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INVESTIGATING THE USE OF ACTIVE TEACHING METHODS BY LECTURERS AT THE PHYSICS DEPARTMENT OF THE UNIVERSITY OF GARMIAN

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ABSTRACT

Using active teaching methods is a requirement for educational systems. The goal of the present study is to investigate the use of active teaching methods by lecturers at the physics department of the University of Garmian in the academic year of 2016-2017.
This descriptive cross-sectional study was carried out at the physics department of the University of Garmian in the academic year of 2016-2017. The population consisted of all students studying at different levels of physics department (N=174); because of the limited population, the sampling done at that period of time (the census method) and final sample included 145 students. To collect data, a questionnaire was used as prepared by the researcher. Validity and reliability of the questionnaire were confirmed by experts (Cronbach's alpha=0.93). The data collected was analyzed by SPSS 22, using descriptive statistics tests, t-test and one-way ANOVA.
Findings show that more than 56% of students believed their lecturers had used active teaching methods while 43.4% of others believed their lecturers had not used them. Also, results show that there was no significant difference regarding gender ($p>0.05$), but there was a significant difference between the year of study and evaluating the use of active teaching methods. This difference was significant for the 1st and 4th year students ($p<0.05$). 4th year students evaluated their lecturers' methods more active than other students.
Although this study show that most of the lecturers at the physics department used active teaching methods, considering the findings about active teaching methods in different years of study, it can be concluded that lecturers of 1st year students need to use active teaching methods more frequently.

Keywords: Teaching Methods, Physics, Active, Students

INTRODUCTION:

Universities are from among important training and research centers in every country. Hence, elevating and developing the scientific and educational levels of a society depend on properly training human capitals, along with cultivating their talent and creativity. In fact, training at universities can be of a dynamic nature only when it starts fostering innovations and using novel teaching methods. According to Maker (1982), when people are forced to imitate rather than express their views and when they are encouraged to exercise only discipline and orderliness instead of doing meaningful works, creativity disappears. Utilizing traditional and inactive teaching methods by professors precludes students from developing their continuous and autonomous decision-making and learning potentials. As a result, the learning process will be gradually boring and it will not only play no role in innovation and creativity, but it will also lead to scientific recession and make them feel indifferent to scientific activities. Therefore, professors must believe that their role in the learning process is not just the transfer of scientific facts, but they should also provide conditions using modern training methods in a way that learning, creativity and the way of thinking be taught to students.

In a recent study carried out by Andala & Ng'umbi (2016) on the students of Kenyata University in Rwanda, it is shown that various methods of teaching students have a significant impact on their efficiency. From among those methods, collaborative methods and discussion groups have the most positive effects and traditional teaching methods have the least impact on students' efficiency. Ganyaupfu (2013) has assessed the impact of the three methods of "teaching-centered method", "student-centered method" and "teacher-student-centered method" in one of South Africa's Universities on students' performance; the results show that the method of the highest impact on students' efficiency and educational progress is the teacher-student-centered method. Gurayshi, Musapour and Abasi (2011) reported in their study that active teaching methods are of great significance especially in teaching physics.

Werf (2005), Teddlie & Reynolds (2000) and Sammons (1995) have shown in their researches that an effective teaching method takes place when a variety of teaching methods and techniques is used skillful manner. Some researchers including Cortright (2005), Cahyadi (2004) and Falconer (2001) have reported that an increase in conceptual understanding that itself leads to the better solving of quantitative problems and the higher ability to retain knowledge happens when teaching is presented in an active and interactive manner.

In a longitudinal study on technical students, Felder and Felder (1998) found that the efficiency rate and learning average of students who had been trained using active methods were by far more than those trained using traditional methods.

Dykstra et al. (1992) argue that making discussion when teaching makes students have their own ideas, and this issue occurs when students are allowed to think, question and establish a link among themselves.

One of the factors that leads to the success of universities and educational systems in applying active learning methods is having scientifically qualified instructors, familiar and enjoyed with educational, vocational and professional skills. However, there might be some obstacles in using these methods from among which one can refer to temporal and geographical constraints, unfamiliarity with teaching methods, implementation difficulty, the large number of students and others.

Teaching in the fields of basic sciences using active methods is much more important because these fields are constantly trying to discover unknown elements of the nature, and innovative and complex sciences and technologies are some parts of their course texts; also the presence of laboratory courses and experimental tests in these fields is from among the main reasons for adopting active and effective teaching methods. Physics as one of the natural sciences that examines the components of the nature and the forces existing among them requires to be taught and transferred to the young generation using active teaching methods. In this field, raising questions in students' minds, motivating students' participation in learning, forming laboratory and scientific groups as well as using scientific sources and scientific training tools seem increasingly urgent for teaching purposes. Therefore, reviewing the rate of applying these methods in this field can arrange for achieving academic improvement and breeding creative minds as well as elevating the country's scientific progress.

Failing to adopt active teaching methods is more common in educational systems and universities of developing and Third World countries. Hence, examining the use or non-use of these methods in such communities can facilitate the identifying of defects in the educational system and the applying of strategic policies to promote the scientific level and develop useful human resources. In addition, due to the fact that students of the teacher training discipline will be involved in playing a training role, the issue of directly experiencing active teaching methods is of more importance to them. The reason is that if they do not experience these methods during academic years, it is possible that after finishing their educations, they may fail to use such methods due to the lack of necessary knowledge of them.

In addition, Physics is from among those fields that due to the need for practical and laboratory activities, active teaching methods play a more significant role in it as against other fields. Considering the issues discussed above, this study aims at investigating the use of active training methods by the professors of the Physics Department of the University of Garmian of Iraqi Kurdistan in the academic year of 2016-2017. Since this issue of the kind is considered as a new research in Iraq and the Kurdistan region, it can lead to some development in the teaching methods at the universities of the region.

METHODOLOGY:

This research uses a descriptive cross-sectional method and regarding its purpose, it is an applied research. The statistical population includes all undergraduate students of the Department of Physics at the University of Garmian who were studying in the academic year of 2016-2017. To select the research sample, due to the limitation of the statistical population, all individuals were chosen using census. The sample group was consisted of 174 students of four different groups of study, based on the annual-unit system of the University of Garmian. Considering the voluntary nature of the participation in the research and including absentees, and damaged questionnaires, a total of 145 individuals participated in the current study.

RESEARCH INSTRUMENT:

using the field survey method and the questionnaire for evaluating active teaching methods, necessary data were collected. The questionnaire referred to was adopted from the Persian version of the questionnaire "Evaluation of teaching methods". The original version of this questionnaire has two parts of A and B where section A is related to the instructors' evaluation of their own performance, and section B is related to the students' evaluation of their own performance. Each section of this questionnaire has 20 questions answered in the form of "yes" or "no", on Thurston Scale. However, with respect to the objectives of this study some changes were made to the questionnaire in a way that only the questions of section A were used, but instead of instructors being demanded to assess their own performance, sentences were prepared in a way that students were supposed to assess instructors. The scoring method was also considered like the original Thurston scale, with yes (score one) and no (score zero) scores. Hence, the minimum and maximum scores in this questionnaire ranged from zero to 20. It should be noted that based on experts' opinions and previous researches, the Cut Point was set above 10. This means that a score lower than10 indicates failing to use active teaching methods, and score 10 and scores over it indicate the use of active teaching methods by instructors.

The content validity of this questionnaire has been evaluated in several studies, for example, in the study carried out by Khadivi and Mohammadi (2008) using this instrument, Cronbach's Coefficient Alpha of the total reliability was obtained at a = 0.93 for this questionnaire.

Given that the questionnaire had not been translated into the Kurdish language until then, it was translated by a team of experts at the University of Garmian. In order to ensure the scientific validity of the questionnaire for being utilized in this study, it was along with a copy of the title and objectives of the research submitted to five professors of the Psychology Department at the University of Garmian, an the final version was prepared upon their approval. To evaluate the validity and reliability of the questionnaire, it was applied and examined on a sample of 50 individuals. The reliability of this scale was analyzed using the Cronbach's Alpha method, and the correlation coefficients were obtained at 0.64. In general, the results indicated that the validity and reliability of the Kurdish version of the questionnaire were suitable. When the final version of the questionnaire was prepared, the questionnaires were distributed among some groups of students in several stages; to take account of moral considerations, prior to collecting the data, each group was briefed on the objectives of the study and the sensitivity of getting accurate answers, and they were assured that the information would be used by maintaining confidentiality.

After completing and collecting the questionnaires, data were analyzed using software SPSS22 (mean and standard deviation) and inferential tests (Independent sample t-test and Analysis of Variance).

FINDINGS:

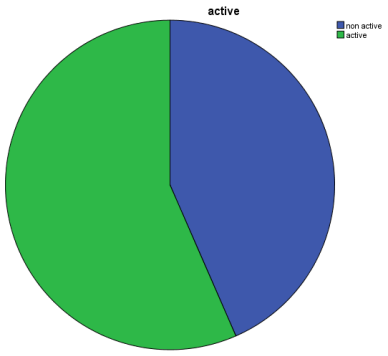
As already mentioned, 145 out of 174 students at the Physics Department completed questionnaires faultlessly, and a total of 29 individuals did not participated in the research (for reasons such as lack of desire, being absent on the research day, damaged or invalid questionnaires). Hence, the turnout was 83.33 percent. Demographic specifications of participants have been reported in Table 1.

Table 1: Demographic specifications of participants

Students at various stages	Gender		
	Male	Female	Total
First stage Students	6	33	39
Second stage students	12	34	46
Third stage student	11	25	36
Fourth stage students	7	17	24
Total	36	109	145

According to the findings, 24.8% of participants were male and 75.2% of them were female. 26.9 % of them were 1st year students, 31.7% of them were 2nd year students, 24.8% of them were 3rd year students, and 16.6% of them were 4th year students. Hence, the highest turnout was related to female and 2nd year students.
Analysis of the scores obtained from the questionnaires showed that 82 individuals of students (56.6%) believed that professors at the Physics Department used active teaching methods, while 63 individuals of them (43.4 percent) believed that professors of this group would not use active teaching methods. Fig. 1 represents the total percentage of using active teaching methods by physics instructors at the Physics Department.

Fig 1. Total percentage of using active teaching methods at the Physics Department



The question-by-question analysis results of the questionnaire (rate of positive responses to each question) have been presented separately for each gender in the form of frequency and percentage in Table 2.

Table 2: Question-by-question analysis results of the questionnaire (rate of positive responses to each question) separately for each gender in the form of frequency and percentage

		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
Frequency	Male	11	21	4	25	32	21	15	16	26	25	13	24	12	20	19	20	22	23	17	16
	Female	14	57	15	82	94	65	57	43	73	44	63	61	40	58	47	49	70	71	41	33
present	Male	%44	%26.9	%21.1	%23.4	%24.4	%24.7	%20.8	%27.1	% 26.3	% 37.2	% 17.1	%28.2	%23.1	%26.6	%28.8	%29	%23.9	%24.5	%29.3	%31.7
	Female	%56	%73.1	%78.9	%76.6	%74.6	%75.3	%79.2	%72.9	%72.7	%63.8	%82.9	%71.8	%76.9	%74.4	%71.2	%71	%76.1	%75.5	%70.7	%67.3
total	Frequency	25	78	19	107	126	85	72	59	99	69	76	85	52	78	66	69	92	94	58	49
	Present	%17.2	%53.8	%13.1	%73.8	%86.9	%58.6	%49.7	%40.7	%68.3	%76.6	%52.4	%58.6	%35.9	%53.8	%45.5	%47.6	%63.4	%64.8	%40	%33.8

Based on the question-by-question analysis results of the questionnaire it was determined that the most positive responses are given to question 5 (86.9%); this indicates the instructors' ability to manage and control classes. Also, the least positive responses are given to question 3 (13.1%), so it has questioned group teaching. To

examine the impact of gender on assessing the instructors' teaching method, the independent t-test was done with the results reported in Table 3.

Table 3: Results of the independent t-test for assessing the significance of the differences of the mean scores of the active teaching method for the two groups of male students and female students

	Levene's Test for Equality of Variances				
	F	Sig	T	Df	Sig
Equal variances assumed	2.01	0.15	1.25	143	0.21
Equal variances not assumed			1.31	64.95	0.19

Based on the results of comparing the two groups of male and female students in evaluating the amount of active teaching methods used, it was revealed that there was no significant difference between the two groups ($t = 1.25$, $p = 0.21 > 0.05$). As a result, male and female students have a similar opinion about the use of active teaching methods.

Also, in order to compare the results obtained on the basis of the academic year of students, to consider the hypothesis of identical variances based on Levene's Test (Levene's statistic = 0.19, $p = 0.90 > 0.05$), the one-way analysis of variance (ANOVA) was performed with the results reported in table 4.

Table 4: Results of the one-way analysis of variance (ANOVA)

	Sum of Squares	Df	Mean Square	F	Sig	Test of Homogeneity of Variances			
						Levene Statistic	df1	df2	Sig
Among Groups	95.16	3	31.72	3.55	0. 01	0.19	3	141	0.90
Within Groups	1258.39	141	8.92						
Total	**1353.55**	**144**							

Based on the results achieved for the analysis of variance, the value of F (3.55) achieved for evaluating the rate of using active teaching methods is significant ($p = 0.01 < 0.05$) for the 1st and 4th year students. Also, Tukey's test was conducted to check the exact difference; the results showed that the difference was related to the 2nd and 4th year students ($p = 0.04 < 0.05$). In this way, the 4th year students evaluated teaching methods of their instructors as more active compared with the 2nd year students.

CONCLUSION:

Due to the importance of using active teaching methods and the need for reviewing them at universities, in this paper, the rate of using active teaching methods by instructors at the Physics Department of the University of Garmian in the academic year of 2016-2017 was assessed. Considering data analysis results, it was demonstrated that active teaching methods are not unknown to the instructors of the Physics Department of the University of Garmian, and that the students of this department generally believe that instructors teach using active teaching methods. This is something positive for professors of the Physics Department, since the effectiveness of this method in facilitating learning has been proven by various researches (Andala & Ng'umbi, 2016; Cortright, 2005; Cahyadi, 2004; Falconer, 2001).

Today, it is recognized that traditional training methods do not have enough efficiency to meet scientific and practical requirements of students, and that making use of modern teaching methods such as active methods, personal participation, group confrontation and problem solving-based approaches seems necessary (Larijani, 2005).

Features of active teaching methods include boosting students' power of speech and reasoning, increasing students' abilities through solving problems, developing creativity, responsibility and character in various aspects, establishing better relationships between instructors and students and the like (Maleki, 2006), while in non-active teaching methods instructors only transfer knowledge and learning is a parrot-like practice.

This method leads to dependence on others, laziness and using findings of others, and strengthens the habit of relying on others and accumulating information inside one's mind (Qureshi et al., 2011).

In addition, Physics is a science relying on laboratory and experimental observations. In this branch of

knowledge, man tries to determine the cause of every phenomenon, and tries to see the behavior of the nature as a systematic reality. The science of Physics is the result of the precise application of senses to observing phenomena. Physics is a way of asking a question followed by an answer that is received through performing experiments and researches. As a result of such scientific researches, physicists and learners get familiar with the way things work, the way they start to exist and their interaction with each other (Van Cleave, Janice Pratt as quoted by Qureshi, et al., 2011).

More detailed results of the study showed that the use of active teaching methods for the 1st and 2nd year students was less than the amount used for the 3rd and 4th year students. Also, the highest score obtained was related to the power of controlling and managing classes by professors and the lowest score was related to the group teaching.

However, according to the research carried out by Lake (2001), utilizing group and collaboration methods can increase students' learning rate and evaluation scores. Hence, the use of this method by professors seems necessary. To explain this finding of the research, one can refer to the current social and political conditions of Iraq that have led to the situation where the academic year starts later than supposed, and as a result professors have been forced to obviate time-consuming methods to advance the courses. Since the group teaching is one of the ways that needs more time, it seems that the findings of this study have been obtained under the impact of certain social and political conditions.

Although previous researches indicate the relationship between active teaching methods and assessment results of students, due to the annual-unit system of the University of Garmian, the possibility of examining and comparing the results of various teaching methods did not exist; hence, it is suggested that in next researches this issue be taken into account. In addition, it is recommended that similar researches be carried out at other educational departments of the University of Garmian so that it will be possible to compare their results and achieve more accurate results.

In the end, all students of the Physics Department of the University of Garmian who participated in this study are highly appreciated.

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