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Message from the Editors

The Online Journal of New Horizons in Education (TOJNED) reflects rapid development on diffusing valuable researches from interdisciplinary fields through academic papers. The journal aims to underline the significance of merging academic disciplines and different practices in the field of education and reflect on news horizons in education. In this respect, selected papers from the field of education need to be original, different practice on the base of qualitative and quantitative researches, especially mix approach.

As this issue promotes how the journal is developing as regards its vision and mission, there are valuable researches and their studies that contributed to the journal. Therefore, I would like to thank to editorial board, reviewers and the researchers for their valuable contributions to the journal and this issue.

Prof. Dr. Aytekin İŞMAN
Editor in Chief

As being editor of The Online Journal of New Horizons in Education (TOJNED), I am happy to publish current issue of 2012. It is a great pleasure to announce the success of the journal developments and contributions of valuable researches. I would like to thank to all authors and associate editors for their contributions to the current issue of TOJNED.

On behalf of the editorial team of Turkish Online Journal of New Horizons in Education (TOJNED), we will welcome to see original and qualified studies of valuable researchers in order to share with academic agenda. All authors can submit their manuscripts to tojnedjournal@gmail.com for the following issues.

Prof. Dr. Cem BİROL
Editor

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A Qualitative Examination of University 'Engagement' through the Lens of Business Executives

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ABSTRACT

The Carnegie Commission on Higher Education and at least 311 Universities recognize the value of community engagement for universities. By definition, this engagement is intended to be mutually beneficial for all constituents. However, there is limited research with regard to the alignment of perspectives on the value of engagement across constituents. This paper finds that business executives do not perceive the university as receiving 'value' from its engagement activities. Further research is called for to examine whether such a perception is a widespread phenomenon, as this has an important bearing on a university's strategic planning process

Keywords: *community engagement, business executives, strategic planning, laddering technique, hierarchical value map*

INTRODUCTION

The Carnegie Commission on Higher Education, established by the Carnegie Foundation for the Advancement of Teaching, in 1973, published a classification of institutions of higher education so as to facilitate the study of higher education. This classification has become de rigueur in academic and non-academic discourse. Despite four rounds of updates to the classification system, no natural home was to be found for a certain university-characteristic - special commitments to the area of community engagement (McCormick and Zhao 2005). It was only in 2006 that this area of higher education found due representation in the hallowed Carnegie classification with the introduction of the category: "institutions of community engagement."

The Carnegie Foundation has defined community engagement in broad terms as "the collaboration between institutions of higher education and their larger communities (local, regional/state, national, global) for the mutually beneficial exchange of knowledge and resources in a context of partnership and reciprocity" (Driscoll 2008, p. 39). This definition encompasses Curricular Engagement and Outreach, and Curricular Partnerships as the two main categories of engagement. In 2010, 115 Universities and Colleges attained the engagement classification, which combined with the 196 institutions that received this classification by 2008 represent about 4.6 percent of all Colleges and Universities.

Should this be interpreted as indicating that all 311 institutions have mutually beneficial exchanges of knowledge and resources in a context of partnership and reciprocity? By definition, the Carnegie Foundation and these Universities and Colleges believe so. This belief is supported by the growing number of Universities' centers dedicated to outreach and engagement and the inclusion of "engagement" as a central part of strategic planning at the University level (e.g., Fitzgerald and Zimmerman 2005). However, as highlighted by Zuiches, et.al (2008), and Driscoll (2008), there is a critical deficit of knowledge regarding the perspectives of community constituents on the engagement activities of universities. The focus on documentation related to institutional culture, commitment, support, and evidence of engagement as well as the use of engagement in higher-education-strategic-planning have fostered university-centric descriptions of community engagement. This paper examines the perspectives of business executives involved in activities and experiences surrounding university engagement and raises a number of issues for

assuring robust, systematic assessments of institutional engagement with communities.

Just as there is a recognition in marketing research of the importance of understanding customers' perspectives of business tactics and strategies (e.g., Gwinner, Gremler, and Bitner; 1998, Overby, Gardial, and Woodruff; 2004), we argue that it is critical to understand the perspectives of community engagement held by community constituents. Without a balanced perspective, it is extremely likely that planning and support for engagement initiatives will result in inefficiencies and reduce the effectiveness which such activities have, not only in benefiting a community, but also in benefiting institutions of higher learning. Particularly when resources are limited, it is critical that engagement programs work smart and remain truly reflective of their intended purpose. Our focus in this direction involves a qualitative study of business executives' perceptions of engagement and its value.

The literature on community engagement and outreach is growing in popularity and in detail. Most recently, a new journal - The Journal of Community Engagement and Scholarship - published out of the University of Alabama is completely dedicated to this topic. Whereas efforts such as this encourage advances in research quality and breadth in this area, our review of the broad area of study suggests that most of the focus in the extant literature remains on the actions and perceptions of engagement from faculty and students perspectives. For example, it tends to focus on specific pedagogy, such as service learning (e.g., Schwartz and Fontenot, 2007) and student perceptions of engagement-related pedagogy (e.g., Bove and Davies 2009). Improving the pedagogical nature of engagement is extremely valuable, as is our understanding of student perceptions of such activities. However, that is only a portion of what defines engagement. Engagement should, as stated previously, be mutually beneficial to all partners. Thus, the gap in research related to the effectiveness and equitable nature of partnerships across all constituents (McLean and Behringer 2008) is troubling.

This paper focuses on understanding business executives' perspectives because they are likely to have experience with several forms of engagement and they represent a large segment of community constituents, particularly for Colleges of Business.

Recalling the intention of the voluntary classification system used by the Carnegie Foundation, Universities that seek to qualify under Curricular Engagement must describe:

"teaching, learning, scholarly activities that engage faculty, students and the community in mutually beneficial and respectful collaboration, address community-identified needs, deepen students' civic and academic learning, enhance the well-being of the community, and enrich the scholarship of the institution" (Driscoll 2008, p. 30).

To qualify under Outreach and Partnerships, universities must describe

"two related approaches to community engagement: first, the provision of institutional resources for community use in ways that benefit both the campus and the community and second, collaborations and faculty scholarship that constituted a beneficial exchange, exploration, discovery, and application of knowledge, information and resources" (Driscoll 2008, p. 30).

This is a lot to do, and there is concern regarding the effort at assessing engagement, as voiced by Driscoll (2008). In particular, Driscoll highlights the need for improved assessment involving the evaluation of the community's need for and perceptions of the institution's engagement. This paper represents a first step in addressing such concerns and encouraging additional research on assessing the alignment of multiple perspectives of engagement.

In particular, this paper investigates the values which an understudied segment of community constituents ascribe to Universities' community engagement efforts. Do they view engagement as beneficial to universities, students, businesses, communities, and faculty? What do they view as the most relevant means of engagement? Next, we present the methodological approach to our exploratory study and the initial results of this study. Finally, conclusions and directions for future research are outlined.

METHODOLOGY

Due to the exploratory nature of this study, a qualitative approach was adopted. Specifically, in-depth interviews following a laddering technique (Reynolds and Gutman; 1988) were utilized. This technique makes for the "drilling down" into executives' perceptions and helps elicit a means-ends portrait of their views on engagement (Gutman; 1982).

A purposeful sampling technique was employed in order to obtain views from executives who have complementary experiences with student and university engagement (Strauss and Corbin; 1990). Interviewees were chosen based on different histories of engagement with their local Universities, but similar levels of involvement in their respective communities. The Universities considered in this study are classified as both Curricular Engagement

and Outreach and Partnership Universities.

A brief description of the executives whose perspectives are considered is provided, followed by the results.

Executive Representative A is a male President and CEO of a Mid-Western-based organization which manages several businesses with a global presence. He is also a board member of several private, for-profit organizations in his area. His hometown has both a public University and a private University, and he is on the board of advisors for the College of Business of the public University. He has extensive experience engaging with college students through internships and co-op programs.

Executive Representative B is a male President and founder of a construction company in a town near a large Southern city. He is also an executive board member of multiple regional business and cultural organizations. His town has a private University, and he has extensive knowledge of the University's engagement efforts. Though he has worked with University students on different political and cultural projects in his region, in his own business he has never engaged with students though internships or co-op programs.

Each executive volunteered to participate in a phone interview regarding his views on engagement. Prior to the interviews, the researchers agreed on the initial question to be asked, "What do you understand about engagement?" From there, the interviews were structured so as to allow the interviewee to pursue issues unique to the particular interview. After the initial question, interviewers were directed to type all that is heard and to encourage additional information by probing participants' answers in an ordered fashion, with questions such as, "What is involved in …" or "Why is that important?"

FINDINGS AND DISCUSSION

The results are presented in two phases. First, the data are reduced to a list of key characteristics of engagement (i.e. types of engagement), consequences of engagement, and the perceived value of engagement (see, Table 1). Second, a Hierarchical Value Map (HVM) which connects these elements of our data reduction according to how they were communicated in the in-depth interviews is developed and presented. Data reduction and the mapping of the data were done by two trained evaluators, based on transcripts of the interviews. For this sample, evaluators' work was compared for agreement, and terms and connections that are shown are those for which there was complete agreement. Though some researchers using this methodology include a middle step of producing an implication matrix (Reynolds and Gutman 1988), that step is not presented in this analysis.

Based on the interviews, means of engagement are identified as being student-centered or as incorporating the greater University. With regard to engagement with the University as a whole, the interviewees included the use of classrooms for community meetings, non-credit instruction from faculty, and the efforts of spouses of administrators to lead community fundraising campaigns. This finding is consistent with what the Carnegie Foundation requests for proof of Curricular Engagement and Outreach and Partnerships. However, though not shown in Figure 1 (below), Executive A did not identify any means of engagement which correspond to Outreach and Partnership expectations for Universities.

Table 1: Summary Content for Engagement Activities

Code	Means of Engagement (with Students)	Code	Means of Engagement (with University)	Code	Consequences of Engagement (for Student)	Code	Consequences of Engagement (for Community)
01	Internship	05	Continuing Education	07	Personal ownership	10	Heighten Culture
02	Co-Op	06	Fundraising	08	Knowledge of business	11	Increase Diversity
03	Members of Community Boards			09	Leadership Skills		
04	Class Projects						
Code	Consequences of Engagement (for Business)	Code	Value of Engagement (for Student)	Code	Value of Engagement (for Business)	Code	Value of Engagement (for Community)
12	Fresh ideas	16	See Higher purpose of business	17	Economic savings	20	Active Citizens
13	Short-term help			18	Broadens Perspectives		
14	Control			19	Corporate Citizenship		
15	Learn about Community						

The executives' perceived consequences and eventual value of these means of engagement related to three different constituents: (1) students, (2) businesses, and (3) the community. The chain of interactions among the means, consequences, and values shown in Table 1 are represented in the means-ends value hierarchical map, shown in Figure 1. Though three constituents were identified, Figure 1 reflects our finding that the constituencies are not necessarily viewed as completely independent of one another with regard to their tendency to create value for one another. Themes which were present in both interviews are marked as "stars" in the Figure. Themes marked as "circles" were unique to one interviewee.

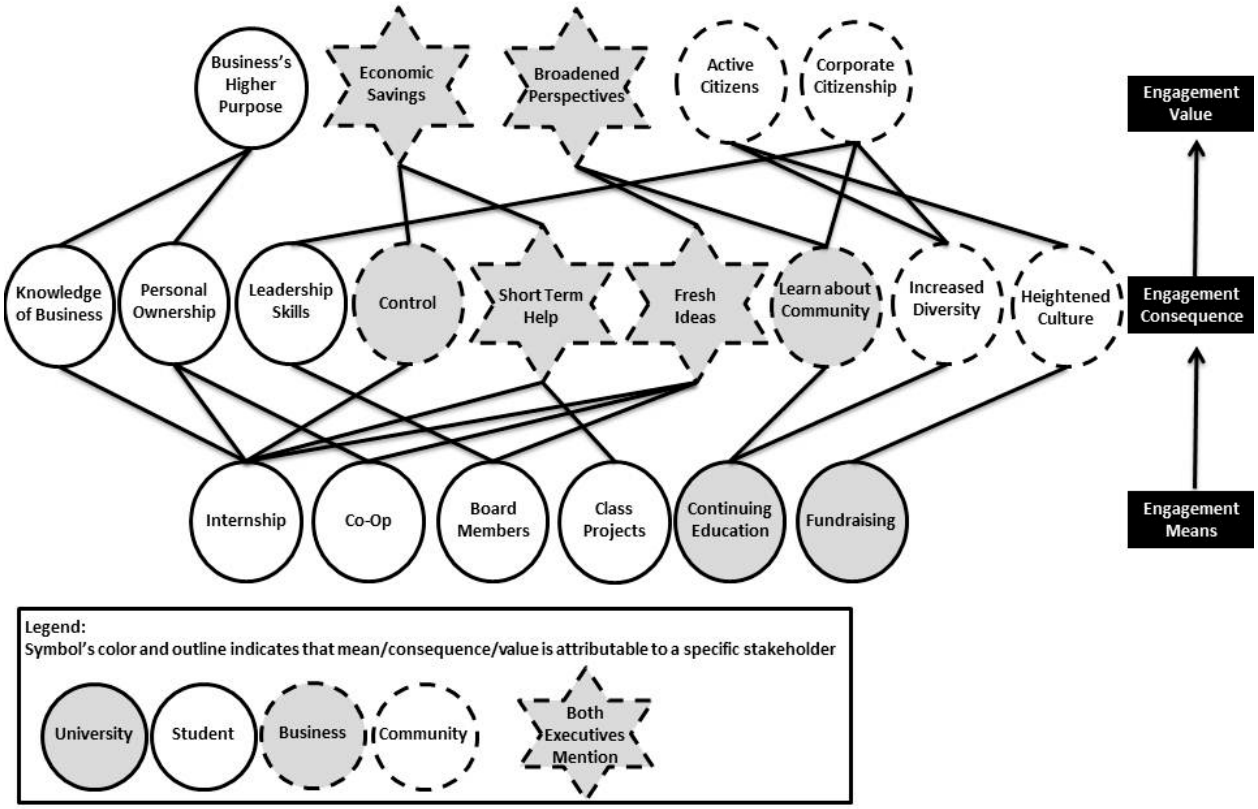

Figure 1: Executives' Means-End Engagement Value Hierarchy

CONCLUSIONS AND RECOMMENDATIONS

This paper, consistent with the definition of community engagement, sets out to encourage a more holistic study of community engagement. To act as a catalyst, we present the initial results of ongoing research into the alignment of perspectives across constituents regarding community engagement and outreach at universities. Some limitations are clear. Foremost among them is the small sample of executives. This issue is being addressed as the researchers continue to pursue this area of research. Nonetheless, there are some interesting conclusions and directions for future research that arise from this paper.

First, it is significant to note that neither of these executives listed their respective university partner as a recipient of value in the engagement relationship. If this finding is shown to be more common across communities, it brings into question whether engagement initiatives among universities are truly "mutually beneficial." Further research may find that the burden of implementing truly reciprocal partnerships rests with the university. Perhaps, at least with regard to businesses, community partners lack the mechanisms necessary to impart value-adding contributions to a university partner. Clearly, they can exert value, and the executives in this sample valued engagement because of what it provides to students and to the community. However, the universities were not particularly identified as value-recipients in these discussions. Thus there appears to be significant promise for future research that explores the dynamics of individual and institutional benefits from community engagement.

Second, the in-depth interviews, even from a small purposive sample, reveal that the number of common themes mentioned by these executives was limited (i.e. 4 out of 20 total themes matched). These results suggest that there may be multiple segments of constituencies among the broader base of business executives, and surely among the greater population of community constituents. Though perhaps intuitive, it is interesting to note that agreement was only in terms of the consequences and value of engagement to business. Future research should investigate whether segments of constituents are best understood by their focus on their position in the community or some other aspect. Similarly, it would be interesting to see if differences among the perceived value of engagement relate to differences in the willingness to engage.

Finally, it is clear that executives' views on engagement are multidimensional. As universities continue to include community and engagement initiatives in their strategic planning, one should be cognizant of the

multidimensional nature of engagement and outreach. In particular, universities and scholars ought to consider the alignment of community partners' perspectives, students' perspectives, faculty perspectives, and administrator perspectives in the planning process.

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ESTABLISHMENT FOR MISCONCEPTIONS THAT SCIENCE TEACHER CANDIDATES HAVE ABOUT GEOMETRIC OPTICS

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ABSTRACT

This study is planned to establish the misunderstandings that science teacher students have about optics. Study data was obtained from 35 sophomore students of Agri Education Faculty, Science Teaching Program during the time period of 2004-2005 fall semester, by applying a 3-tired multiple choice test, which contained 19 question articles and making interviews with ten different students. The result of the tests and interviews with students (teacher candidates) shows that students have misunderstandings about "light propagation", "light reflection," and "light refraction". Student's understanding levels on these subjects are 24.3%, 58% and 25% respectively. Some misunderstandings about light refraction are; "Special beams have drawn as they are reflected from the thin and thick edged lenses" and "Speed of light is constant and has the same value in all mediums". Some misunderstandings about reflection are; "About the formation of an object's view at plane mirror, the changes of level and the place of source of the light that illuminates the object and changes of the level and place of observer change the view that appears in the mirror" and "Special beams don't reflect but refract and pass through the mirror". In addition, to know that teacher candidate students have a low level of understanding about 'light propagation', 'light reflection' and 'light refraction.' In order to establish these misconceptions and fix them in relative programs, representative classes are needed and this is important for science education.

Keywords: *Science Education, Optics, Misconceptions, Teacher Candidates, Physics Education*

INTRODUCTION

In the recent time period, which the importance of science education is increasing, learning the basic science concepts will help students to be able to learn advanced science subjects easier. Instead of teaching subjects, Science Education seems to be tending to teach concepts in recent years. Therefore, as the other countries in the world, there are many studies continuing about concepts in our country too. In order to make sure that students have an understanding level for concepts, to establish the misconceptions and to fix the misconceptions, these studies are concentrate on developing materials and researches on teaching techniques to teach the concepts. Researchers reveal that some time, students have different understandings and statements from scientists have about concepts (Osborne 1982, Palmer 2001). From Scientific Environments, unaccepted Student Statements are generally, "Misconceptions", "Preconceptions", "Alternative Framework", "Common sense concepts", or "Spontaneous Knowledge" (Ayas, Ozmen, Costu, 2002). These Misconceptions full thoughts keep the person from understanding subjects and develop the concepts in their mind.

There are studies in Physics Science that are to establish student misunderstandings and

understanding levels. Among these, Light and Light reflection, Light Refraction and the ones about colors are reserving important places [Kaya and Buyukkasap, 2004, Epik and dig. 2001, Buyukkasap and Samanci, 1988; Yildiz 2000; Feher and Meyer 1992; Galili and dig, 1991, Anderson and Karrquist, 1983]. Kaya and Buyukkasap have established student's understandings levels and misunderstandings about Light and atom (Kaya and Buyukkasap, 2004). As outcome of this research, we have established that student's understanding levels on Light and Atom are 26%, and 84% and misunderstandings on the Light and Atom are 34% and 6% respectively. Misunderstandings about Light were found as "Light is the Substance that illuminate the surface it attains", "Light is a group of lines that comes from a certain source and goes towards eternity" and it's relation with Atom is found as "Atom is the smallest indivisible piece of substance". Guesne and Dig (1985), Ramadas and Direves (1989) and Yildiz (2000) have worked on the definition and structure of Light. The misconceptions about the definition of Light that Yildiz has designated in his study with sixth grate (elementary school) students were found, as "Light is an illuminator substance", "Light is an effect that supplies to see" and "Light is as same as daylight". Guesne and his friends have established that 13-14 year old students have been considering the light as existed. Ramadas and Direves made students to make definition of "light". Lots of student said that light was a group of long, slim and bright lines. Because of the fact that the distance that light takes directly is invisible, it is difficult for students to make definition of existence of the light.

As indicated in the literature, learners have widespread misconceptions. In order to cease them, first of all, teachers and pre-service teachers have to gain knowledge of the misconceptions. Therefore, it is very significant to establish these misconceptions on the topic. As a result, in this study it has been planned to establish that what misconceptions the pre-service teachers have about light.

Misunderstandings and lack of knowledge of 'Light Concept', 'Light Reflection' and 'Light Refraction' often cause difficulties for Candidate Teachers in their future jobs. Thus, on behalf of Science Education, these basic concepts have to be known as well and the misunderstandings about Light Reflection and Light Refraction must be established and removed. For this reason, research question of the study has designated, as "Do candidate teachers have a good enough understanding level on geometric optics?" In the process of solving this problem, sub-problems below will be solved.

Candidate Science Teacher's

1. Understanding levels on Light Propagation
2. Understanding levels on Light Reflection
3. Understanding levels on Light Refraction
4. What kind of misunderstandings they have.

METHOD

The study aims to determine the conceptions and misconceptions of prospective science teachers about refraction and reflection, In addition, helping students acquire scientific thinking skills for the subjects of refraction and reflection, ensuring that they thoroughly learn the concepts they are supposed to know, helping them establish connections between the basic concepts they know and the phenomena they encounter in daily life, keep them updated about the latest developments in technology and guiding them to science and optical technology, the study is intended to contribute in their education.

The data was obtained from 70 sophomore students, whom are attained from 90 students arbitrarily, of Agri Education Faculty, Science Teaching Program during the time period of fall semester in 2004-2005.

Study data has obtained by applying a 3-tired test, which contained 19 question articles and semi-structured interviews with ten of the sample students.

At first progress of the 3-tired test, questions were asked as written, at the second progress of the test, questions were asked on a diagram and at the third progress of the 3-tired test, and questions were prepared to make sure of the answers that were given to the first and second progresses. The reason of making three-progressed test was to increase the confidence of data. To prepare the questions for this test, resources that have been applied are; I- The test that was used by Chen and his Friends (2002) to high school students in Taiwan that was suppose to determine

students' misconceptions about images at plane mirror, II- The test that was used by Yildiz to the sixth grade (elementary school) students to establish misconceptions about 'The Light Unit' and III- Experts opinions. Researchers prepared 30 multiple-choice questions on Light propagation, Light reflection, and Light Refraction to establish student's misunderstandings about subject. In order to examine the validity of these questions, five experts in Science field, which are in charge at the Agri Education Faculty and Kazim Karabekir Education Faculty, examined the questions by analyzing from the sight of validity, fixed the needs and brought the number of questions down to 22. The test was prepared as multiple-choice test and last choice of questions of the multiple choices test is prepared as "If you think that none of these choices is right, write your own answer or illustrate in a diagram". Only one article of the answer choices was prepared as correct and the others are to cause misconceptions. First practice of this test was applied to 32 first grade students of Agri Education Faculty. After first practice of the test, three unclear questions were taken out of the test because of not understandable. After unclear questions were taken out of the test, the other questions were reviewed and then the validity of the test 'α-coefficient number' was found 0.69.

In order to support the test results and establish the students' misconceptions, there are interviews composed of ten questions applied to the students. The purpose of semi-structured interviews was to make the person more comfortable and give them more room for their statements about topic and to let them be able to explain their answers easier (Karasar 1994). Thus, it was possible to expose Candidate Teachers misunderstandings. Interview data were recorded in writing method.

During data analyzes, every correct answer to the questions in the test was taken as understanding and incorrect answers were taken as misunderstandings. Frequencies and percents of correct and incorrect answers have been calculated. The discussion on how to analyze data is continuing between educators. "It is needed to establish the same and different thoughts of students that they had about topic and its details, than compare the results," says Yin. To reflect the real thoughts of students, the sentences that students have said during interviews must be taken directly and unchanged (Yin, 1994). We have represented interview's data at the question-answer form. Data analyses are made in two different ways. Original and individual thoughts are taken directly just as Yin says, but same and different thoughts from more than one person are analyzed as taking frequency and putting into percentage.

FINDINGS

In order to establish understanding levels and concept misconceptions about 'optic', data gathered and analyzed with help of basic analysis methods. Below are two main titles that research findings are based on. These two titles are given as "The Findings Obtained From Test" and "The Findings Obtained From Interviews"

Test Results

As obtained from the test, frequency and percentages of correct answers for 'Light Propagation', 'Light Reflection', and 'Light Refraction' are given on tables 1, 2 and 3.

Frequency and percentage of the test

Table 1: The Light Reflection and Inventions obtained from images of Light Reflection

	Comprehension (Understanding)		Misunderstanding		Sureness	
Question	F	%	F	%	F	%
1	7	20.0	28	80.0	31	88.6
2	18	51.4	17	48.6	26	74.3
3	9	25.7	26	74.2	27	77.1
4	14	40.0	21	60.0	26	74.3
5	17	48.5	18	51.5	25	71.4
6	27	77.1	8	22.9	33	94.3
7	25	71.4	10	28.6	34	97.4
8	27	77.1	8	22.9	31	88.6
9	23	65.7	12	34.3	31	88.6
10	27	77.1	8	22.9	29	82.9
11	20	57.1	15	42.9	27	77.1
15	30	85.7	5	14.3	31	88.6

Table 1 gives us an idea on that students have 58% average level of understanding on the subject 'Light Reflection'. The findings indicate that their understanding level of light reflection 58% is a quite low.

Misconceptions about light Reflection: In order to see an object from plane mirror in a dark room, the mirror needs to be illuminated (28.6%) while both mirror and object need to be illuminated (51.4%). The image of an object in the mirror is on the extension of observer's glance direction (20.0%). The image of an object in the mirror is always faced to the observer (22.9%). If light bulb is put to a higher level, the image of object will also appear at a higher level (11.7%). When it is put to a higher level, the image of object will appear at the lower level (57.1%). If the observer gets far from the mirror, the image of object will get far from the mirror too (31.4%). If the observer gets far from the mirror, the image of object will get closer to the mirror (20.0%). Black object is invisible from the mirror (17.1%). The image lines that come from observer reflect from the mirror and than effect the black ball (28.6%). A beam that comes from a light bulb and goes to concave mirror in any direction gets refracted and continues on its way (17.1%). A beam that comes from a light source and goes to convex mirror in any direction reflect as to pass through the focal point that is behind the mirror (14.3%).

As we can see, students have many misconceptions about light reflection. It also appears at the 3rd progress that the participants have confidence for their answers to the 1st and 2nd progress (average 79.32%).

Table 2: The Light Refraction and findings obtained from the images that have occurred by Light Refraction

	Comprehension (Understanding)		Misunderstanding		Sureness	
Question	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
14	19	54.3	16	45.7	27	77.1
16	12	34.2	23	65.8	30	85.7
17	9	25.7	26	74.2	28	80.0
18	28	80.0	7	20.0	33	94.3
19	22	62.8	13	37.2	30	85.7

Students' average understanding levels are appearing as 25% from the data on table 2. As seen from the table the students' understanding level of light refraction is quite low.

Student misunderstandings that are obtained about light refraction: An observer that looks straight to the aquarium sees the fish farther (5.7%). An observer that looks straight to the fish that is in the aquarium sees the fish at the same position (5.7%). A beam that comes from a light source and goes to thin edged lens in any direction gets reflect and continues on its way (37.1%)

As we can see, students have some misconceptions about light refraction. It also appears at the 3rd progress that the participants in a great ratio have confidence for their answers to the 1st and 2nd progress (average 80.95%).

Table 3: The findings that are obtained from 'Light Propagation' questions.

	Comprehension (Understanding)		Misunderstanding		Sureness	
Question	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
12	1	2.9	26	74.3	20	62.5
13	16	45.7	19	54.3	25	71.4

Students understanding levels about Light Propagation are appearing as average 24.3% from the data on table 3. It is seen that the student understanding level of light propagation is very low. Every article of the question (12) about Light propagation is about; speed of Light propagation, the changes on Light when it changes the medium and it is waves, Light Frequency, and Light Intensity.

Student understandings that are obtained about light propagation: while beams are passing through a medium from one another, wavelength does not change (14.3%). While beams are passing through an medium from one another, its speed doesn't change (54.3%). While beams are passing through an environment from one another, its intensity doesn't change (5.7%). When Light enters into a medium, its frequency changes (73%). If a light wave passes through the air before a glass object then through the glass object, into the air behind the glass object, the speed of light wave increases suddenly but it occurs lower than 3 x 108 m/s (22.9%). If a light wave passing through the air enters the glass object and then exits to the air again the light wave goes forward with the speed that it has from the glass object. (14.3%). If a light wave passing through the air enters the glass object and then exits to the air again, the light speed reduces (8.6%). There are important misunderstandings about light propagation as it appears. At the 3rd

progress students (participants) have confidence for their answers to the 1st and 2nd progress (average 66.95%).

The Findings Obtained From Interview

The findings that are obtained from the interviews are given below.

1. What kind of changes occur with the speed of light if the light enters to denser medium from the air that has diffraction index 1 and repasts to the air?

Two students: "Its speed reduces, after it gets out of the medium no changes occurs with its speed".

Three students: "Its speed increases suddenly, but it gets a lover speed from the speed it has in the air".

One student: "its speed gets lower than it is in the air; after it repasts to air its speed reduces again".

Other students: "its speed reduces in the denser medium, after it gets in the air; it gets its speed as before". 40% of students have answered this question correct. Many of students have misconceptions about light speed when it changes its medium.

2. When light enters to different medium. Which properties of light changes?

When light enters to a different medium:

>Seven students: "Wave length does not change". Three students: "Wave length changes".

>Five students: "Light speed changes". Five students: "Light speed doesn't change

>Nine students: "Light frequency changes". One student: "Light frequency doesn't change".

>Two students: "Light intensity doesn't change". Eight students: "Light intensity changes".

Students have many important misconceptions about light propagation in different medium.

3. If a pencil is put in front of a mirror in a dark room, to see the image of the pencil in the mirror should the flashlight be aimed at mirror or pencil or aligned parallel to the mirror? Why?

Three students said "Plane mirror needs to be illuminated by applying lantern into it" three different students said "both mirror and object need to be illuminated" and last four students said, "Only object needs to be illuminated".

4. Does an Image of a pencil in front of a mirror appear bigger when you look at the pencil from far distance or from a near distance? Why?

Seven students said, "When observer gets far from the mirror, the image of pencil appears smaller", two students said, "When observer gets far from the mirror, the image of pencil appears bigger" and one student said, "the appearance wont change its size". Many students have thoughts that object has its image by the beams that are going from eyes.

5. Does an Image of a pencil in front of a mirror slide down when you look at it from above or from down? Why?

Seven students said, "When you look at the pencil from above its image gets smaller", three students said, "Its image does not chance". It seems to be that many students have the same misconception that they had from the question before.

6. In a dark room, does the image of a pencil in front of a mirror get smaller if the lamp is raised up or become distant? Why?

Six student said "When the light source is risen up, the image of the object becomes smaller" while three of them said, "When the light source is pulled up, the image of object gets bigger". Lastly, one said, "image does not change". They all still have the same misconception from two previous questions.

7. Draw the special rays on the thick lenses and the ray that comes from any direction to it.

Two students said, "Rays will reflect back from the lens", five students said, "rays will have a straight direction" and none of the students knew what direction will rays have after they passed through the lens. The data prove that

20% of students think of lenses as reflectors, and they have not understood the Light Refraction subject, but have memorized the special rays only. Half of the students have understood the matter.

8. Draw the special rays on the convex mirror and the ray that comes from any direction to it.

Two students have described the special rays correct but these students could not state the way of the rays that come into convex mirror in any direction. Other students have described the way of special rays and the way that come into the convex mirror in any direction. It can be said that most of the students has understood the reflection of special rays from a convex mirror.

9. How does the image of an object in a denser medium change according to their place as an observer looks it from air.

Looking from an obvious angle through denser and transparent medium, "The image will get farter," said two students, and the other students said "The image of the object will get closer while looking at it from an obvious angle". "If you look through the object in the transparent medium directly, the image will be in its real position" said two students, but the others said the image will get closer. Most of students have understood light refraction and the images occur after the refraction but some of them still have misconceptions about refracted rays and the changes when they are in different mediums.

10. Do black colored objects appear in the mirror? Explain the reason?

Four students: "The reason black object has an image in the mirror is that black object scatters the light rays". One student: "The light rays that come from observer's eyes reflect from the mirror and illuminate the black object". One student: "because of black object absorbs the light, black object does not appear in the mirror". Other students said that black object appears in the mirror but they could not state the reason for that. As we can see most of students don't have the knowledge of black object that it can spread light too.

DISCUSSION AND SUGGESTIONS

In order to establish the misconceptions about optics, this study has determined that students from Science Education department have low understanding abilities and many misconceptions about Light propagation, Light reflection, and Light Refraction.

According to test results: student understandings about light reflection established as 58% (Table 1). Students understanding levels on light reflection are low. Main misconceptions that candidate teachers have about light reflection; "In order to see the object in the plane mirror, mirror has to be illuminated", "In order to see the object through the mirror in a dark room, both object and mirror need to be illuminated", "If the light source that is used to make image appear gets moved, the size of image of object in the mirror will get effected by this movement", "If observer moves, the image that has occurred in the mirror will move and its length will get longer", "The beams that are sent to the mound-mirror and hole-mirror get refracted and pass behind the mirror". There are misconceptions established, as black object doesn't appear in the mirror. These misconceptions support findings obtained from interview. There are different investigators have established similar misconceptions too (Chen and His Friends, 2002). We think the reasons for these misconceptions to occur with students are because students have the thought of an object for in order to appear in the mirror, light to illuminate the object has to come from the mirror and also when teachers make drawings about image occurring, teachers don't explain the light and observer that is in the environment.

Student understandings on Light Refraction established as 25% (Table 2). Students have very low understanding levels on refraction. Student's misconceptions about Light Refraction have been established. These are; "If you look at the object in a thick environment from a less thick environment, image of object will appear farter", a light beam that comes to the thin edged lens from any direction, gets reflected from thin edged lens than continue its way". The findings obtained from interviews show that very a few students have these misconceptions.

Student understanding levels on light spread have established as 24.3% (Table 3). Student understanding levels on light spread are very low. The misconceptions that are obtained from the questions that were asked about Light Spread: "Light refraction degree is not depended on light-speed-degree factor when light is spreading at different environments", "While the light is spreading in different environment, its speed, strength and wave-length doesn't change" and "While light is passing through clear environment from another clear environment, its frequency changes". The findings that are obtained from interviews support this result.

Student's low understanding levels on optics and reasons of their misconceptions about this subject are thought as insufficient knowledge from high school, the OSS (student selecting examination) as an obstacle for school

lessons to be studied and lacking laboratory activities. In the research that Kaya and Buyukkasap have done on Light and Atom, they found elementary school, middle school and high school teachers and the materials they have been using for optics as reasons of students misunderstandings (Kaya and Buyukkasap 2004). As other reasons for our students misunderstandings, we think that is because of most of them had studied their middle and high schools at rural areas and also they had been taught science classes with the teachers whose field is not science.

Lecturers and teachers should explain the light that comes to the object and state the observer in the environment while they are explaining reflection subject and making drawings about image occurring.

The futures science teachers have to comprehend these concepts very well. The misunderstandings that teachers have will cause students to misunderstand same subject, which is an understatement. Misunderstandings that teachers have are reported in literature (Goodwin, 2000). Therefore, establishing misconceptions and misunderstandings on these subjects are needed in our faculty.

Student misunderstandings and concept misconceptions on optics are arising from middle schools and high schools teachers and materials they have used for classes. Researches and necessary precautions are needed for this subject.

Lecturers, teacher and text writer have to pay enough attention to these subjects and warn students about details, which can be misunderstood.

Also, high school and college level classes need to be taught with computer support and animation slights. Laboratory activities and developing optics materials studies needed.

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IMPACT OF TRAINING WORKSHOPS ON CREATION AND ADOPTION OF NEW ELECTRONIC SCIENTIFIC JOURNALS

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ABSTRACT

A series of eleven workshops were organized by the Scientific Publishing Center (SPC) to faculty members each of which to a specific college associated with University of Bahrain (UoB). The total number of participants was 238. A structured questionnaire was distributed at the end of each workshop, and interviews with some of the participants were conducted. Data analysis indicated high levels of rating to these workshops on the seven aspects under concern. Workshop organization came at the top with a percentage of 94.4% of respondents giving it either very good or good. Topics covered was second with a rating of 93.5%. Time assigned to the workshop was third (92.6%).The fourth was method of presentation (92.0%), followed by used examples (91.7%). Profit gained from these workshops got a rating of (81.5%). Motivation for initiating electronic journals came at the end with a rating of (75.9%).The interviews showed a complete agreement on satisfaction of participants with such kind of workshops. Fifteen projects for initiating electronic journals were received from some of the participants.

Keywords: *Training Workshops, New Electronic, Scientific, Journals*

INTRODUCTION

It is evident that the world is witnessing a dramatic move towards electronic publishing (Al-Khalili, 2012; Mahmoud, 2011; Shapiro, 2005; Aretimi, 2012; Heider, Laverick, &Bennett, 2009; Nelson, 2008; Byrne, 2000). Nelson (2008) indicated to this move by saying that "Each year one of the biggest debates in higher education seems to be: Is this the year that electronic textbooks take off? E-reader devices are getting better. The inventory of digital content is expanding. Business models are emerging to support the needs of students, faculty members, and publishers. People are getting comfortable with new modes of information delivery and pervasiveness of technology in their lives." (PA29).

Recent electronic books afford interactive facilities between the readers and the text, being loaded as hypertext not as PDF. Such a form of electronic books facility is termed as open access, in which readers can get access to related sources or subjects through highlighted links.

College instructors have began to abandon traditional approaches to instruction, shifting towards digital textbooks (Heider, Laverick, &Bennett, 2009; Nelson, 2008; Byrne, 2000). Moreover, most hard copy journals began to produce an electronic version of them; whilst keeping on producing the paper text version. This means that the electronic version did not replace the paper version. However, still so many online journals are emerging drastically.

Along with this shift towards electronic publishing, a new kind of economy began to evolve, which is known as knowledge economy. Wikipedia (2012) indicated that: “Various observers describe today's global economy as one in transition to a knowledge economy, as an extension of an information society. The transition requires that the rules and practices that determined success in the industrial economy need rewriting in an interconnected, globalized economy where knowledge resources such as know-how and expertise are as critical as other economic resources.

According to analysts of the knowledge economy, these rules need to be rewritten at the levels of firms and industries in terms of knowledge management and at the level of public policy as knowledge policy or knowledge-related policy".

Traditional book publishers began to invest in such an economy. However, scientists, producers of knowledge are not in the focal concern in this economy. Their scientific production, including books, research articles, and any other innovations are the material of this economy. Even though, they usually do not get involved directly in this economy. Their scientific production goes to publishers who mostly dictate tough conditions on them. Electronic publishing might solve such a problem to scientists, and began to take over traditional publishing.

University faculty members need to be encouraged for having a major role in electronic publishing through research journals and textbooks. In this regards, workshops in which they can get training, and share ideas about recent trends in such type of publishing seems to present a high demand. However, workshops should not be left without objective evaluation. The main aim of this article is to present an objective evaluation to a series of workshops organized by the Scientific Publishing Center SPC to all faculty members at University of Bahrain UoB.

Research Questions

This study aimed at getting answers to the following questions:

1. Was the workshop satisfying to participants in terms of length of time assigned, organization, topics covered, examples, presentation, profit gained, engagement and encouragement?

2. What are the main benefits participants got through these workshops?

3. What are the major drawbacks of the workshops?

4. Were the workshops encouraging to participants to get involved in electronic publishing process?

METHODOLOGY

The experimental approach in research was followed in this study . The one shot pre-experimental design was used. A mixed approach research model combining qualitative and quantitative methods was followed for data collection and analysis. Direct observation, interviews and open ended questions were used as part of qualitative method. A structured questionnaire was used for quantitative data collection and analysis.

A series of workshops on how to establish and run electronic scientific journals were organized by SPC to welling faculty members in each of the ten colleges associated with UoB alone. This center is an official one established recently at the UoB for the purpose of publishing scientific production through all available tools. The center chose electronic publishing as a starting step for assisting scholars on publishing their production. Each workshop took about two hours. Focus was on distinguishing aspects of respectable scientific journals, especially on adherence to scientific standards of quality, regularity, variation of scholars in the editorial board, having Impact Factor IF, recentness of topics tackled and type of scholars whom work has been published in the journal like those who have high h-index.

Impact factor and h-index were clarified in each of the workshops with many examples . In short, Impact Factor was defined (Amin & Mabe, 2000) as being an index that shows how much the published articles in a journal are significant and affecting others to cite in their following research .It is based on a three year basis. Thus it couldn't be found to any journal before three years of lunching. Moreover, the journal must be indexed in a universal data bases like Ulrich which produces 300,000 periodicals or Elsevier which produces 18,000 periodicals.

The impact factor is found through Journal Citation Report JCR which is a product of Institute for Scientific Information ISI. It is the average number of times a journal published papers are cited up to two years after publication.. JCR provides quantitative tools for evaluating journals. The impact factor is one of these., and can be considered to be the average number of times published papers are cited up to two years after publication. It is calculated automatically and electronically according to the following formula:

Impact factor = A/B

A = number of times articles published by the journal

in the past two years were cited in indexed journals.

B = Number of articles, reviews, proceedings and notes

published by the journal during the same period.

Regarding the h- index, it was shown that (Bar-Ilan,2008) it is an indicator suggested by Jorge E. Hirsch index in an attempt to measure both the productivity and impact of the published work of a scientist or a scholar. It is obtained automatically and electronically through a very simple counting procedure based on finding how number of times the published papers of a scholar has been cited by others. It is perceived that if a scholar has an index of h it means that he has published h papers each of which has been cited in other papers at least h times. As an example of that if Professor Mahmoud has an h index of 15, it means that 15 of his published papers each of which has been cited in other papers at least 15 times.

Participants were practically trained on how to find out their own h-index. An already validated questionnaire (see appendix) was distributed at the end of the workshop. Some of the participants were also interviewed regarding their opinion about the workshop they were engaged.

Instruments

Two types of instruments were used in this study: a questionnaire and an open interview. The questionnaire consists of three parts. Part one asks about factual data including name, affiliated college and department, total number of publications, and his h-index. Part two asks about the type of experience the faculty has with electronic journal. Part three asks about the participant's opinion at a four rating scale about the workshop on seven aspects. These aspects include time assigned to the workshop, workshop organization, topics covered in the workshop, used examples, method of presentation, profit gained, and motivation acquired (engagement, and encouragement). The last two questions were open response questions about useful aspects of the workshop and suggestions for improvement.

The validity of this instrument was assured though the process of construction.

This instrument was originally a modified version of an official one used by the Continuing Learning and Community Services Center at UoB. Moreover, a panel of judges consisting of four faculty members at UoB were asked for confirmation of valid covering of the instrument.

The reliability of the instrument was assured through applying it on a subsample of this study consisting of 27 faculty members. Chronbach alpha as a measure of reliability was found to be 0.86 which is a very good indicator of trust in the results of this instrument.

Population And Sample

Faculty members from ten colleges associated with the university were invited to participate in a scheduled time assigned to their colleges. Two hundred thirty eight showed up who make the sample of this study. Two hundred sixteen of them filled up the questionnaire. Table 1 shows the distribution of both the sample and population of this study. This sample is almost one third of the population, which is good enough as a representative sample.

Table 1: Distribution of population and sample of the study

College Name	Population	Sample
College of Science	100	37
College of Engineering	35	23
College of Information Technology	78	31
Bahrain Teachers College	50	17
College of Business Administration	85	11
College of Arts	150	51
College of Physical Education and Physiotherapy	20	12
College of Law	32	15
College of Health Sciences	77	24
College of Applied Sciences	48	7
Overall	675	228

Statistical Analysis

The Statistical Package for Social Sciences was used for data analysis. Descriptive as well as analytical test were used. The second section presents the obtained results.

Findings of the Study

Respondents were asked to rate the workshop on seven aspects on a four rating scale very good, good satisfactory, weak). These aspects were: Time assigned to the workshop; workshop organization; topics offered in the workshop; used examples; profit gained: and motivation acquired. Table 2 the results of chi square tests regarding differences due to college affiliation of the responses it indicated non-statistically significant differences among faculty members due to college affiliation on rating six of the seven aspects of evaluation. Differences on only one aspect (workshop organization) were statistically significant ($\chi^2 = 43.818$, df = 27, $\alpha = 0.05$). Thus, only overall percentages were percentages of faculty members combined from different colleges were presented in table 2 without going into the details of how respondents in each of the 10 colleges rated the workshop on each of the seven aspects.

Table2: Rating given to major aspects of the workshops by all respondents combined[a].

Aspect being valued	Very good	Good	Satisfactory	Weak	Total	Chi Square
Time Assigned to the Workshop	8 3.7%	192 88.9%	14 6.55	2 0.9%	216 100.0%	24.341
Workshop organization	126 58.3%	78 36.1%	11 5.1%	1 0.5%	216 100%	43.818*
Topics offered in the workshop	125 57.9%	77 35.6%	12 5.6%	2 0.9%	216 100%	28.233
Used examples	120 55.6%	78 36.1%	16 7.4%	2 0.9%	216 100%	24.246
Method of presentation	134 62.0%	66 30.0%	15 6.9%	1 0.5%	216 100%	39.251
Profit gained	59 27.3%	117 54.2%	38 17.6%	2 0.9%	216 100%	29.316
Motivation acquired	78 36.1%	86 39.8%	46 21.3%	6 2.8%	216 100%	32.447

[a] number on top is count; number on bottom is percentage.

* significant at α=0.05 df=27

If we look at table two on how respondents rated the workshop on each of the seven aspects of evaluation, we find that regarding time assigned to the workshop, a relatively high percent (92.6%) rated the workshops either good (88.9%) or very good (3.7%). Regarding topics offered in the workshops, the majority (93.5%) of the respondents rated it either good (57.9%) or very good (35.6%). Used examples was not different from time assigned in rating. Almost same high percent (91.7%) rated the workshops either very good (55.6%) or good (36.1%). Method of presentation was also rated the same (92.0 %) rated it either very good (62.0%) or good (30.0%). Profit gained was also rated slightly high since (81.5%) rated it either very good (27.3%) or good (54.2%). Motivation acquired seems to be distributed among very good (36.1%), good (39.8%) and satisfactory (21.3%).

Regarding workshop organization, even though the majority (94.4%) rated the workshops either very good (58.3%) or good (36.1), detailed results need to be presented since differences due to college affiliation were statistically significant. Table 3 shows how faculty members from the ten colleges rated the workshops on this aspect. It is evident that these differences appeared as a result of that, whereas the majority of respondents from Bahrain Teachers College BTC (88.2%) and College of Physical Education and Physiotherapy CPEP (83.3%) rated the workshops very good, only a very low percentage (19.0%) of respondent from College of Engineering gave it the same rating. Other colleges did not go far from BTC and CPEP. College of Health Sciences rated the workshops at very good of (79.2), and College of Law at (73.3%). A rating around more than fifty percent came from the rest of the colleges.

Participants were also asked if the workshop encouraged them to attend more workshops of the same but tackling different issues. The absolute majority (94.4%) of them indicated that they are willing to attend such workshops. Non-statistically significant differences (χ^2 = 6.348, df = 9, not significant) due college affiliation in this respect.

The open responses of the respondents in the questionnaire showed that the main benefits they got from the workshop were how to start an electronic journal, how to find h-index and how the impact factor of the journals is calculated. As for the drawbacks of the workshops, they indicated that they need more practical examples, limit the number of participants in each workshop and conducting more workshops especially for Arabic speakers.

The interviews held at the end of each workshop with some of the participant (2 to 3) revealed an almost complete agreement

About the importance of arranging these workshops to faculty members especial on current issues like electronic publishing. Some said: Where are you from us? Why didn't you arrange such a badly needed workshop?

Another indicator of success of these workshops was that in one month following the completion of these workshops we received 15 proposals for initiating new electronic scientific journals.

Table3: Rating given to workshops organization split according to respondents' college affiliation

College		Organization				Total
		Very Good	Good	Satisfactory	Weak	
College of Science	Count	17	13	2	0	32
	% within College	53.1%	40.6%	6.3%	.0%	100.0%
Bahrain Teachers College	Count	15	2	0	0	17
	% within College	88.2%	11.8%	.0%	.0%	100.0%
College of Engineering	Count	4	13	4	0	21
	% within College	19.0%	61.9%	19.0%	.0%	100.0%
College of Health Sciences	Count	19	5	0	0	24
	% within College	79.2%	20.8%	.0%	.0%	100.0%
College of Information Technology	Count	15	14	0	0	29
	% within	51.7%	48.3%	.0%	.0%	100.0%

College		Organization				Total
		Very Good	Good	Satisfactory	Weak	
College of Law	College Count	11	4	0	0	15
	% within College	73.3%	26.7%	.0%	.0%	100.0%
College of Arts	Count	25	18	5	1	49
	% within College	51.0%	36.7%	10.2%	2.0%	100.0%
College of Business	Count	6	4	0	0	10
	% within College	60.0%	40.0%	.0%	.0%	100.0%
College of Physical Education and Physiotherapy	Count	10	2	0	0	12
	% within College	83.3%	16.7%	.0%	.0%	100.0%
College of Applied Studies	Count	4	3	0	0	7
	% within College	57.1%	42.9%	.0%	.0%	100.0%
Total	Count	126	78	11	1	216
	% within College	58.3%	36.1%	5.1%	.5%	100.0%

$\chi^2 = 43.818$, df = 27, significant at $\alpha = 0.05$

Discussion and Implications

The study revealed influential impact of training workshops on faculty members. It is shown that the faculty members have a high level of encouragement by expressing this in writing their responses to the open-ended items in the questionnaire, and further through the interviews held with some of them. In addition, they highly rated the workshops on all of the seven aspects under concern; which include time assigned to the workshop, workshop organization, topics offered in the workshop, used examples, method of presentation, profit gained, and motivation acquired for initiating their own electronic journals. Such results mean that these workshops were will organized and presented. Moreover, the impact of these workshops is evident through the received fifteen proposals for establishing new electronic journals within only one month following the completion these workshops. These results are very encouraging to us at SPC for arranging more workshops.

One explanation of the aforementioned results is that part of the success of these workshops is due to the experimental experience workshop leader (Prof. Mahmoud Abdelaty). Besides being a highly productive researcher, he was a real example of successful experience on establishing and managing fifteen electronic journals covering different fields of scientific research each of which has its own editor in-chief of whom he was one. Direct access to these journals through **naturalspublishing.com** website was one of the activities that participants had practiced. Such an experience was encouraging to them. Another source of success came from the unlimited support we got from the university president (Dr. Ibrahim Mohammad Janahi) who was following the implementation of each workshop, and urging each college dean for encouraging faculty members in his/her college to participate in the assigned workshop to them. Such facts about the implementation of the workshops in this study imply that if success is aimed at for any workshop, top administration must be involved.

RECOMMENDATIONS

Based on the results of this study, we could draw the following recommendations:

1. Exemplary scholars who are practicing this technique successfully should run any influential training workshop for faculty members on how to establish and run their electronic journals.
2. Influential workshops should be planned through the top administration of the association.
3. Eventually electronic publishing is taking over paper publishing; this trend should urge us at the universities to prepare our faculty members to become effective participants in this move trough arranging many workshops around this issue.

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APPENDIX

THE QUESTIONNAIRE

UNIVERSITY OFBAHRAIN

Scientific Publishing

جامعة البحرين

Dear Colleague

We would like to thank you for spending few minutes of your time to fill the following short questionnaire. Your participation and opinion along with some biographic information are highly appreciated.

Part I:

Your name: ……

Your college: ……**Your Department** ……

Total number of your published articles: ……

Your h-index: ……

Part II

Please tick mark the type of experience you have with electronic journals of the following list::

Type of Experience	Yes	No
A member of the editorial board of electronic journal/s		
Published paper/s in electronic journals		
Reviewing articles for electronic journals		
Reading articles in electronic journals		

Part III

Your opinion about the workshop

Please tick mark the suitable box in front of each of the following aspects:

1- Time assigned to the workshop: ☐ Very Good ☐ Good ☐ Satisfactory ☐Weak

_____

2- Workshop Organization: ☐Very Good ☐ Good ☐ Satisfactory ☐Weak

_____

3- Topics covered in the workshop: ☐Very Good ☐ Good ☐ Satisfactory ☐Weak

_____

4- Used Examples: ☐Very Good ☐ Good ☐ Satisfactory ☐Weak

_____

5- Method of presentation: ☐Very Good ☐ Good ☐ Satisfactory ☐Weak

_____

6- Profit gained: ☐Very Good ☐ Good ☐ Satisfactory ☐Weak

_____

7- How much does this workshop motivate you to start a new journal?

☐Very Good ☐ Good ☐ Satisfactory ☐Weak

8- Do you like to attend more workshops within the same field? ☐ Yes ☐ No

_____

8- What are the most useful points in the workshop?

……..

_____

9- What would you like to suggest for improvement of forthcoming workshops?

……

_____Thank you so much

INVESTIGATION OF PRIMARY EDUCATION 6th, 7th and 8th GRADE STUDENTS' ATTITUDES TOWARDS SCIENCE AND TECHNOLOGY LESSON

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ABSTRACT

This article aims to examine the attitudes of 6th, 7th, and 8th graders', who attend a good conditioned school in Serdivan, Sakarya, towards Science and Technology lesson. It was also examined whether there was a significant difference between attitude scores and girls and boys. In order to find out how to promote students attitudes towards science, 9 students were interviewed. The acquired quantitative data was analyzed in SPSS 13.0. The study findings indicated that there was a significant difference between the attitude to Science and Technology lesson and grades, whereas there wasn't any significant difference between the attitude scores and gender. Moreover, the qualitative data acquired through the interview with students indicated that the attitude towards science can be promoted carrying out more experiments and applying student-centered education.

Keywords: *Primary education, science and technology lesson, gender, attitude, mixed methods research.*

INTRODUCTION

Bringing up qualified individuals is one of the crucial goals that societies give importance to. Being able to realize this goal is only possible through education and instruction. It is impossible not to see the effects of the innovations taking place in the science world and technology as an extension of these innovations on people's lives in our daily life. For this reason, in order for the students to be able to sufficiently learn the science subjects which are offered in school curricula, these subjects should be made meaningful for them and positive attitudes should be developed (Erdemir & Bakırcı, 2009). Especially, development of societies and their keeping up with the times are possible through bringing up qualified individuals and making this functional.

That science is getting more and more complicated everyday has made it compulsory for the individuals to be science and technology literate (Aydın, Sucuoğlu & Balım, 2009). The vision of Science and Technology Curriculum in Primary Education is 'to aim at educating all the students, no matter what individual differences they may have, as science

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and technology literate; and, as for the science and technology literacy, it is described as 'a combination of science-related skills, attitudes, values, perceptions and knowledge which are necessary for the individuals to develop the skills of research-questioning, critical thinking, problem solving and decision making, to become lifelong learners and to maintain their curiosity about the world and their environment (Education and Morality, 2006).

In science lessons, students should be taught not only the knowledge that they need in the class hour, but also problem solving skills, rational thinking and developing positive attitudes that will enable the students to use what

they learn in the class in daily life (Erdemir & Bakırcı, 2009). The aim of Science and Technology lessons is to enable students to learn about the physical, chemical and biological phenomenon and events taking place in their environment together with their functionality and meanings (Bahar, 2006).

In Science and Technology lessons, the purpose for students is not to memorize the scientific information but to transform this knowledge into their everyday lives, to know what to do and how to react when they encounter a situation and to gain thinking skills which are similar to that of a scientist (Demirbaş & Yağbasan, 2006). The focus of science education is to enable students to assess the knowledge that they gain in schools with a new perspective and to reflect this knowledge on their future lives (Bilgin & Geban, 2004). High-quality science education also contributes to students' critical thinking skills (Sert Çıbık, 2009).

That people who have received science education can read, understand and interpret scientific information is thanks to the science and technology literacy that they have gained. Emergence of such reactions has caused individuals to select science courses, follow scientific information, take up hobbies related to science and develop positive attitudes (Kozcu Çakır, Şenler & Göçmen Taşkın, 2007).

One of the student features that have an important effect on the learning process is student's attitudes towards the lesson (Altınok, 2004). Attitude is a combination of positive or negative, learned and consistent behaviors towards a specific object (Magno, 2003). Turhan, Aydoğdu, Şensoy and Yıldırım (2008) describe attitude as an individual's tendency to behave positively or negatively towards any event, object or group of people. They put forward that attitudes are not behaviours but that they are tendencies to display some behaviours and that they are abstract concepts; however, they stated that attitudes are possible to observe as in an individual's forming a good or bad opinion of an event, reaching a decision and reflecting it on his behaviours. As for Demirel and Ün (1987), they expressed that an attitude is a positive or negative reaction to an object, an event or a person. Attitudes are related to academic achievement because they develop in the learning environment in time (Magno, 2003). According to Bandura (1977), attitudes are often used together with motivation in order to achieve something.

According to functional theories, individuals develop attitudes towards objects that are in line with their needs. In that case, attitudes are the most beneficial ways for individuals' needs (Erden, 1995).

Basically, attitude is based on two features. One is that they are long-lasting and the other one is that they are cognitive, affective and behavioral. These two features are dynamic and they affect each other. In primary education, Science and Technology lesson is one of the least liked and most feared lessons (AÖF Ders Kitabı, 2007). In addition, it is one of the lessons that students have problems understanding and that they fail (Durmaz & Özyıldırım, 2005).

The purpose of measurement of attitudes in education and instruction might be to predict the behaviours that individuals are likely to exhibit in time or in the future, and based on this prediction, change the existing ones and create new situations (Nuhoğlu, 2008).

As attitude being a difficult affective variable to define, 'attitude toward science' can be defined as a belief system or a set of values that are towards an object that is a product of science, science lesson or reflections of science on the society. Attitudes related to science are connected to student participation in science lessons and exhibiton of effective performance (Norby, 2003). While Gardner has described science-related attitude as a learned tendency to evaluate objects, people, events and situations in a specific way or a set of propositions related to science, Martinez, in his studies that aimed at determining the effects of attitudes on science education, has put forward that students' attitudes towards science lessons affect their academic achievement, their gaining scientific attitudes and their tendency to continue studying in the field of science (cited in. Altınok, 2004).

In the learning process, teachers' attitudes and behaviours have an influence on students' attitudes. When students meet their teacher in a new class, they are open to any interaction which is likey to come from the teacher.During this process, students get to know their teacher and develop ideas and feelings about him. In teacher-student relationship, teachers' dominant- obedient or hostile- affective attitudes affect students' attitudes related to the lesson (cited in. Altınok, 2004).

A science lesson based on technology should be perfromed in a learning environment which is applied, cooperative and constructive. Students should get feedback from their teachers at the end of the activities. Students' attitudes towards the lessons are related to their participation in the lesson. In an international study (20 countries), it was revealed that students' participation in the lesson enhanced their attitudes. Since students' participation in the lesson increases with teachers who perform activities during the lessons, students' attitudes are enhanced, too (Norby, 2003).

It is very important that teachers working in state schools exhibit positive attitudes in science lessons. That teachers

think rationally, implement the processes specified in the curriculum effectively and behave objectively have an important role in students' developing positive attitudes during the lessons. Moreover, teachers' implementing their lessons in a way that they are informed about the latest developments in science education makes theis process even more positive and productive (Ediger, 2001).

As the purpose of science education being to develop positive attitudes towards science regardless of gender, many studies that have been carried out show that male students' attitudes towards science are more positive than that of female students. The reasons for this have been determined as cultural effects and male students'having more interaction with technological devices compared to female students. In addition, it has been emphasized that interests and activities in the early childhood period shape one's future actions (cited in Azizoğlu & Çetin, 2009). Catasabis (1995) state that gender does not affect attitudes towards science, whereas Boone (1997) puts forward that gender has an influence on attitudes towards science and even that girls' attitude points are different from boys' attitude points (cited in Sorge, 2007).

Problem Definition

Is there a statistically significant difference among the science and technology lesson attitude scale points of primary 6th, 7th and 8th grade students?

Sub Problems

1. Do primary school students' attitudes differ significantly according to grade level?

2. Do primary school students' attitudes differ significantly according to gender?

3. What are the factors that affect primary school students' attitudes positively?

Assumptions Of The Study

It was assumed that the students responded to the questions honestly during the study.

Limitations Of The Study

This study was limited to Serdivan district of Sakarya province and so it could not be generalized to the province or the country.

Findings are limited to the data collected through data collection tool.

METHOD

Study Design

A mixed methods research design was used in order to realize the purpose (general purpose) of this study. Generally, a mixed methods design is when researchers seek answers to a question or questions by using both qualitative and quantitative data (Nagy & Biber, 2010, p.3). As known, quantitative studies focus on the relationships among variables (Denzin & Lincoln, 1998, p.8) and tyr to answer the question of 'how much' whereas qualitative studies focus on the process and seek answers to the questions of 'why and how' (Yıldırım & Şimşek, 2008). Researchers who use mixed methods designs can collect quantitative data through standard tests, scales, true-false tests or grading scales while they can gather qualitative data via interviews, open-ended written questions, focus group interviews, journals, documents, written boks or works of art (Brannen & Halcomb, 2009, p.68). It is sometimes the best way to use a mixed method that merges qualitative and quantitative methods (Muijs, 2004, p.6). Using a mixed method provides the balance by strengtening the weak points of other methods and is a valuable strategy to reveal empirical records related to the topic (Axinn & Pearce, 2006, p.58-59).

Population And Sample

The population of the study comprises all the secondary stage students in primary schools in Serdivan district of Sakarya province while the sample is composed of a total of 90 students- 47 females and 43 males- in the 6 th, 7 th and 8 th grades of a primary school with a high socioeconomic level. In most of the study, sample was selected through simple random sampling. Simple random sampling is a method in which each sample is given an equal chance to be chosen and the chosen units are accepted as the sample (Büyüköztürk, Çakmak, Akgün, Karadeniz & Demirel, 2009). As for the interview method used in the qualitative part of the study, convenience sampling was made use of. Convenience sampling earns the study speed and practicality (Yıldırım & Şimşek, 2008).

Participants

While collecting data during the study, three students from among the students of each 6th, 7th and 8th grades – a total of 9 students- were interviewed.

Data Collection Techniques

In the study, science attitude scale which was developed by Geban, Ertepınar, Yılmaz, Altın and Şahbaz (1994) was used in order to find out students' attitudes towards science lesson. Attitude scales are one of the most prominent and commonly used methods of measuring attitudes. The most commonly used one among attitude scales is Likert scale. In Likert-type scales, a lot of positive and negative items related to the attitude to be measured are written. For these items, reactions are stated in the form of expressions "I totally agree" "I agree" "I neither agree nor disagree" "I don't agree" "I definitely disagree".

Cronbach - α reliability coefficient for the attitude scale that was used in this study was calculated as 0.916.

According to the results of the factor analysis, items in the Science and Technology Lesson attitude scale were grouped under two factors and the variance ratio that these two factors explained on the scale was 1,72 while the total variance was % 49,32. The common variance that these two factors explained on the items varied approximately between % 32 and % 72. These two basic factors were categorized as positive and negative.

In this scale, 1., 2., 3., 4., 5., 7., 8., 10., 11., 12. and 15. are positive items.

Sample items:

Science is a field that I like a lot.

I like reading books related to Science.

Science has an important role in daily life.

I like solving problems related to Science in the lessons.

6., 9., 13. and 14. are negative items .

6. I have trouble attending Science and Technology lessons.

9. I feel bored when studying Science.

13. Science and Technology lesson is unlikeable among others.

14. It is not attractive for me to take part in discussions related to Science and Technology subjects.

Negative items were transfered to the statistics program by being corrected via converting the points

In order to elicit students' reflective opinions as part of the qualitative dimension of the study, a seven-item semi-structured interview form was prepared and implemented in a semi-structured format. Karasar (2010) categorises interviews in three groups as structured, unstructured and semi-structured according to the implemented rules. Unstructured or semi-structured interviews are rather flexible, let the interviewees change the direction of the interview and reveals new topics that the researcher did not consider while designing the items (Axinn & Pearce, 2006, p.27).

Interviews were carried out with students in a face-to-face fashion and they were recorded via a tape recorder by students' consent. Later, the recorded interviews were listened, transfered to the computer and transformed.

Data Analysis

The collected data were analyzed by using SPSS 13 package program. Frequency values were used to show students' distribution in terms of grade levels and gender, and the gathered data were analyzed by using independent-samples t-test and one way ANOVA in the SPSS program.

Content analysis was used while analyzing the qualitative data. Content analysis is a technique in which the researchers categorize the concepts that came out by conceptualizing the data which was transformed into written form under common themes in a logical way (Yıldırım & Şimşek, 2008). Categories were produced via an inductive analysis by coding the raw data collected through the interviews. Data were grouped under the specified categories so as to make them meaningful fort he readers. Coding and categorization processes were performed by one of the researchers in a repetitive fashion. Thus, sticking to the reseacrh problem and the purpose, unnecessary codes were omitted and new codes were added to some parts when necessary. The researchers worked together while naming the categories, though. As a result, tables in which each and every participant's opinions related to the topic could be seen separately were obtained.

FINDINGS AND COMMENTS

In this part, findings that were obtained as a result of the data analysis carried out to find answers to the problem and sub-problems were included.

Analysis Of The Quantitative Data

First of all, One Sample Kolmogorov – Simirnov test was performed to test whether the analysis to be carried out was parametric analysis or not. As a result of the analysis, it was seen that attitude scale points had a normal distribution (Kolmogorov – Simirnov $Z = 1{,}066$, $p = .206 > .05$). Büyüköztürk (2010) suggests examining the variables with a normal distribution through parametric tests.

Attitudes Of Students In Different Grades Towards Science Lesson

Table.1.a. Descriptive Statistics of Attitude Scale Points

Grade	N	$\overline{X}$	S_S
6	30	26,03	6,55
7	30	43,56	10,03
8	30	46,00	7,95

Table.1.b. ANOVA Results of Students' Attitude Scale Points according to Grades

Source of variance	Sum of Squares	S_d	Mean Squares	F	p	Significant difference
Between groups	7120,067	2	3560,033	51,618	,000	8-7, 6-7
Within groups	6000,333	87	68,969			
Total	13120,4	89				

*p < .05

In the results of the independent-samples one-way analysis of variance (One-way ANOVA), a statistically significant difference between students' grade levels and their attitude scale points was discovered (F (2, 87) = 51,618 , p < .05).

According to the analysis results, students' attitude points vary according to the grade they belong to. The results of the Scheffe Test which was performed to find out between which grades the significant differences occurred show that attitude scale means of the 6th graders (X = 46,00) and the 8th graders (X = 43,56) were higher than that of 7th graders (X = 26,03). Attitude points of the 6th and the 8th graders exhibit a difference compared to the attitude points of the 7th graders.

The Effect Of Gender On Attitudes

Independent t-test was performed in order to find out whether there was a significant difference between attitude points and gender.

Table.2. Independent t-test Results related to Students' Gender and Attitude Points

Gender	N	$\bar{X}$	S	t	p
Female	47	35.44	12,9	2,602	0,11
Male	43	41.90	10,3		

*p < .05

When all the students were taken into consideration, no significant difference was detected between students' gender and their attitudes towards Science and Technology lesson according to the results of the independent t-test. There is no significant relationship between gender and attitude points.

The results of the analysis carried out show that the effect size of gender variable on the differences among points in the attitude scale is at medium level (Büyüköztürk, 2010). It can be stated that % 7 of the variance observed in the attitude scale points can be explained by gender (η^2 = .07 > .06).

Analysis of the Qualitative Data

Obtained findings for every question directed to the participants are presented below in the tables.

Item 2: *'' Which lesson do you like most? ''*

Answers that participants gave for item 2 are presented in Table 3 below.

Table 3: Participants' answers for item 2

	Mathematics	Science and Technology	Social Sciences	Turkish
S1	✓	✓	✓	
S2		✓		
S3	✓			
S4			✓	
S5	✓	✓		
S6				✓
S7	✓	✓		✓
S8		✓		
S9	✓	✓		
f	5	6	2	2

When the participants were asked which lesson they liked most, some of them responded that they liked maths, science and technology and social sciences at the same time while one of the participants stated that s/he liked only social sciences. Some others replied that they liked maths, science and technology and Turkish.

Item 3: '' For Science and Technology lesson, if you like it, why? If not, why not? ''

Answers that participants gave for item 3 are presented in Table 4 below.

Table 4: Analysis results of the answers that participants gave for item 3

	Learning process	*f*
Lesson processes	enjoable	4
	boring	1
	interesting	1
	Negative teaching effect	1
	Positive teaching	1
	Memorized science	1
	Matemathical operations	1
Difficulty of the subjects	Complexity of the subjects	1
	Difficult subjects	2
Transfer for real life	Current issues	4
Σ		17

When the participants were asked why they liked or didn't like Science lessons, codes of "enjoyable, intersting, boring, negative taching effect, memorization, positive teaching effect, mathematical operations" were categorized under the theme of lesson processes (10), while the increasing complexity level of the subjects and the difficulty level of a subject at hand were grouped under the theme of difficulty of the subjects (3). The code for transferring the science subjects to real life was categorized under the theme of transfer for real life (4). Participants stated that they liked science lessons because they were enjoyable and because of the effect of sense of humour that kept the science lessons away form monotony. A group of participants expressed that they liked science because it was related to real life. The integration of science with maths and the science subjects' getting more and more comprehensive in time are also reflected on the participants' opinions. Particiants' opinions related to this question are as below:

-' Subjects are already from our daily lives. So, they are more interesting' .(S1, 6th grade)

-'I can't understand the lessons very well. It might be because of the teacher. Or maybe because the subjects

are getting more complicated, but my interest in science decreased.' (S3,7th grade)

-' Because the subjects in Science and Technology are very difficult and a little bit boring.' (S4 , 7th grade)

-' Because I fing the lessons enjoyable.' (S5 , 8th grade)

-' I like my Science and Technology teacher, I find the lessons educational, I find science lessons more related to outside world'. (S7, 6th grade)

-' Because there are some mathematical operations and I am bad at maths. But I can succeed in subjects that require memorization. I can't do the ones that require mathematics.' (S6, 8th grade)

In addition, different from these views, one of the participants stated that he liked Science and Technology lesson with the effect of his/her family (especially his/her father) and that Science lesson became a hobby for him/her.

- ' Because my father has engrained this in me since my childhood and also it is related to my hobbies, that's why '. (S8, 7th grade)

Item 4: '' Can you tell me about a science lesson that you enjoyed most?''

Answers that participants gave for item 4 are presented in Table 5 below.

Table 5: Analysis results of the answers that participants gave for item 4

		f
Teaching-learning process	Experiment-based science	2
	SPS Basic skills	1
	CBI	1
	Permanent learning	3
	Cognitive burden	1
Classroom environment	Humour and science	3
	Enjoyable teacher	3
	Enjoyable process	4
	Positive classroom atmosphere	1
Σ		**19**

When the participants were asked to tell a science lesson that they enjoyed most, according to the answers, codes of experiment-based science, SPS (Scientific Process Skilss) basic skills, Computer Based Instruction (CBI), permanent learning, cognitive burden were categorized under the theme of teaching-leraning process (8), whereas the codes of humour and science, enjoyable teacher, enjoyable process, positive classroom atmosphere were categorized under the theme of classroom environment (11). Participants expressed that they derived pleasure from experiment-based science lessons and claimed that their teachers' use of visuals during the lessons had an effect on making what they learned permanent. They also stated that their teacher's implementing the lesson through discussing the subject at hand with the students was more effective than their taking notes and that, as a result, they did not have to deal with taking notes and doing the lesson in this way disburdened their cognitive burdens. Participants stated that they mostly enjoyed the lessons in which the teacher established a closer relationship with the students, made the learning process more fun and allowed for humour at times rather than a lesson in which the teacher lectured only. Some participant opinions related to this question are as follows:

- *' Generally, Y.....teacher both teaches his/her lesson and makes us laugh by telling jokes. In fact, I can say that all our lessons are fun'.* (S1, 6th grade)

- *'In the science lesson that I enjoyed most, we covered the subject of 'bones'. In that lesson, the teacher showed us the bones from the computer. We listened vary carefully and that lesson was good'* (S2 , 6th grade)

- *Lessons that I enjoy most: I take more pleasure in lessons in which we do experiments.'* (S3, 7th grade)

- *'In the science lesson that I enjoyed most, students who talk a lot and disturb the class were absent. Because there was no noise problem, we could cover the subjects very fast. And it was very enjoyable'* .(S4 , 7th grade)

- 'When we do experiments, I understand better and more comfortably. They are more comprehensive and I don't forget them. It is more beneficial.' (S6, 8th grade)

- The science lesson that I enjoyed most, Y …..teacher was teaching again, he was teaching the cells. Y…..teacher always teaches us first,and the next week we write it in our notebooks. He doesn't make us write in the notebooks. Because of this, I enjoy science lessons a lot. There is no writing, one week we listen and the other week the teacher wanst us to transfer what we learn into our notebooks. His teaching is also fun. I may easily get bored when we deal with difficult subjects. When the lesson is more enjoyable, it is more permanent…' (S7, 6th grade).

Item 5: '' Can you tell me your dream science lesson? What should you, your teacher and your friends do in this lesson?''

Answers that participants gave for item 5 are presented in Table 6 below.

Table 6: Analysis results of the answers that participants gave for item 5

		f
Teaching- learning process	Enjoyable process	5
	Experiment-based science	3
	Teacher-student relationship	5
	Permanent learning	4
	Cognitive burden	2
	Concrete experiences	3
	Good teacher	3
Learning environment	Organized classroom environmnet	2
	Interested learning environment	2
	Positive classroom atmosphere	2
	Humour and science	3
	My dream environment	1
	Labarotuary and science	6
Teaching- learning styles	Cooperative learning	1
	Active science	2
	Use of scientific models	2
Σ		46

When the participants were asked the question 'Can you tell us your dream science lesson?', the codes that the answers produced 'enjoyable process (5), experiment-based science (3), teacher-student relationship (5), permanent learning (4), cognitive burden (2), concrete experiences (3) and good teacher (3) were categorized under the theme of teaching-learning process, while the codes of organized classroom environment (2), interested learning environment (2), positive classroom atmosphere (2), humour and science (3), my dream environment (1) and labarotory and science (6) were grouped under learning environment. Cooperative learning (1), active science (2) and use of scientific models (2) were categorized under the theme of teaching-learning styles. Participants of the study described their dream science lesson as one in which they had fun, they had a closer relationship with the teacher, the teacher implemented the lesson using humorous elements, they did experiments when needed, they could concretize the concepts and added that in this way what they learned would be permanent. They also put forward that the lessons should be implemented in environments related to the subject. For example, they stated that lessons could be done in a labarotory or in nature when necessary. In addition, they expressed that a positive classroom environment should be provided when need be. They added that classrooms should be organized, students should be more interested in the lessons and the classroom size should not be big (number of students). Some of the participant opinions related to this question are as follows:

- ' The enironment that we have is almost like my dream science lesson'. (S1, 6th grade)

-' I prefer to do it in a lab..Our teacher is good..the lesson should be fun and it should make us laugh..Jokes should be better so that the lesson can be more enjoyable. The teacher should be enjoyable. Students should not talk too much'. (S2, 6th grade)

- 'I would really like to do science experiments in labs where scientists work. I would like to have our lesson there…my classmates should be more interested in the lesson. They talk too much and the lessons can't be understood. It is as if they don't care about the lesson. Maybe our teacher should explain things more. s/he should explain things instead of having us write the things in the book…I think learning things that develop in labs, for example things that can be shown via experiments, like concrete things, is better and they should be taught in a practical way. We should have a place lika that…the teacher can Show some of the things while teaching. If s/he has the materials, of course. Other than this, s/he should teach better and make the class stop talking in a better way (S3, 7th grade).

-'……The students and the teacher g oto the lab. The teacher teaches everything there in an applied way. The lesson can be done in nature, class or the lab depending on the subject. In my opinion, physics subjects should be covered mostly in class, chemistry subjects in lab and other subjects such as light in nature..(S4, 7th grade).

-' The teacher should be friendly, closer, I mean s/he should both treat us well and teach the lesson effectively. …our books should be more clean and useful, like our test books'. (S6, 8th grade)

- '…… The lesson should be more observation-focused. It shouldn't be boring, and it should be permanent'. (S8, 7th grade)

Item 6: ''What kind of activities do you do related to science and technology?''

Answers that participants gave for item 6 are presented in Table 7 below.

Table 7: Analysis results of the answers that participants gave for item 6

		f
Written material	periodical +	1
	periodical -	8
Visual material	Documentary	8
	TV news with science content	2
	TTNET Vitamin	1
	Internet	1
	Animation	2
SAC	Experiment	2
	Scientific Model	1
	Material	1
	Learning need	2
Science hobby	Keeping journals	1
	Project-based science	2
	Science Art Centre	1
Σ		33

When the participants were asked the question 'What kind of activities related to science and technology do you do?', their answers in terms of following a periodical or not were grouped as following a periodical (1) and not following a periodical (8) and categorized under the theme of written material. The codes for documentary (8), watching TV news with science content (2), benefiting from TTNET Vitamin (1), watching science-related animations (1) were categorized under the theme of visual material, and keeping a journal (1), project-based science (2), visiting the Science Art Centre (SAC) (1) were grouped under the theme of science hobby. Participants stated that they did not follow periodicals and only read them when they came across them. They also stated that they watched documentaries about science and used the internet when they needed it. They expressed that they did experiments in

line with their interest areas and went to the Science Art Centre to develop projects. Some of the participant opinions related to this question are as below:

-' As documentary, I have the National Geographic set. There are some science-related documentaries that I watch in that. ….I mean, there isn't a periodical that I buy every month. I read them only when I come across them… I use TTNET Vitamin.' (S1, 6th grade)

-'…….. we all write journals about what we learn'. (S2, 6th grade)

-'…….For example, the other day I mixed oil and water, and I added a spoonful of salt into it. One day later, small things appeared in it. I really wondered about it. However, I couldn't search it because I didn't have a microscobe. I search things like that, things related to science and technology, on the internet.' (S3, 7th grade).

-'I can now make atomic models using modeling clay. At the moment, I am working on it.' (S4, 7th grade)

-' I watch the news that are connected with science and technology.' (S7, 6th grade)

-' I mostly like to develop projects or do research on a project and ask questions. I watch documentaries, you know, like safari type of documentaries. I follow NTV Science and scientific and technical journals…I used to g oto the Science Art Centre but I had to quit it because of the SBS exam.' (S8, 7th grade).

Item 7: *'' Do you relate science to everyday life? ''*

Answers that participants gave for item 7 are presented in Table 8 below.

Table 8: Analysis results of the answers that participants gave for item 7

		f
Subject	Astronomy	1
	Living things and life	4
	Systems in our bodies	3
	Geology	2
Everyday life	Environmental issues	2
	Medicine	1
	Science-Technology	1
	Active participation	1
	Projects	1
Ideas about science	Epistemological beliefs	1
	Useless science	2
Σ		18

When the participants were asked the question 'Do you relate science to everyday life?', their answers produced some codes. The codes of astronomy (1), living things and life (4), systems in our bodies (3) and geology (2) were merged under the theme of science subjects. Other codes from the participants' answers such as environmental issues (2), medicine (1), integration of science and technology (1), active participation (1) and projects (1) were categorized under the theme of everyday life. Epistemological beliefs (1) and useless science (2) codes were grouped under the theme of ideas about science. Participants stated that they observed the science subjects that they studied at school in their everyday lives, and that they related what they learned to natural events. Some of the participants claimed that the integration of science and technology caused global environmental problems and stated that technology led to environmental pollution. Some participant opinions related to this question are as follows:

-'Science, how can I say, deals with earthqukes…or other natural events like germination. Science researched it and shows us how it happens. What else, it examines the human body. In this way, doctors can get help from science. People's lives can be saved thanks to science. (S1, 6th grade)

- 'Germination of trees, their growth, development, features..how they photosynthesize. …how bones grow?

How our bodies are protected? The circulatory system.' (S2, 6th grade)

- 'In my opinion, science is not very related to everyday life….for example, light that we learn here at school. It says that green light passes through green filter. How can we use this in everyday life? What are we supposed to do with it? I don't think we generally use it.' (S4, 7th grade)

-' ı think about negative things. For example, if people try to do important things related to science, global warming won't get worse. A more effective energy souce can be found instead of nuclear energy. I mean, our environment does not get polluted.' (S5, 8th grade)

-'Yes, I see science-related things especially in space research. Overall, we learn lots of things in science lessons.' (S6, 8th grade)

After the question 'Do you relate science to everyday life?', the participants were asked another question 'Do you consider yourself science-literate?'. The answers are as follows:

Table 9: Analysis results showing students' ideas related to their science and technology literacy

	Number of students								
Science and technology literacy	1	2	3	4	5	6	7	8	9
Basic concepts			☐		☐	☐	☐		
Science leading to knowledge								☐	
Inquisitory nature of science	☐		☐					☐	
STS	☐		☐				☐		

When Table 9 is analyzed, it can be concluded that some of the students did not know what it meant to be science and technology literate, that they did not consider themselves as science and technolgy literates in a sufficient level and that some of them only reflected some specific sub-categories. Some student answers related to this question are as below:

-'For example, an earthquake happened. I can comment on how to help the people, how it occurs, how it can be prevented'. (S1,6th grade)

-'I don't know.' (S2, 6th grade)

-'No, I don't. I would rather see myself as someone who can do the experiments'. (S4 , 7th grade)

-'Yes, because of what we learn in the lessons, we have some knowledge. Because of this knowledge, we are also informed about the news. We know if it will be useful or not, but not always…' (S6, 8th grade)

CONCLUSION AND SUGGESTIONS

In the study we carried out, a significant relationship between the 6th, 7th and 8th grade students' (who all study at different grade levels in primary education) Science and Technology attitude scale points and the grades they attend to. Our study results are also in line with those of Kozcu and the others (2007). Attitude points of 6th graders were calculated as higher than those of 7th graders. When the attitude points of 7th graders and 8th graders of primary education are compared, 8th graders' attitude points were calculated as higher. However, the same difference could not be observed between the students at the 6th and 8th grades. The increase in students' attitude points at the 8th grade might be because these students are preparing for the secondary school exams or due to their social environment, family or teacher factors. The results show paralelism with those of Ekici and Hevedanlı (2010) and Tekbıyık and İpek (2007), whereas they don't support the findings of Azizoğlu and Çetin's studies. This could be related to the difference in the sample. Zusho, Pintrich, Coppola (2005) concluded in their study that attitude points of students at different levels varied according to the groups. In studies carried out by Hendricks ve Barrington (1988), it was concluded that students in different grade levels exhibited differences from each other. Erdemir and Bakırcı (2009) compared the attitude points of students at different grade levels and concluded that there was a significant difference among the attitude points of students studying at different levels. In the comparison of attitude points among grades, it was observed that students' attitude points decreased as the grade level got higher (Cited in Altlnok,

Ün Açıkgöz , 2006). However, our study results contradict with those of Karaer's (2007) study. According to the results of Karaer's study, attitude points do not show a difference in terms of grade levels. We can explain this with the differences in samples.

In this study, when all the students' atttitude-related Science and Technology points were compared to the gender factor, it was concluded that attitudes did not differ significantly according to gender. There was no significant difference between the male or female students' attitude points and their grade levels. In other words, attitude points of students studying at different grades did not exhibit a significant difference in terms of gender. The results of this study are similar to those of Sorge (2003) , Kelly (2008) , Kozcu and the others (2007), whicl all show that gender does not affect students' attitudes. While Gardner claimed in his studies that gender influenced attitudes towards science, other studies carried out in the 1990s revealed that gender had a little influence on these attitudes (Cited in Kozcu et al. , 2007). In studies performed by Serin, Kesercioğlu, Saracaloğlu and Serin (2003); Altınok (2004); Denizoğlu (008); Tekbıyık and İpek (2007); Turhan and the others (2008) and Doğruluk (2010), the results showed that there was no statistically significant difference between attitude scale points and gender. Science points do not differ according to gender. Becker (1989), in his study which was performed in order to identify the differences between attitude points and gender, stated that there were not any significant differences between gender and attitude points. Similarly, Çelikkaleli and Akbaş (2007), in their study which was carried out to investigate the relationship between attitude development and gender differences, expressed that attitudes did not vary significantly in terms of gender. In his study, Altınok (2004) reached the opinion that gender did not affect attitudes. That Bilgin and Geban (2004) could not identify a statistically significant difference between gender and the attitude points that they obtained as a result of their studies support our study results. However, according to the results of the studies they performed, McComas (1996 , Kahle (1996), Norby (2003) concluded that gender had an effect on attitudes towards science and Norby (2003) stated that attitude points were higher in favour of female students (Cited in Freedman, 2001). In a study performed by Karaer (2004), it was concluded that there existed a significant difference between male and female students' answers to the attitude scales.

Answers that students studying at different grades gave to the Science and Technology Lesson Attitude Scale differ from each other. The reason for this could be individual differences, students' having weak attitudes towards the lesson, family structure, socioeconomic level and environmental factors. The greatest responsibility for increasing the points in this attitude scale falls to teachers and the family. That teachers exhibit positive attitudes towards Science and Technology in the lessons may increase students' interest in and attitudes towards this lesson. Similarly, scientific developments that are related to that time could be discussed within the family.

When all the students were considered, no significant difference between attitude points and gender was detected. These results may indicate that in our society, the interest in science exists regardless of gender differences.

According to the results of the interviews with the students, students' relating Science and Technology lesson to everday life indicates that it is possible to transfer what is learned at school tor ela life outside. Results also show that during the lessons, teachers should make use of humour while teaching, respect students' ideas and make the lessons more fun in order to make the learning process more productive for the students. Similarly, the results reveal that students would like to have a more enjoyable learning process which will in turn lead to a more positive teacher-student relationship so as to have more effective and productive lessons. Teachers should also let their students' be more active in the lessons and express themselves better while teaching (Norby, 2003). Because teachers' attitudes in the lessons influence students' attitudes, teachers should seem more interested in the process during science lessons and reflect this upon their students (Norby, 2003).

Teachers should not implement their lessons based on only mathematical operations or rote learning; rather, they ought to employ a mothod which addresses the mind and logic and which is easily comprehensible. During the interviews, some of the participants stated that in science lessons they only liked the parts that required memorization (based on verbal skills). However, teachers should be aware of this fact and perform their lessons by concretizing the subjects or concepts. Students can gain positive attitudes towards science not only at school but also in their social environment and family environment (Shymansky, Yore, Anderson, 2000). During these interactions, examples about current science subjects can be given and their causes and results could be discussed.

Written and visual materials could be used in order to increase students' positive attitudes towards science and technlogy and direct their interests towards science. One of the participants expressed during the interviews that his/her teacher made use of computers while doing the lesson and in this way, his/ her learning became more permanent. Similarly, meaningful learning can be enabled by using scientific models and materials and making what students learn more permanent.

A science lesson which is based on experiments and observations might increase students' interest in the lesson and thus make students like science lessons and enable them to develop positive attitudes towards them.

Learning environment should also be altered depending on the subject that is learned; when necessary, lessons should be held in labaratories or in nature. A cooperative learning environment could be created by getting the students to form groups during the activities. Activities based on experiments and practice should be planned and students should be involved in this process (Norby, 2002). In this way, students' participation in the lesson and their attitudes towards the lesson could be improved in a positive way. However, it should be noted that communication with the students during these activities should be established in a way that is suitable for the students' cognitive levels and it should not lead to a situation i which students' cognitive burden will be increased. Teachers ought to teach their lessons with a language that matches students' cognitive levels (Shymansky, Yore, Anderson, 2000).

Noise, which is one of the factors that hinder the communication in the class, and too big class sizes have a negative effect on students' attitudes (Nair & Fisher, 1999). Results that were obtained from the interviews show that students complain about negative classroom environment. It seems that jokes which are told to make the lesson more enjoyable cause disruption of the lesson and initiation of two-people conversations in the classroom. Humour could lead to unwanted consequences in the class while it can also have positive effects on learning. Similarly, big class size has a negative influence on students' attitudes. When students were asked about their dream science lesson, they mentioned a class in which there were a small number of students.

In order for students to be able to develop positive atttitudes towards science, appropriate visual materials (documantaries, animations, scientific models) should be used in schools, family and other socio-cultural environments, and students ought to be directed towards popular science periodicals. In this way, students will turn into individuals who can question, research, observe and experiment, and who know what scientific and technological developments mean and how they ocur by being more aware of the existing scientific and technological events.

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THE EVALUATION OF THE TEACHERS' OPINIONS FOR LESSON PLANNING SAMPLES PREPARED BY USING CREATIVE DRAMA METHOD IN MATHEMATICS TEACHING

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ABSTRACT

This research is made for indicating the overview of the teachers about the mathematics lesson plan application in mathematics teaching, which is prepared by using creative drama method by class and math teachers who are the officers in primary school education between terms 2010-2011. The working group of the research is consisted of 40 teachers in Afyon and in İzmir, who are the officers in 20 official primary schools and whom are selected randomly and as a volunteer. This research's data were collected by semi-structured interviews. The results obtained from analysis of the data are as follows: 45% of the teachers told that the planning is good. The lesson plan which is prepared by using creative drama method, is one of the ways that the teachers liked (35%) about attracting the students' attention. 25% of teachers have acclaimed of the applicableness of the lesson plan, 22.5% have acclaimed of detailed content, 20% acclaimed of the activities in lesson plan, that make students be active and the use of drama method. The ability of making the teached topic understand of the plan making the knowledge permanent, removing the monotonousness of the lesson, smooth and funny situation of the lesson are the actions that are liked by the teachers. The vast majority of the teachers told that the crowded classroom and inadequate time are the difficulties in creative drama in the lesson plan of the size of the application which is prepared by using creative drama method in teaching of math. As 42,5% of the teachers indicated that there is not a place to make changes in the plan and stated that it is applicable, 17,5% of them advised that the event in the plan must be less in terms of time and proposed to give examples from our country.

Keywords: *Creative Drama, Mathematics Teacher, Lesson Plan, Teachers' Opinions.*

INTRODUCTION

Mathematics is a part of life. It helps to perceive the world and to improve our environment. A low success rate in this lesson, which has a great importance in our lives, mostly depends on the methods used to teach mathematics. (Baykul. 2005:3)

Researches carried on in primary and secondary schools reveal that the methods used in the lesson are lectures or question-answer (Pesen, Odabaş, ve Bindak 2001:32). In our country, widely used narrative method makes the abstract concepts of the subject more difficult to understand. It is necessary to build up environments in which student based teaching-learning activities can be performed. (Şahin, 2005, Özsoy, 2003, 2004, 2010)

Aydın and his colleagues' (2000) research shows that teachers have difficulties' in explaining the concepts of math and describing them as concrete information which makes students unable to join the lesson actively. Besides, they explained that it is necessary to prevent students memorizing the information, give importance to group works. (Dursun and Peker, 2003:136)

Due to the contemporary approaches in education, cretive drama method has been used to enable the person to be active, to learn by realizing, makes him/her a productive and creative person and also it helps the person to improve healthy social communication skills. (Kaf, 1999:2)

The results of the researches done on teaching and learning math revealed the encouraging effects of the creative drama on understanding the concepts, remembering them and supporting positive attitude to math. (Saab, 1987; Omniewski, 1999; Fleming et al. 2004; Duatepe, 2004, Kotarinov, 20109.

Studies are required to explain creative drama, inform teachers about the application prospects and motivate the professional improvement of teachers. Özgün-Koca and Temizöz (2009) proposed in their studies to enrich the quality and quantity of the periodicals including articles, sample lesson plans, teaching methods and approaches to inform teachers about the developments in education.

As Gerver and Syroi (2003) proposed in their articles, if every teacher works on six activities and prepare six lesson plans every year, the group of the teachers in a school will have a good document of lesson plans and activities at the end of the year, and every year the archive will be enlarged. Moreover, if it can be done not only in one school but in every school of the town, it might make the archives larger (Trans. Özgün-koca and Temizöz, 2009).

In respect of these proposals, lesson plans based on creative drama are prepared for the subject "Natural Numbers" in the mathematics curriculum of the primary school 4th class and "Integer Numbers" in secondary school 6th class.

The aim of the research.

The aim of the research is to present the lesson plans prepared to teach the subject "Natural Numbers" in the mathematics curriculum of the primary school 4th class and "Integer Numbers" in secondary school 6th class. Besides, it includes the evaluation of the plans according to the opinions of the class and mathematics teachers.

The Problem Of The Research

What are the opinions of the class and mathematics teachers about the lesson plans prepared by the researchers and based on the creative drama method?

The Sub-problems of The Research

Considering the lesson plans prepared by the researcher and based on the creative drama method;

*What are the aspects which the class and mathematics teachers liked? / disliked?

*What are the changes which the class and mathematics teachers want to do?

METHOD

In this part, there is information about the model of the research, study group, data collecting instruments, collecting and analyzing the data.

The Research Model

As it aims at revealing a real situation, scanning method is used and it has narrative quality.

Study Group

The research which was made in the term of 2010-2011 was carried on by 40 teachers who were chosen at random from the public schools in İzmir and Afyon and joined the research volunteer. There were 27 women and 13 men

teachers in the group, and 28 of them were primary school class teachers, 12 of them were secondary school mathematics teachers.

Data Collecting Instruments

Data of the research were collected by semi-structured interviews. After the lesson plans were examined by the teachers, the questions on the form were answered. Each interview took about 15 minutes.

Data Analysis

Qualitative methods have been used to analyze the data through an interpretative approach. To analyze the interview questions, video records have been printed and formed teacher files. Then, after analyzing the questions one by one, question files have been formed. Lastly, category files were formed by analyzing the question files.

While forming the categories, same or similar answers were collected in a group. Check list matrixes were used to form category files. In forming category files, first the answers of the teachers were classified, numbers were calculated by using the registers, and then some interesting or explaining answers were selected in order to be quoted. In each category, numbers of the teachers were used to calculate the percentage of the teachers. Numbers and percentages are used to explain categories.

FINDINGS

In this part, data collected during the interviews with the teachers were given through each sub- question.

What aspects of the lesson plans researchers prepared by using creative drama method are liked by primary and secondary school teachers?

This part includes the views of the teachers and the aspects they appreciated about the lesson plans prepared by using creative drama method. The frequency and percentage rates of the appreciated aspects which were chosen by the primary school class teachers and the secondary school mathematics teachers are shown on the table below.

Table 1. The appreciated aspects of the creative drama based lesson plans, their frequency and percentage rates.

The appreciated aspects of the creative drama based lesson plans,	f	%
It has a good planning	18	45
It attracts the attention of the students	14	35
It is usable	10	25
It has a detailed content	9	22.5
It makes students active	8	20
It uses creative drama	8	20
It enables the teachers to fulfill the objectives	7	17.5
It prevents the lessons being monotonous	5	12.5
It is entertaining	4	10
It makes concepts easy to remember	3	7.5
It is fluent	1	2.5

Some views of the teachers on the lesson plans prepared by using creative drama are as follows,

I think it is very good. Shortly, it is good to reinforce all the things learnt. It includes every objective needed to be taught. Although ı have been teaching for 20 years, of course ı sometimes use drama, I have never thought about it before and I want to use it from now on.(T1-14) We know that the realized concepts are more permanent. If the

students are curious instead of being dictated they keep the information longer. This method is better for both the teachers and the students. (T2-8) It is a good plan. It makes students curious. (T2-9) That's good. Using drama is good, I mean. It attracts their attention so they can join the lesson. It is a good plan.

Then which aspects do you like most?

It includes drama. It's not monotonous. (T1- 2) It is quite good. It has a rich content. So it reaches the goals. Students are in the activity together. It sounds good that they are all active in the drama. Evaluation is planned well at the last step. It is a good plan to use creative drama. (T1-10)

What aspects of the lesson plans researchers prepared by using creative drama method are disliked by primary and secondary school teachers?

This part includes the views of the teachers and the aspects they disliked about the lesson plans prepared by using creative drama method. The frequency and percentage rates of the disliked aspects which were chosen by the primary school class teachers and the secondary school mathematics teachers are shown on the table below.

Table 2. The disliked aspects of the creative drama based lesson plans, their frequency and percentage rates.

The disliked aspects of the creative drama based lesson plans.	f	%
Inadequate time to apply the plan	13	32.5
Inapplicable in crowded classes	8	20
Not useful	6	15
Not including different samples	5	12.5
Probability of causing trouble to maintain order in the class	4	10
It has no aspects I disliked	15	37.5

Some views of the teachers are as follows;

Number of the students must be limited. For example, there are 40 students in our 5th classes. I mean it is difficult to use it in such classes (T1- 30). I use it, but not in every lesson. We can't complete the program me as we have to study for the level tests (T2-6). Lesson hours are not enough for these kind of activities. Population and the environment of the classes are not suitable to use these methods (T2 – 11). ... For example for a problem I give some examples. But in this activity the number of the samples is not enough. I think we should do more. Another point is time. It is a problem. It might not be enough. Well, three hours for it is not bad but if you don't separate them (T1 – 23).

What are the changes the primary school class teachers and the math teachers want to make in the lesson plans which the researchers prepared by using the creative drama method?

In this part the opinions of the primary school class teachers and the math teachers about the lesson plans which the researchers prepared by using the creative drama method are included

Table 3. The frequency and the percentage rates of the changes wanted to be made in the lesson plans

The changes wanted to be made in the lesson plans	f	%
It might be shorter considering the lesson hours.	7	17.5
It might include examples from daily life	7	17.5
Improvisations might be shorter	3	7.5
It should be practiced in smaller classes	3	7.5
It should be applied to the other subjects of math	2	5
There is no change I want to do	18	45

Some changes the primary school class teachers and the math teachers want to make in the lesson plans which the researchers prepared by using the creative drama method:

As we always try to explain it is a great trouble to carry out such plans in crowded classes. It is just trouble. If you do it with the teachers it can be good but it is not possible with students. Or, in other words, it depends on the class, for example, the place the students live in or the environment (T1-8). I think if it has examples from daily life, it works better (T2-3). No, I think it is pretty good. It is really applicable as it uses imagination and the concrete objects at the same time (T2-5). It is not bad but maybe there should be fewer games. It has a lot of games. While playing and doing all these games and activities, the classroom will turn to be a hullabaloo. There will be a lot of noise and disorder. In order to prevent that there maybe shorter games and activities so it becomes easy to control. It might be more useful (T1-23).

It is quite suitable for the primary school but if I consider my classes and the subject it is inadequate (T2-12).

RESULT

The results of the survey which was about the evaluation of the lesson plans prepared to use creative drama method for the primary school 4th class mathematics curriculum subject “Cardinal Numbers” and the 6th class subject “Whole numbers are as follows;

45% of the teachers told that the plan is good. 35% of them liked the planning as it attracts the attention of the students. 25% liked its being applicable, 22.5% found it detailed in content, 20% told that the aspects they liked are its including creative drama and activating the students. It is also said that it makes the subjects easy to comprehend, the information given remains permanent, it doesn’t have a monotonous process, it is fluent and entertaining. Majority of the teachers explained that one of the difficulties in using the plans is crowded classes (20%) and the other is inadequate time (32.5%). 45 % of the teachers said that there is no point needs to be changed.17.5% of the teachers who want to change the plans proposed to limit the time of the plan predicted to use creative drama. The teachers also expressed that the activities should be chosen from daily life, there should be less improvisation, the method can be used to teach the other subjects and it is suitable for small classes.

Proposal

Considering the opinions of the teachers participated we can do the following proposals:

- It is essential to arrange the time of the lesson plans.
- The facilities and the conditions of the classroom has to be defined and the environment has to be re arranged to be suitable for creative drama
- Planning and the activities should suit the level of the students.
- New lesson plans should be prepared considering the opinions of the teachers and the changes they want to make in the plans.
- Researchers should improve new lesson plans for different subjects of the mathematics to use creative drama method and submit them to the teachers to be used

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