

The Effect of the Open Inquiry Learning activity on Learning achievement and Multiple intelligences

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Abstract

The purpose of this study is to investigate the effects of the open inquiry learning activity over traditional instruction on 7th grade students' achievement and multiple intelligence. The subjects of this study consist of 120 of 7th grade students from four classes of instruction . One of the classes was randomly assigned as an experimental group and its students were instructed by using open inquiry learning method and another one of the rest classes was assigned as a control group, students from the later group was instructed with the traditional instruction. Achievement test and multiple intelligence test were administered to the experimental and control groups as the post tests. Analyzing the data was conducted with comparing

and studying the relations between Achievement and multiple intelligence scores on both the experimental and control groups. The result shows that the achievement and multiple intelligence of students from the experimental group carried out a significantly mean score which higher than those in the control group at the level of significance of .05.

Keywords : open inquiry learning activity, multiple intelligence

1.Introduction

Knowledge inquiry process is one of learning processes that allows learners construct new knowledge by themselves through thinking process and practice (IPST., 2546) and gives them an opportunity to suggest their innovative ideas and creative work pieces; especially, open inquiry activity emphasizes on making learners think independently. Principal characteristics of open knowledge inquiry are problems , questions , and theories prepared by teacher while experimental design, data analysis, experimental result interpretation and summary designed and implemented by learners themselves. (Bruck et al., 2009). Such learning management activity comprises a variety of sub-activities enhancing multiple intelligences of students and helping them have a chance for self-development in all areas as well as

improving self-wisdom or self-competency of those students at the same time. (Tisana Kammanee, 2002). Each part of human brain has different functions, then, contributing different learners and their different learning processes and abilities resulting in each learner has at least 8 multiple intelligences: 1) Linguistic Intelligence, 2) Logical–Mathematical Intelligence, 3) Bodily – Kinesthetic Intelligence, 4) Visual/Spatial Intelligence, 5) Musical Intelligence, 6) Interpersonal Intelligence, 7) Intrapersonal Intelligence, and 8) Nationalism Intelligence. Therefore, if learners are equipped with many areas of multiple intelligences, they will be able to accomplish their learning based on the discovery of Guisti (2008) that high school students in a Physics class of long term discipline designed on open inquiry learning with CRT (Criterion Referenced Physics Test) can achieve higher score compared to students those in guide inquiry learning with statistical significant (p - value = .049). However, on learning management based on open inquiry in the country, few researches are found and no study of the effects of open inquiry processes on multiple intelligences are presented. From above reasons, the researcher became interested in investigating the mentioned topic concerning multiple intelligences and student learning achievement under the environment of open inquiry learning management activity to explore further effective development of science learning processes.

2.The aims of the study

1. To compare mean scores of multiple intelligences between experimental group of students with open inquiry learning activity and control group of students with traditional learning method

2. To compare mean scores of learning achievement between experimental group of students with open inquiry learning activity and control group of students with traditional learning method

3.Research Methodology

3.1 Research Design

This research is an Quasi Experimental Design comparing mean scores of multiple intelligences, mean scores of learning achievement between experimental group of students with open inquiry learning activity and control group of students with traditional learning method.

3.2 Participants and Instruments

Research population is 7th grade students from 4 classrooms in total of 120 persons. As an experimental group, 27 subjects were taken from one of four classrooms with simple sampling method. With the same sampling method, 29 students in one of the rest classrooms were treated as a control

group. Research instrument includes 10 “force and motion” learning management plans, achievement test of 30 items, and multiple intelligence test of 40 items (5 items for each of 8 areas).

3.3 Data collection

The researcher had conducted the learning achievement test and the multiple intelligence test for 1 week and then implemented open inquiry learning activity on the experimental group and traditional one on the control group. During this learning management activity implementation , the researcher had recorded video and collected students' works for further analysis once the learning activity was ended. Then, the learning achievement test and the multiple intelligence test were examined.

3.4 Data analysis

Comparative analysis was carried out on mean scores of learning achievement and multiple intelligences. Statistical mean (\bar{X}), standard deviation (S.D.), and (t-test) were applied pre-test and post-test of the learning activity, on both experimental group and control group. Students' responses on activity sheets and activity implementation video were investigated simultaneously.

4.Results

The researcher proposes comparative research results in terms of mean scores of learning achievement and multiple intelligences as described in table 1 and 2 respectively.

Table 1 shows mean (\bar{X}), standard deviation (S.D.), and t-test of learning achievement scores pre-test and post-test of the open inquiry learning activity among students in the experimental group and traditional learning activity among students in the control group.

Sample	Number (persons)	Pre-test		Post-test		Pair t-test	P-value
		(\bar{X})	(S.D.)	(\bar{X})	(S.D.)		
Control	29	7.59	2.57	13.10	2.39	-9.879	.000 ^a
Experimental	27	8.92	3.23	17.26	1.58	-15.164	.000 ^a
t		-1.722		-7.568		-	

p-value	.091 ^c	.000 ^b	-
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*p^a Comparison between pre-test and post-test of learning activity

*p^b Comparison of learning achievement scores after the learning activity between the control and experimental groups

*p^c Comparison of learning achievement scores before the learning activity between the control and experimental groups

In above table 1, it suggests that the learning achievement's mean scores of students in the control group is differed from those of students in the experimental group with the statistical significant level at .05.

Before the learning activity, the learning achievement's mean scores of students in the control group is not different from those of students in the experimental group with the statistical significant level at .05.

After the learning activity, the learning achievement's mean scores of students in the control group is different from those of students in the experimental group with the statistical significant level at .05.

Table 2 demonstrates mean (\bar{X}), standard deviation (S.D.), and t-test of multiple intelligence scores pre-test and post-test of the learning activity (among their groups)

Sample	Number (persons)	Multiple intelligences (areas)	Pre-test		Post-test		Pair t-test	P-value
			(\bar{X})	(S.D.)	(\bar{X})	(S.D.)		
Control	29	MI*	12.79	5.31	18.10	3.95	- 6.348	.000
		Linguistic	1.86	0.95	2.52	1.43	- 1.776	.087
		Logical– Mathematical	1.48	1.18	2.62	0.94	- 4.919	.000
		Bodily – Kinesthetic	1.62	0.90	1.72	0.92	- 0.516	.610

		Visual/Spatial	1.34	0.93	1.66	0.77	- 1.665	.107
		Musical	1.38	0.94	1.97	0.78	- 2.436	.021
		Interpersonal	1.76	1.62	2.55	1.40	- 2.298	.029
		Intrapersonal	1.62	1.39	2.07	1.49	- 1.689	.102
		Nationalism	1.72	1.09	3.00	1.22	- 5.373	.000
Experimental	27	MI*	13.67	5.81	20.51	4.17	- 9.825	.000
		Linguistic	1.93	0.83	3.03	0.98	- 5.701	.000
		Logical-Mathematical	1.63	0.97	3.11	0.69	- 6.660	.000
		Bodily – Kinesthetic	1.37	0.97	2.48	1.01	- 4.057	.000
		Visual/Spatial	1.59	1.08	2.56	1.01	-4.44	.000
		Musical	1.74	0.98	2.26	0.76	- 3.174	.004

		Interper sonal	2.00	1.59	2.33	1.77	- 1.363	.185
		Intraper sonal	1.70	1.35	2.04	1.16	- 1.669	.107
		National ism	1.70	1.20	2.67	0.67	-5.57	.000

*MI is a total of 8 multiple intelligences.

In table 2, it was found that 8-area multiple intelligences' mean scores of students in the control group before and after the learning activity is different with the statistical significant level at .05. For each area of multiple intelligences, Logical–Mathematical , Musical , Interpersonal and Nationalism multiple intelligences' mean scores of students are much different with statistical significant at .05 but Linguistic , Bodily – Kinesthetic , Visual/Spatial and Intrapersonal multiple intelligences' mean scores of students are not different with statistical significant at .05. For the experimental group, 8-area multiple intelligences' mean scores before and after the learning activity is different with the statistical significant level at .05. Based on each area of multiple intelligences, Linguistic , Logical–Mathematical , Visual/Spatial , Musical , Bodily – Kinesthetic and Nationalism multiple intelligences' mean scores of students are much different with statistical significant at .05 but Interpersonal and Intrapersonal multiple intelligences' mean

scores of students are not different with statistical significant at .05.

Table 3 shows the t-test of mean scores on pre-test of multiple intelligences derived from students in both the control group and the experimental group and ones on post-test of multiple intelligences derived from students in both the control group and the experimental group (tested among their groups)

Multiple intelligences (areas)	Pre-test		Post-test	
	t	P-value	t	P-value
MI*	- 0.588	.559	- 2.225	.030
Linguistic	- 0.267	.791	- 2.905	.005
Logical– Mathematical	- 0.506	.615	- 1.048	.299
Bodily – Kinesthetic	1.002	.321	- 1.058	.295
Visual/Spatial	- 0.917	.363	- 1.753	.085
Musical	-	.166	-	.402

	1.404		0.845	
Interpersonal	- 0.562	.576	- 1.012	.316
Intrapersonal	- 0.225	.823	- 0.681	.499
Nationalism	0.066	.947	1.765	.083

*MI is a total of 8 multiple intelligences.

In table 3, it suggests that the 8-multiple intelligences' mean scores on pre-test of students in the control group is not differed from those of students in the experimental group with the statistical significant level at .05 but the 8-multiple intelligences' mean scores on post-test of students in the control group is different from those of students in the experimental group with the statistical significant level at .05. For each area of multiple intelligences, Logical–Mathematical ,Bodily – Kinesthetic and Visual/Spatial multiple intelligences' mean scores of students are much different with statistical significant at .05 but Linguistic ,Musical , Nationalism Interpersonal and Intrapersonal multiple intelligences' mean scores of students are not different with statistical significant at .05.

6.Summary, discussion and suggestions

In this research, it was found that students in the control group and the experimental group have the same result of learning achievement with statistical significant at .05, until the open inquiry learning activity was applied (in the experimental group), mean scores of students in this group are differed from another group with statistical significant at .05 in correspondence with the research of Guisti (2008) that high school students in a Physics class of long term discipline designed on open inquiry learning with CRT (Criterion Referenced Physics Test) can achieve higher score compared to students those in guide inquiry learning with statistical significant ($p\text{-value} = .049$). Based on the open inquiry learning activity, students are enabled to design experiment, analyze collected experimental data, translate results and provide the summary by themselves. This way make those students have opportunity to explore their various self-interests in given activities.

In terms of 8 areas of multiple intelligences, the mean scores on both pre-test and post-test of students in the control group are different with statistical significant at .05 similarly the mean scores on both pre-test and post-test of students in the experimental group are different with statistical significant at .05. For each of 8 areas of multiple intelligences, it was found that

Logical–Mathematical , Musical , Interpersonal and Nationalism multiple intelligences' mean scores on pre-test and post-test of students in the control group are different with statistical significant at .05 but Linguistic , Bodily – Kinesthetic , Visual/Spatial and Intrapersonal multiple intelligences' mean scores on pre-test and post-test of students in the control group are not different with statistical significant at .05. Linguistic , Logical–Mathematical , Visual/Spatial , Musical , Bodily – Kinesthetic and Nationalism multiple intelligences' mean scores on pre-test and post-test of students in the experimental group are different with statistical significant at .05 but Interpersonal and Intrapersonal multiple intelligence's mean scores on pre-test and post-test of students in the experimental group are not different with statistical significant at .05.

Comparing the multiple intelligences scores between those of the control group and the experimental group, result exhibits that pre-test scores of each 8 areas of multiple intelligences between both students in the control group and those in the experimental group are not different with statistical significant at .05, however, after the learning activity was applied, the mean scores of each 8 areas of multiple intelligences become different with statistical significant at .05. Then, for each of 8-area multiple intelligences, Logical–Mathematical , Bodily – Kinesthetic and Visual/Spatial multiple intelligences' mean scores are different with statistical significant at .05 but

Linguistic, Musical, Nationalism, Interpersonal and Intrapersonal multiple intelligence's mean scores are not different with statistical significant at .05. This results illustrate that the open inquiry learning activity can strengthen students' multiple intelligences probably due to it allow students participate in learning activity and design experiment by themselves contributing multiple intelligence improvements such as Logical–Mathematical , Bodily – Kinesthetic and Visual/Spatial. Therefore, in learning activity design, learner participation is significant in particular sub-activities i.e. experimental design, data analysis, conclusion resulting in settling self-learning and multiple intelligences.

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