6th-8th grades) teaching program (MNE, 2005) to “make use of newspaper clips within the process of learning and teaching” was also passed by the Head council of Education and Morality, and therefore, within the comments column of the teaching program, statements related to the matter were included. Similarly, this situation was extended to the course books and the use of newspapers was officially accommodated within the course content.

However, there is a limited number of studies that are about how newspapers can be used in science education and how it can be of use. In reality, daily newspapers are tools that are highly effective and convenient in relating inclass subjects to real life (Garrett, 2007). If the fact that the similarity between inclass subjects and attainments, and real life increases the students’ attention to the subjects and that therefore their learning takes place more effectively (Whitelegg and Parry 1999; Özmen 2003; Fortus, et. al., 2005) is taken into consideration, the importance of the matter comes forward more strikingly. There are some studies that state that newspapers can be made use of in increasing the student academic achievement, attitude, and high-ranking thinking skills in primary education science and technology lessons (Bozkurt, 2010; Kırıkkaya, Bozkurt and İşeri, 2011). In a study carried out by Yaşar and Ünlüer in 2011 in a Social Sciences class, the influence of using newspapers on the students’ academic achievement and attitude was explored and it has been reached to the conclusion that using newspapers increases the academic achievement of students and that it provides positive attitude towards the lesson. When reviewing the literature, not having come across with extracurricular activities that enable

chemistry subjects to be understood is quite significant in relation to this study's importance. In addition to frequently used media tools such as the radio, television and newspapers enabling motivation for social change and improvement, they are also informal education tools strong enough to change attitude and traditions (Kumar, 2009).

Media tools are quite efficient in gaining knowledge and skills that are difficult to gain via formal education (Özay, 2008). Individuals internalize the information gained through media tools more easily and they do not struggle to adapt this information to their daily lives (İlkörücü, 2007).

As one of the media tools, the newspaper has a high motivational strength (Dee Garrett, 2007) and it is quite effective in drawing attention to science matters in articles (HalkiaandMantzouridis, 2005).

In this sense, for this study, in order to enable the students studying at the vocational highschool to understand the lessons related to chemistry and scientific matters better, to encourage the students that are creative and think differently, and to make boring and unrelated matters more entertaining for them (Aikenhead, 1992; Yörük, 2008), every month, as an extracurricular activity, an activity to prepare a **chemistry newspaper** was carried out. To find solutions to the problems students experienced in chemistry lessons, how significant the extracurricular activities were and in what sense the activities have affected the class' achievement have been studied.

The purpose of this study, by taking prior knowledge under control, is to research whether "the applications of preparing a chemistry newspaper as an extracurricular activity" on the determined four subjects has an effect on the students' achievement and to identify whether there is a difference among the students by comparing those students' achievement with the students of the control group that did not have any extracurricular activity. These determined four subjects, "the Development of Chemistry, Periodic Table, Compounds, Chemical Changes," are types of subjects we come across with in media organs and whether the science and mathematics achievement that is low among vocational highschool students due to the aforementioned reason was affected with the help of the extracurricular newspaper production activities will be examined.

Sub problems of the study are as follows:

- i. Is there a significant difference between the experimental group's and control-1 and control-2 groups' chemistry achievement (CAT-1) prior the application?
- ii. Is there a significant difference of students' chemistry achievement between the experimental group that carried out extracurricular activities and the control groups within which extracurricular activities were not carried out (CAT-2)?
- iii. Is there a significant difference of students' chemistry achievement between the experimental group that carried out extracurricular activities and the control groups within which extracurricular activities were not carried out (CAT-3)?

2. Methodology

Research Model

In this study, a quasi experimental design with pre-post test and experimental and control groups was designed. While experimental design was defined as research designs used in order to discover the cause-effect relations among variables (Büyüköztürk, 2007; Gall, et. al., 1996), the purpose of quasi experimental design is the same with the experimental design. The difference between them is that in

quasi experimental design, the control and experimental groups are not chosen randomly but are chosen through measure (Ekiz, 2003; Karasar, 2006).

In this study, the control and experimental groups were not assigned randomly and the academic achievement rate of the groups, which is this study's dependent variable, was controlled fairly through pretests. The courses of the experimental group and the control-2 group was carried out by the researcher. This is because the researcher wanted to carry out the classes in order to prevent the factor that would affect the study due to teaching differences. Control-1 group, on the other hand, was taught by the school's teacher. This was to determine whether the researcher had an influence and in order to see that the teacher of the experimental group was acting unbiased towards the control group. Therefore, another teacher with the same teaching experience carried out the classes of the control-1 group. Both teachers have 19 years of experience in teaching.

By having the researcher and the teacher use the same class materials, it was meant to prevent the difference of knowledge and application between the two of them. To make sure that within the three groups the explained concepts and given examples are the same, the lessons plans were prepared according by the researcher to the syllabus.

Research Population and Sample

The population of the research consists of 9th grade students studying at Ankara's Mamak district in the academic years 2009-2010. The sample of the research is of 78 students studying at 9th grade at different Trade Vocational Highschools. Students were asked to sign a consent form. Students were also informed that they if they wished not to not partake in this study, they were free not to. When determining the sample, the level of readiness of the subjects to be taught to the students were taken into consideration. However, it was unlikely to create new classes of different groups while education was ongoing. For this reason, by making use of the results that were acquired from the CAT-1 application that examines the prior knowledge of **the Development of Chemistry, Periodic Table, Compounds, Chemical Changes** that they had learned until the 9th grade, classes that were compatible with their readiness level were selected. This was to enable the compatibility of behavior among the students that is prerequisite of target behavior that students are expected to gain within class (Sönmez, 2009). The students of this sample are between the ages of 15 and 17, and their socioeconomic level is low. The experimental group is of 28 students with 13 girls and 15 boys whereas the total of the control groups is of 50 students with 27 girls and 33 boys.

Data Collection Tools

The lessons started in November and continued for 5 months, the study was completed by the end of March. The lessons were carried out through traditional education in both schools. Within the experimental group, a "Chemistry Newspaper" was produced in relation to the extracurricular activity carried out in parallel with the unit. Table 1 presents the research design.

Table 1. Research Design

Groups	N	Pre-Tests	Method	Post-Tests
Experimental Group	28	CAT-1	* Traditional Method * Extracurricular Activity "Chemistry Newspaper" (November-December-January-March)	CAT-2, CAT-3
Control Group 1	25	CAT-1	Traditional Method	CAT-2, CAT-3
Control Group 2	25	CAT-1	Traditional Method	CAT-2, CAT-3

Chemistry Achievement Test (CAT)

Cat 1, 2, and 3 that were carried out through validity analysis and that were prepared by the researchers were used to measure the student achievement in the study. Evaluation analysis was carried out simultaneously with the teaching activities as much as possible in accordance with the lessons's purposes and attainments. That is, together with the education and teaching process, the evaluation process also continued within the frame of the attainments. The validity and reliability analyses of the questions and answers were carried out and an expert's opinion was sought for the content validity. 3 university faculty members, 3 research assistants, 1 assessment and evaluation expert, and 4 chemistry teachers were asked for their opinions on the exam questions and necessary changes and corrections were made. CAT 1, 2, and 3 were designed with the quality to measure the attainments foreseen within the Chemistry Teaching Program (Table 2).

Table 2: The distribution of subjects, number of attainments, and types of questions of CAT-1, 2, and 3

Chemistry Achievement Test	CAT-1	CAT-2	CAT-3
Content	Unit-1 The Development of Chemistry	Unit-2 Periodic Table Unit-3 Compounds	Unit-4 Chemical Changes
Attainments	12 attainments	24 attainments 12 attainments	10 attainments
Number of Questions that Require Short Answers	8	6	6
Number of Questions that Need to be Answered as True or False	6	4	4
Number of Questions that Require Gap Filling	5	4	4
Number of Questions that Require Matching	6	6	8
Structured Grid Questions	1	1	2

In line with the Ministry of National Education's proposal, questions that consisted of different assessment and evaluation techniques were prepared by the researchers and were asked within the content of the teaching program. Structured grid, true false, gap filling, short answer, of exam questions were used in CAT-1, CAT-2, and CAT-3.

Among the questions provided below as examples; while questions that were prepared as structured grid were evaluated, the most preferred scoring technique that was suggested by Johnstone, et al. (2000) was used. Answers of questions that required short answers, true false, and gap filling were scored as 1 whereas the wrong answers were scored as 0. In order to see whether the the questions of CAT are understandable and possible to answer; a pilot study was carried out in another class at the same school. After necessary changes were done on the questions that required correction, it was applied on the experimental and control groups. Later on, the reliability coefficient KR-20 was calculated and was identified respectively as 0.76, 0.83, and 0.79. Below are some questions from CAT as examples.

Sample Question-1 Sample question prepared as structured grid and took part in CAT-2:

From the elements below;

- Which has/have a covalent bond.
- Which has/have an ionic bond

KBr	Cl ₂	CO ₂	Zn	N ₂
N ₂ O ₄	NaCl	O ₂	FeCl ₃	H ₂ O
SO ₂	P ₄	Ne	KNO ₃	BaO

Sample Question-2 Sample questions prepared as **True False** and took part in CAT-1 and CAT-2:

Circle the statements below as “T” or “F”. Write the correct answers of the False statements.

1. Cellulose, starch, and oil are inorganic compounds. (T) (F)
2. Alchemy is a science that depends on data of experiment and observation. (T) (F)
3. Electrons are shown as (•) dots in Lewis structure. (T) (F)
4. Physical bond occurs with the exchange of electrons. (T) (F)

Sample Question-3 Sample questions prepared as **Gap Filling** and took part in CAT-2:

Fill the gaps with the appropriate concept. (Substance, law of conservation of mass, anion, cation, metal, nonmetal, inert gas, law of constant proportions)

1. The law known as the is when elements that form the compound bond with a constant rate.
2. When writing the formula of ionic compounds, the is written first.
3. 1A group elements are known as
4. Elements that are reluctant to form a chemical bond are known as
5. Anything that has mass and volume is called

Sample Question-4 Sample question prepared as **Matching** and took part in CAT-1:

Match the concepts with the provided definitions.

- | | | |
|--|-------|----------------|
| 1. Polyatomic ion. | (...) | Cation |
| 2. Profession of turning valueless metal to gold. | (...) | Avogadro's law |
| 3. Positively charged ion. | (...) | Lewis |
| 4. Gas has equal amount of molecules in equal volumes when at constant temperature and pressure. | (...) | Alchemy |
| 5. Showing electrons as dots. | (...) | Root |

Sample Question-5 Sample question that requires short answer and took part in CAT-2:

Write the names of the compounds whose formulas are given and write the formulas of the compounds whose names are given.

Nitric oxide:

Iron(II) sulfide:

CH₄:

NH₃:

Assumptions of the Study

1. Students have answered all tests with honesty and sincerely.
2. The researcher taught the experimental group and the control group objectively and did not act biased.
3. The teacher that taught one of the control groups is equivalent to the researcher in terms of knowledge and experience.
4. The selected sample represented the population.

Limitations of the Study

1. The study sample is limited with 78 students chosen from Ankara.
2. This study is limited with four units that are covered in 9th grade.
3. This study is limited with the attainments of the teaching program presented by the Ministry of National Education.

Data Collection

1. Before the study, in order to determine whether there was an academic difference between the experimental and control groups, CAT-1 was carried out.
2. The study began in November of the academic years 2009-2010 and continued until April. Two newspapers were produced in November and December.

The newspapers' production process is as follows:

The lessons of the control and experimental groups were carried out through presentations and teacher-centered traditional teaching method that consists of question-and-answer and discussions. This method was extended through the explanation of subjects/concepts, writing the concepts on the board, students writing in their notebooks and repeating verbally. The teacher has conducted the lesson by answering the questions directly and by asking exemplary questions that supported the lesson. The lesson was supported with activities that reinforced the concepts. The lesson plans were designed based on the teaching program through the units on the Development of Chemistry, Periodic Table, Compounds, Chemical Changes.

In addition to the traditional teaching method, preparation activities for “**Extracurricular Activity Chemistry Newspaper**” were carried out. **This process was organized as follows;**

Throughout this process, the NIE student guide prepared by Dee Garrett (2008) was made use of.

Course Preparation: Students were informed by the teacher about the necessary materials for the extracurricular activity (archive scanning, printed and online newspapers, construction paper, scissors, glue, etc.)

Focus of the Newspaper: In this section, which part of the newspaper should be made use of for the activity was explained. As the selected material for the newspaper activities did not have to overlap with the course that it was prepared for (Sanderson, 1999), although it was partially related, the selected section was used. The newspaper sections that were mainly used; Titles, news articles, photographs, advertisements, cartoons, and food sections.

Related Attainments: Which attainments that take part in the teaching part are met with this activity were identified (Table 2).

Introduction-Drawing Attention: As the selected subjects were also partially mentioned within the content of science lessons, the prior knowledge of the students for these subjects were tested (CAT-1).

During the Activity: The steps of how the newspaper is going to be produced and which applications are to be followed were explained. During the process, necessary help was also provided.

After the Activity: In this part, it was expressed that the activity and lesson will end with a presentation and discussion and that the activities will be on display.

The same course materials were used in all three classes.

A 10-person special publication committee was selected among the volunteering students and under the care of the publication committee a newspaper was produced, 4 chemistry newspapers in total, every month. All of the class students took part in the production of the newspapers; however, 10 of these students had an extra role of organizing the gathered materials.

The first newspaper's subject was "**the Development of Chemistry**," the second's was "**Periodic Table**," the third's was "**Compounds**," and the fourth's was "**Chemical Changes**." The first pages of these newspapers are provided in Appendix.

The students carried out their work twice a week in a room they have designated themselves as the chemistry room. They worked in this room after lessons for an hour or so to produce the newspaper pages, around 2 hours on Mondays and Thursdays.

At the beginning of November students gathered all of the newspapers and magazines they could reach without regarding the date or issue and brought them to the chemistry room within reach of the experimental group. With these newspapers and magazines, by bringing together the issues they had collected from their homes and around, they created an archive where they could collect clips of these issues related to scientific developments that had drawn their attention.

As the financial circumstance of the school and the students was insufficient, it was not likely to follow all of the current publications. However, two of the students that had internet access in their homes identified the subjects that drew their attention and shared the appropriate data for the newspaper and contributed with news and technological developments apart from printed publications.

The students within the committee shared the appropriate subjects that drew their attention by following the current publications they were able to reach with the rest of the committee members. After the archive was created in the chemistry room, by identifying the interest and skills of the students, in line with the answers from the students, the responsibilities of preparing the newspaper pages were shared.

Students that had skills in preparing crosswords, drawing pictures, writing poems, using the computer adequately shaped their work by combining these skills with chemistry subjects.

Later on, the general template of the future newspaper was prepared. In this template, the name of the newspaper and the subjects to take part on the pages were identified. The newspaper was decided to be of 4 pages and

On the first page, the main subject based on the unit took place.

On the second page, when possible, science people that contributed to scientific studies from the past and the recent time were provided. Within the related month, information related to national or religious holidays and important dates were provided as well.

On the third page, information on chemistry related activities that took part in classrooms throughout the school year and their images, and activities related to trips and observation were provided.

On the fourth page, crossword puzzles related to chemistry and suggested publications from the library took place.

To motivate the students, on one of the pages of the newspapers, the photograph of the newspaper committee and their names were published.

Suitable subjects were cut from the related sources and pasted to papers of A3 size for the general template of the newspaper production.

At first, the first print was in black and white to correct the spelling mistakes and errors, and then the print in color took place. For each publication, the same steps were followed.

In general, repeating the chemistry subjects that were in the newspaper and providing themes that would enable the students to reinforce these subjects in their minds was paid attention to. In other words, the subjects from the previous month were organized together with the student newspaper committee and presented in the newspaper once again. Within this aspect, the aim was to make students realize that chemistry is an essential part of life by presenting chemistry matters in relation with current matters that the students wish to learn about. The published newspapers were distributed to the experimental group. The schedule carried out within this study is as presented in Table 3.

Table 3. Applications of the Study and the Schedule

Groups	November (Pre-test) 1 st exam		December		January 2 nd exam	School Break	March (Post-test) 3 rd exam	
Subjects	Development of Chemistry		Periodic Table		Compounds		Chemical Compounds	
Experimental Group	CAT-1	Issue-1	Issue-2	CAT-2	Issue -3		Issue-4	CAT-3
Control Group 1	CAT-1	-----	-----	CAT-2	-----		-----	CAT-3
Control Group 2	CAT-1	-----	-----	CAT-2	-----		-----	CAT-3

This monthly newspaper provides chemistry matters, technological developments, environmental issues, and crosswords and activities related to these matters.

- After the first two newspapers were published, CAT-2 was conducted on the experimental and control groups.
- Afterwards, by following the same process, the 3rd and 4th newspapers were published.
- At the end of the process, CAT-3 was conducted on the experimental and control groups.

3. Data Analysis

- Before the extracurricular activities in producing a newspaper were carried out, the analysis of variance was conducted to determine whether there was a significant difference between the experimental and control groups. It can be put forward according to the test results of the homogeneity of the variations which are the fundamental assumption of ANOVA Analysis of Variance that the p value was identified as 0.903 and that since this value is greater than 0.05, the variances are homogenous. When the results of the analysis of variance is taken into consideration, it was observed that there was not a difference (sig. >0.05) between the experimental and control groups. The mean of the experimental group's students' CAT-1 was 55.714; the control 1 group's students' was 50.800; the control 2 group's students' was 53.480. Table 4 provides the results of the analysis of the variance.

Table 4. Results of the Analysis of Variance to Evaluate the CAT-1 Data

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	319.08	2	159.54	.73	.48
Within Groups	16395.95	75	218.61		
Total	16715.03	77			

When Table 4 is examined, it can be seen between the means of the experimental and control groups, there is not significant difference.

2. After the first and second chemistry newspapers were published, CAT-2, and after the third and fourth chemistry newspapers were published, CAT-3 were conducted and the collected data was analysed through the anova analysis. The results are provided in Table 5.

Table 5. Results of the Analysis of Variance to Evaluate the CAT-2 and CAT-3 Data

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4491.52	2	2245.76	13.87	.000
Within Groups	12137.19	75	161.82		
Total	16628.71	77			
Between Groups	8219.21	2	4109.60	28.57	.000
Within Groups	10788.11	75	143.84		
Total	19007.33	77			

After the first and the second chemistry newspapers were produced, the mean of the experimental group's students' CAT-2 was 69.21; the control 1 group's students' was 55.12; the control 2 group's students' was 52.08. When Table 5 is examined, it can be seen that there is a significant difference between the means of the three groups. These results show that the application has provided a significant result in favour of the the experimental group's students. With the Scheffe analysis results, it has also been determined that from the means of the experimental group's students and Control 1 and 2 groups' students, there is a significant difference in favour of the experimental group's students. A significant difference was not identified between the means of Control groups 1 and 2. The results of the Scheffe analysis are provided in Table 6.

Table 6. Results of the Scheffe Analysis

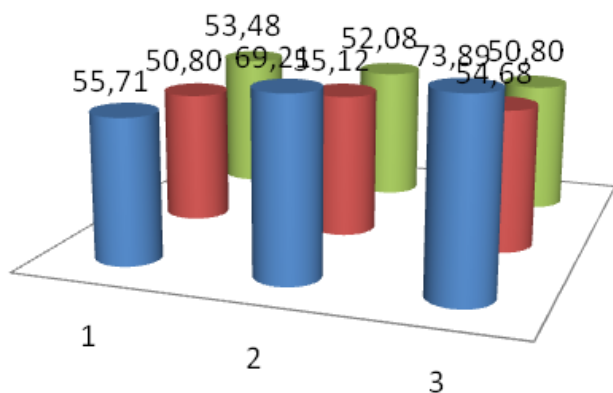
Dependent Variable	(I) Student Group	(J) Student Group	Mean Difference (I-J)	Standard Error	Significance
CAT-2	1.00	2.00	14.09*	3.50	.001
		3.00	17.13*	3.50	.000
	2.00	1.00	-14.09*	3.50	.001
		3.00	3.04	3.59	.701
	3.00	1.00	-17.13*	3.50	.000
		2.00	-3.04	3.59	.701
CAT-3	1.00	2.00	19.21*	3.30	.000
		3.00	23.09*	3.30	.000
	2.00	1.00	-19.21*	3.30	.000
		3.00	3.88	3.39	.523
	3.00	1.00	-23.09*	3.30	.000
		2.00	-3.88	3.39	.523

Once again when Table 5 is examined, according to the anova analysis results for CAT-3 that was conducted after the third and fourth chemistry newspapers were published, it was seen that there was a significant difference ($\text{sig.} < 0.05$) between the experimental and control groups. The CAT-3 mean of the experimental group's students was 73.89; the control 1 group's students was 54.68; the control 2 group's students was 50.80. These results show that the application has resulted in favour of the experimental group's students. The Scheffe analysis also put forward that from the means of the experimental group's students and Control 1 and 2 groups' students, there is a significant difference in favour of the experimental group's students. A significant difference was not identified between the means of Control 1 and 2 groups (Table 6).

3. Two different applications were carried out within the experimental and control groups of this study, traditional education was practiced in control groups whereas in the experimental group, in addition to the traditional education, 4 chemistry newspapers supporting Chemistry, Technology, the Society, and the Environment were produced. After two newspapers were published, in January, CAT-2 was conducted and while a significant increase was observed within the experimental group, no significant increase was observed within the control groups. After the third and fourth chemistry newspapers were published, in March, CAT-3 that was conducted on all groups consisted of the same questions and while an ongoing increase was observed within the experimental group, no significant increase was observed within the control groups. Results of CAT 1, 2, and 3 means are provided in Graphic 1.

Graphic 1. Results of CAT 1, 2, and 3 Means

■ Experimental Group ■ Control 1 Group ■ Control 2 Group



Graphic 1. CAT 1, 2, and 3 Means of the Experimental, Control 1, and Control 2 Groups

4. Conclusion and Suggestions

In this study, to what extent using newspapers when teaching chemistry in highschools affects the student's achievement was examined. Although a study carried out at a vocational highschool was not found in literature review as sample, studies that show the increase in the student's achievement rate in science, history, social sciences, geography, and language classes with the use of newspapers in class, and studies that are compatible with this study were found.

In this study, teaching with methods that might motivate the student, that will draw the attention of the student and increase his interest, and that will make learning more meaningful were found within the findings as factors that increase the achievement of the matter and it was reached to the conclusion that extracurricular activities related to teaching increase achievement. With the printed newspaper activities,

all the students that were not in the experimental group have also started to follow scientific publications and technological developments, and have started to bring newspaper or magazine clips that have drawn their attention to class and share them with their friends.

In Jarman and McClune's research (2001), most of the teachers have stated that they believe in using newspapers in teaching science. The finding which shows that teaching through using newspapers to increase the students' academic achievement in chemistry is more efficient than traditional teaching is in agreement with Olson's study (1985), whose findings are in favour of the use of newspaper that positively changed the students' knowledge, and Olson's findings (1984) that put forward the fact that the newspaper enables essential changes in changing and improving the students' knowledge and attitude.

In the same sense, Sulluvian (2002) and Bozkurt (2010) have pointed out that using newspapers in classrooms have a positive effect on the student's achievement and this is in agreement with our findings that suggest using newspapers in chemistry lessons increase the student achievement. Guenther and Lashier (1985) also showed newspapers as the source of informal learning and as one of the keys to reach achievement in science lessons and they published many activities where newspapers were used. Carried out by Munck (2006), "The Use of Newspapers and Journals in Teaching History" was a research related to the use of newspapers in education. The research was carried out for ten weeks in 3 different 10th grade classrooms of 90 students in total. At the beginning and end of the unit, an achievement test was carried out and according to this test, it was reached to the conclusion that with the use of newspapers and journals in class, students had learned their civil rights better and their interest towards reading these publications had increased. Arin's study (2006), "The Use of Current Issues in Social Sciences Lessons to Affect Student Achievement and Memorization," used 6th grade students as pilot model. In the study, it was reached to the conclusion that by following the current issues via sources such as the newspapers, journals, and TVs, their achievement in Social Sciences and their memorization abilities had improved. For Ünlüer's study (2008), "The Effect of Using Newspapers in Social Sciences Lessons on Students' Academic Achievement and Attitude," 4th grade students were chosen and together with the qualitative and quantitative data collection methods, a compound method was applied. By the end of the study, it was reached to the conclusion that teaching by using newspapers in Social Sciences lessons increased the students' achievements and improved their attitude when compared to traditional teaching.

In a study carried out by Maheshwari (1980), it was stated that when compared to the students that were taught only through textbooks, the student groups that were taught also by the use of newspapers were advantageous in terms of vocabulary and reading comprehension. Poindexter-Wilson's study (1986) pointed out that the group that was taught via the use of newspapers was much more successful than the group that was taught traditionally. Lentnek (1997) stated teaching based on using newspapers improves the students in a better sense in terms of grasping the issues and developing their critical thinking skills when compared to students who are not taught via the use of newspapers.

Knowledge is permanent through meaningful learning. According to Ausubel (1968), learning is meaningful when new information is associated to prior knowledge. If association does not take place, the information will stay in the frontal lobe temporarily for the short term memory and then it will be forgotten. This generally happens through traditional learning method. However, presenting what has been learned via the newspaper as newsworthy enables knowledge being permanent and updated.

According to the findings of this study, the following suggestions are presented for future studies:

- In accordance with the chemistry teaching program, activities that are related to subjects appropriate for 10th, 11th, and 12th grade can also be carried out by choosing related units. For example, when going through units of acid base, balance, speed, electrochemistry, organic chemistry, chemistry in our lives, and such, related materials can be easily found and by supporting these types of activities, a contribution can be made to the student achievement.

- With an application in general highschools, whether there is a difference among students can be found out.
- The effect of using newspapers in other types of lessons can be studied to examine its effect on student achievement.
- With extracurricular activities, attitude, motivation, and perception towards the chemistry lesson can be compared as before and after the activities.
- To put it another way, as Wittgenstein (1926) stated, “The solution is found by reorganizing the information that is already possessed.”

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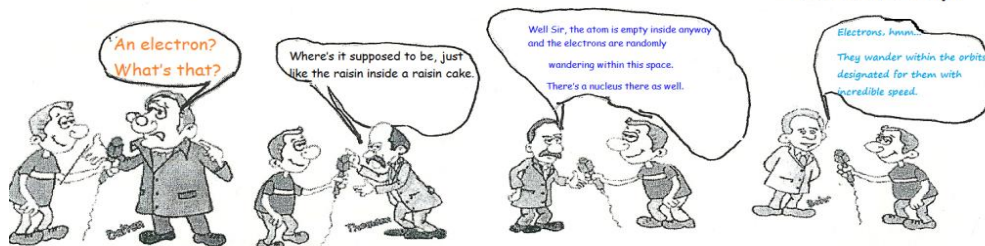
APPENDIX

YUNUS EMRE ANATOLIAN VOCATIONAL HIGH SCHOOL

24 November 2009

CHEMISTRY GROUP

We celebrate our
Teachers'
Teachers Day!



Our reporter travelled through the atom's history and interviewed the scientists that made great contributions by asking them about the electron which are the particles that form the atom. Are you curious about the answers? Which scientist do you think gave the most correct answer?



LET'S USE NATURAL SUBSTANCES TO COLOR FOOD!!!

The synthetic dye used in the food industry causes a lot of harm on people. Health is the most important element of human beings.

Eating consciously is the necessity of living healthily. For this reason, natural dye should be used instead of the synthetic dye that is used in food. Nowadays, people have been discussing the fact that synthetic dye does not have any advantage toxicologically and that natural dye should be used instead. Serious restraints have been brought to the use of synthetic dye being used as food substance. We should draw attention to the fact that synthetic dye substances should be used not in the food industry but in the industry sector and that the industrialists in our country should be guided within this respect as well. For example, we have to encourage the use of food such as red beet that is grown widely around our country and whose leaves and pulp are not used.

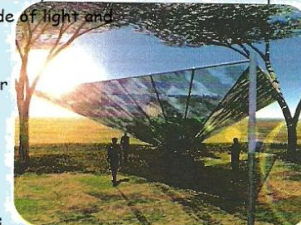
In other countries, experiments about this matter were carried out and as a result, by using red cabbage, liquorice, carrots, and red beet, tainted yellow-orange and tainted purple-maroon color pigments were obtained and by using these in the food industry, the color of dough was changed. Similarly, people living in ancient time would also use natural substances such as vine leaves, walnuts, and onion skin to dye their fabric.

By using the natural substances to color food, there will be new job opportunities, environmental pollution will be prevented, there will be contribution to the world's economy, and the human health will have been protected.

We carried out related experiments with our Chemistry teacher at school as well and we observed the fact that fabric can be dyed with the use of natural substances.

MAKING WATER OUT OF AIR

Through drought and global warming, it's been understood that water is the most important source of the recent years. Using the water sources we have well and getting water from any kind of possible way excites us. Israeli two doctorate students developed a quite simple mechanism with which they enable making water out of air and with which they received an international award. The mechanism, which is no other than an upside down pyramid made of light and foldable panels, enables the humidity within air to condense and flow to a tank. Joseph Cory and Eyal Malka, who are doing their doctorate studies in architecture in



Technion-Israel Technology Institute, created "Watair" that is a pyramidfunnel with a 30 square meter surface that makes 48 litres of water from air every day. Depending on the amount of collectors, the invention is thought to be used easily within urban and rural areas that suffer water problems. The "Watair" designers received the first prize among 100 project teams that took part in the "Obtaining Water Contest" that was organized by a notable engineering and innovation firm called Arup.

Source: Bilim ve Teknik, June 2007 (American Technion Society Press Release, 4 June 2007)

"If you want to live a better life, kill your bad thoughts."
Sir W. Raleigh

"If the path you're walking doesn't have any challenge or obstacle, that road leads to nowhere."
Bernard Shaw

once a month is published

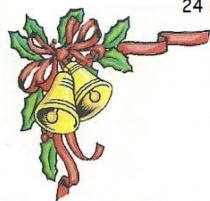
YUNUS EMRE ANATOLIAN VOCATIONAL HIGH SCHOOL

24 December 2009

cHEMISTrY GROUP

Issue: 2

School Principal: Ahmet KARADEMİR



Happy New Year!

How was the Avogadro's Number Calculated?

Avogadro's Number is known as $6,02 \cdot 10^{23}$.



Avogadro's great-great-grandfather starts to count one mole particle....)



Avogadro's great-grandfather continues...
Avogadro's grandfather..



Avogadro's great-grandfather continues...
Avogadro's grandfather..



Finally, Avogadro reaches the number $6,02 \cdot 10^{23}$

PERIODIC TABLE

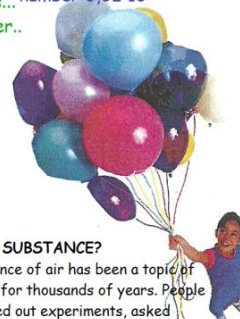
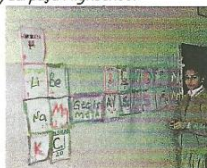
After the elements' discovery one after another, there happened to be a need to form a table that would list the common properties of the elements. Dimitri Mendeleyev fulfilled this need with his periodic table. When the scientist looked at Mendeleyev's table at first and realised that the table was listed according to the atomic weight, they made fun. However, as if making fun of those that had made fun, Mendeleyev's table has survived until today with only a few minor changes.



Do you know what these minor changes are? Some of the elements being listed according to their proton numbers instead of their atomic weight. It should not be forgotten that atomic weight is parallel with the proton number and it usually is listed in the same manner as of the proton number. Another information that we thought would be important is that... Henry Moseley who carried out the final studies on the Periodic Table was Rutherford's student. Moosely was assigned as a soldier in World War 1 and his duty was to be a war photographer. When going to war, Moseley died in Gallipoli on 10 August 1915.

By the way, our Chemistry teacher told us that the quickest way to memorize the periodic table is to make funny and catchy sentences by using the symbols of the elements. She presented the 1A group that is one of the popular groups of the periodic table to be asked in every exam as follows: "Haydarpaşa Lisesinin Nankör Kimyacı" or "Haydarpaşa Lisesinin Nazik Kimyacı." (Group 1A: H (Hydrogen), Li (Lithium), Na (Sodium), K (Potassium)) the teacher offered learning through mnemonics device causing the sentences to lose sense when translated but the literal translation for the examples are as follows: "Ungrateful Chemist of Haydarpaşa Highschool" or "Kind Chemist of Haydarpaşa Highschool"

Solutions are endless for this matter, if the matter is the periodic table, verses that would top the Ramadan poems would be written about it. For this reason, there are many more poems for every group... There is the Group 2A, the Group 7A, aaaaaanndddd... the dear proud Nobles Gases... the Group 8A. Remembering them is easy but let's learn how to memorize those groups in class...

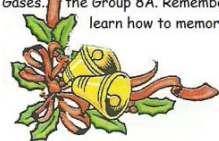


IS AIR A SUBSTANCE?

The existence of air has been a topic of discussion for thousands of years. People have carried out experiments, asked questions, and constantly questioned: Is air a substance? In order to find the answer to this, it is necessary to define what substance is:

Substance is a presence that "takes up a certain area" and "has a mass." Does air take up space? Does it have mass? The answer to these can be found through a simple experiment. First, take a balloon and weigh it on a very precise scale. Then, fill the balloon with air. You will see that as air enters, the balloon inflates. In this sense, it can be said that air takes up space. This way, we have proved the first part of the definition about a presence being a substance.

Does air have a mass? Let's put the inflated balloon on a precise (laboratory) scale and weigh it. The scale will show that there is a difference between the first weight and the last weight. This shows us that it has a mass. So, we can say with confidence that because it takes up space and has a mass, air is a substance.



happy new year

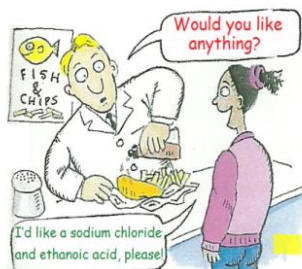
YUNUS EMRE ANATOLIAN VOCATIONAL HIGH SCHOOL
22 JANUARY 2009

Issue: 3

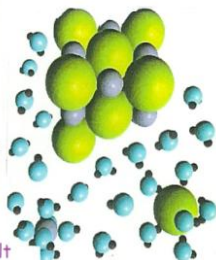
CHEMISTRY GROUP

School Principal: Ahmet KARADEMİR

Chemical Bonding



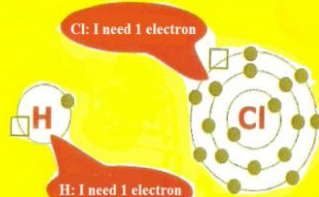
Translation: The girl asks for some salt and vinegar for her salad.



COVALENT BONDING

The bond that involves the sharing of electron pairs between atoms is called a covalent bond. It takes part among non-metallic atoms. For example, by sharing their electron pairs, two hydrogen atoms form a covalent bond between each other. This way, each hydrogen atom becomes stable. Just like hydrogen, plenty of non-metals form compounds with other non-metals. CO , H_2O , NO_2 , CO_2 are some of these.

Covalent bond is of two types: Polar and Non-Polar.



THE STORY OF HYDROGEN

The hydrogen atom used to have only one electron. This electron, on the same level, was constantly wandering around by itself. The atom was quite disturbed from this situation. So, it was looking for a friend for the electron.

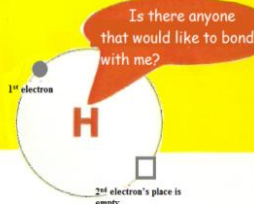
If this atom could find a friend for its electron, it would be happy, as the stable atoms would reach the pattern of electron. With these emotions, while wandering absentmindedly, it came across with another hydrogen atom. It told the atom it had come across with,

"My electron is very lonely, why don't you give me your electron."

The other atom, "I'm dealing with the same situation. No way! You give me your electron."

The first atom, "Then by finding a common solution let's come closer so we will always be near each other. This way, our electrons will have the chance to be in both of our layers and they will no longer be lonely."

After this dialogue, the electrons constantly went between the layers of the hydrogens. This way, the atoms formed a bond between each other and they reached happiness.

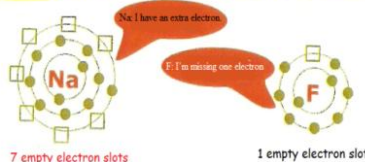


İyonik Bağ



Within ionic structures, instead of molecules, a lattice occurs.

The bonding that occurs due to the electrostatic attraction between the (+) and (-) charged ions is called ionic bonding. Of atoms that form ionic bonds have (+) charged ions that gives up electrons and (-) charged ions that accept electrons. Common salt is created from the ionic bonding between sodium and chloride atoms.



Chemistry Teacher:
Nuray YÖRÜK

Kimy@ Grubu (Group Chemistry)

Bilgehan GÜÇLÜ

Emre YÖRDEM

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Neşe AYSAN

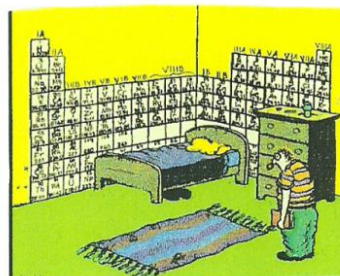
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Şeyma KAYA



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Öğrenci Forumu



The solution Bülent's parents found for him because he wasn't doing well with Chemistry.

Issue: 4

School Principal: AHMET BAKAN

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Polymer

CHEMISTRY GROUP

THIS ISSUE HAS THIS
YEAR'S GREATEST
INTERVIEW!

Amazing Plastic

Used plastic bottles can be turned into a soft wool-like fabric used in making clothes. These pictures show how it is



1. First, old plastic bottles are divided according to their colors.



2. Then, the bottles are washed by being sprayed on with pressurized water.



3. Later, the bottles are broken to pieces by metal cylinders.



4. By melting the plastic pieces, a sticky mixture is created.



5. Long ropes are made by pouring the melted plastic through holes.



6. After they cool, the ropes are turned into a thick fabric through weaving machines.

It takes 800 years for plastic bottles that haven't been recycled to decompose in a storage yard.

BARLEY FOR THE HORSE, CHEMISTRY FOR THE BRAVE... (Turkish proverb)

WITHIN EVERY CHEMIST LIES A DISCOVERY!

Pasteurisation:

Pasteurisation was invented by French chemist Louis Pasteur in 1876.

Milk is pasteurized by being heated for 15-20 seconds at 72°C-76°C. Then it is quickly cooled. Pasteurized milk should be kept in refrigerators and be consumed within two-three days.



Some wastes can be turned into new things and can be used again. We call this recycling.



Paper, cardboard, glass, metal, and plastic can be reused.

Usually, recyclable stuff has this sign on them.



One glass bottle decomposes in 4000 years in nature.

Bubble gum decomposes in 5 years.

Metal cans decompose between 10 to 100 years.

Cigarette filters decompose in nature in 2 years.

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