Journal of Physics: Conference Series **710** (2016) 012025 doi:10.1088/1742-6596/710/1/012025

A study: Effect of Students Peer Assisted Learning on Magnetic Field Achievement

Wannapa Mueanploy
Department of Science and Mathematic
Faculty of Science and Technology
Pathumwan Institute of Technology, Bangkok, Thailand 10330

Email: bpuifai06@hotmail.com

Abstract: This study is the case study of Physic II Course for students of Pathumwan Institute of Technology. The purpose of this study is: 1) to develop cooperative learning method of peer assisted learning (PAL), 2) to compare the learning achievement before and after studied magnetic field lesson by cooperative learning method of peer assisted learning. The population was engineering students of Pathumwan Institute of Technology (PIT's students) who registered Physic II Course during year 2014. The sample used in this study was selected from the 72 students who passed in Physic I Course. The control groups learning magnetic fields by Traditional Method (TM) and experimental groups learning magnetic field by method of peers assisted learning. The students do pretest before the lesson and do post-test after the lesson by 20 items achievement tests of magnetic field. The post-test higher than pretest achievement significantly at 0.01 level.

1. Introduction

The magnetic field is a vector having both direction and magnitude. The magnetic force that carry on a charge q moving with a velocity v in a magnetic field B has a magnitude given by $F = qvB\ sin\theta$. Where θ is the angle between v and B. The right-hand rule applies in order to find the direction of force. The SI unit of magnetic field is the **tesla** (T), also used the weber per square meter (Wb/m^2). An additional commonly used another unit for magnetic field is the **gauss** (G), where 1 T=10^4 G. If a straight conductor of length L current I, the magnetic force on that conductor when it is placed in an external magnetic field B, is $F = BIL\ sin\theta$. The right-hand rule also gives the direction of the magnetic force on the conductor. The torque τ on a current-carrying loop of wire in the magnetic field B has magnitude given by $\tau = BIA\ sin\theta$ .Where I is the current in the loop and A is its cross-sectional area. The angle θ between B line drawn perpendicular to the plane of the loop.

If a charged particle moves in a uniform magnetic field such that its initial velocity is perpendicular to the field, the particle will move in a circular path whose plane is perpendicular to the magnetic field. The radius r of the circular path is $r = \frac{mv}{qB}$ where m the mass of the particle and q is its charge.

The magnetic field at a distance r from a long, straight wire carrying a current I has a magnitude $B = \frac{\mu_0 I}{2\pi r}$ Where $\mu_0 = 4\pi \times 10^{-7}\ T.m/s$ is the permeability of free space. The magnetic field lines created by a long, straight wire are in the form of concentric circles.

Ampere's law can be used to find the magnetic field around certain simple current-carrying conductors. It is stated as $\sum B\| \,\Delta l = \mu_0 I$. Where $B\|$ is the component of B tangent to a small current element of length Δl that is part of a closed path and I is the total current that penetrates the closed path. The force per unit length between two parallel wires separated by a distance d and carrying currents I and I has a magnitude given by $\frac{F}{L} = \frac{\mu_0 I_1 I_2}{2\pi d}$. The force is attractive if the current are in

the same direction and repulsive if they are in opposite directions. The magnetic field inside a solenoid has magnitude $B = \mu_0 nI$. Where n is the number of turns of wire per unit length, $= N/L$.
The magnetic field can apply in advance further and related issues, Two different temperature dependencies of the thermal conductivity are observe for $\vec{H} \parallel \vec{b}$: linear at low magnetic field and quadratic for magnetic field larger than 1 Tesla[1]. The magnetic fields in the mT range are applied to study the effect on single particles or few-particle systems that are trap inside the sheath region. The behavior of the paramagnetic dust particles is considerably different form that of dielectric plastic particles [2]. The magnetic force microscope is a powerful tool for recording media studies. However, identifying magnetic contribution is still an issue in high-resolution studies [3].
The major objectives of teachers are to effectively use instructional strategies to improve students' cognitive and effective outcomes. Many studies have been conducted in different settings of education, using different kinds of the cooperative learning techniques. Cooperative learning methods of peers assisted learning indicates that the appropriate method of learning at the high level is Student Teams Achievement Divisions [4]. One kind of cooperative learning to approach, in order to encourage students to improve their achievement and promote more positive attitude an alternative to lecture-based teaching could be Student Teams Achievement Divisions[5].

2. Methodology

2.1 The achievement test
The achievement tests were 20 items in 5 multiple-choice about unit of Magnetic Field and Its Effects, Field Sources and Magnetic Flux and Induction Law. The tests and two parallel sets created by the author and analyzed by B-index Program.

2.2 The experiment setting
The sample in this study was selected from the 72 students. 12 students who received grade A,B$^+$ or B, 36 students who received grade C$^+$ and C and 24 students who received grade D$^+$ an D in Physic I Course. After that rearrange in 12 groups in each group composed 6 students: one from A, B$^+$ or B, three from C$^+$ and C and two from D$^+$ and D. Random sampling 6 groups (36 students) are control groups and another 6 groups (36 students) are experimental groups. Groups of student are small (six students) for this experiment.

2.3 Study in Class
Planning, teaching each cooperatives learning should take between 50-60 minutes to complete content.
2.3.1 The students in control groups (N = 36) went to learning TM in lesson of magnetic field.
2.3.2 The experimental groups (N = 36) went to learning PAL in lesson of magnetic field.

2.4 The process of learning PAL is follows:
2.4.1 The teacher introduces a lesson. The time spent in this step is about 8-10 minutes.
2.4.2 The experimental groups learning PAL are asked to discuss through group work and brainstorming. The times expected for this learning activity is about 25-30 minutes
2.4.3 All of students in experimental groups take individual post-test (first time). The times set for this step about 15-20 minutes. In addition each student can check correct answers by themselves after taking the mentioned test. Importantly, the results obtained from the post- test of each experimental group must be more than 80 percent. However, if the result of each group is lesser than 80 percent, it means that the set hypothesis is rejected. Each student is expected to obtain the result more than 80 percent that means the student can answer the correct answer more than 16 items. Under such circumstances, if the particular student gets the correct answer less than 16 items, the students are expected to go back to the second step and the third step respectively so as to take the post test that is designed in parallel to the first one. In this study, all students in the experimental groups are expected to get the scores 80 percent after going back to learn the lesson in three times.

The results of the experimental groups and control groups analyze by means, standard deviation; independent t-test significant at 0.01 level.

3. Discussion and Result

3.1 The results of this study control groups learning TM and experimental groups learning PAL in lesson of magnetic field get the score pretest are not different in figure 1 and post-test score of control groups and experimental groups are significantly at 0.01 level in figure 2. The post-test scores of experimental groups use the chanced to get back to step 2 and 3 in three times to take everyone 80 percent in figure 3

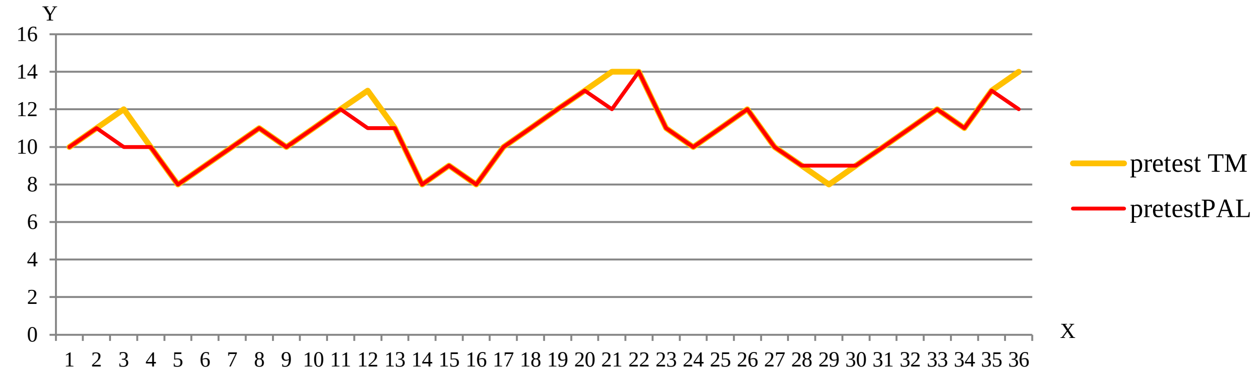

Figure1 the pretest score control groups (TM) and experimental groups (PAL)

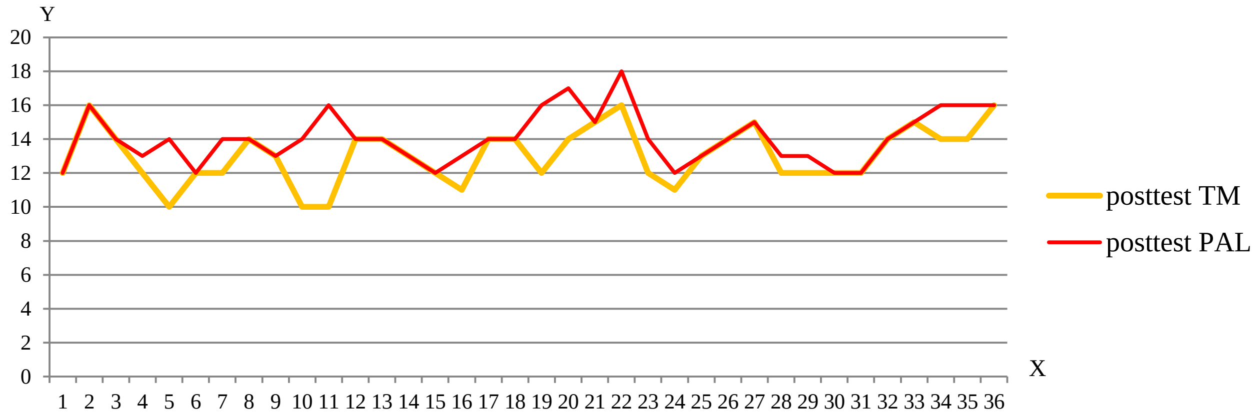

Figure2 the post-test score of control groups(TM) and experimental groups (PAL)

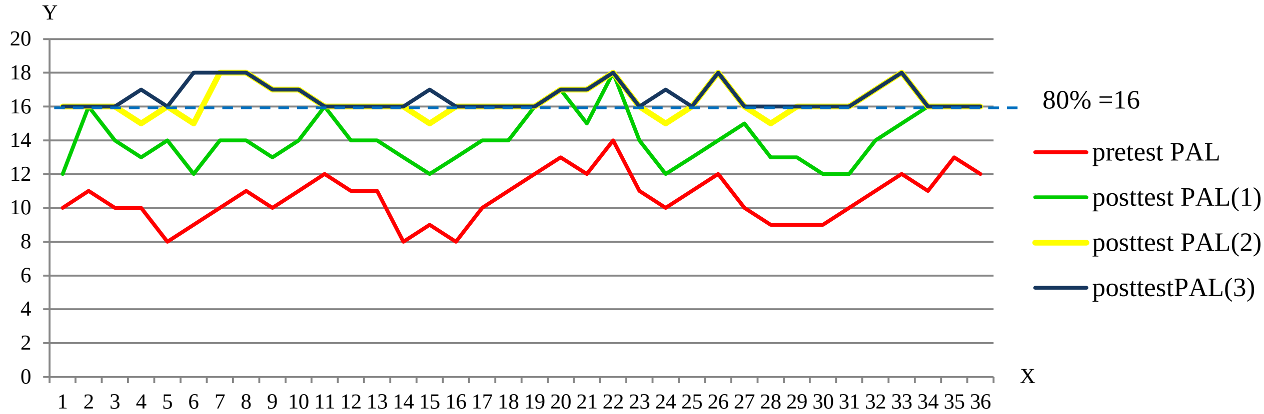

Figure3 the experimental groups pretest and post-test scores in three times

3.2 The results of analyzing pretest and post-test physics achievement magnetic field of PIT's students are as the following.

Table 1 The results of analyzing pretest physics achievement magnetic field of PIT's students

Statistics Sample	**N**	$\bar{X}$	SD	t-test
Controlled groups	36	9.70	1.70	0.50
Experiment groups	36	9.52	1.44	

From table1 finding an average of the pretest in physics achievement, magnetic field the experiment groups learning PAL is 9.52 the average of the pretest the controlled groups learning TM is 9.70. Using t-test independent sample to compare achievement finds that the experiment groups and controlled group's achievement is different insignificantly.

Table 2 The results of analyzing post-test physics achievement magnetic field of PIT's students

Statistics Sample	**N**	$\bar{X}$	SD	t-test
Controlled groups	36	11.73	1.65	
Experiment groups(1)	36	12.67	1.54	2.5^{**}
Experiment groups(2)	36	14.65	0.88	10^{**}
Experiment groups(3)	36	14.90	0.77	3.6^{**}

$^{**}p < .01$

From table (2) Finding the average of the post-test in physics achievement, magnetic field learning method of PAL is 12.67,14.65 and 14.90 the average of the post-test the controlled groups studied in TM is 11.73. Using t-test independent sample to compare achievement finds that is significantly higher at 0.01 level.

3.3 The results chart of analyzing pretest and post-test physics achievement magnetic field of PIT's students were show percentage the development in groups. In this study the p-value is used as an alternative to rejection points to provide the smallest level of significance at which the null hypothesis would be rejected.The probability of getting the results to given that the null hypothesis is true**.** It means the achievement of PIT's students learning PAL is higher than the achievement of PIT's students learning TM.

This study helps engineering students to understand in magnetic field to apply in advance further and related issues. The magnetic field measurement was the most widely applied technology of magnetic measurement it was not only significant to study in all areas of solid physics but also make and important contribution to study in related subject [6]. It was found that magnetic field has power on surface tension and electrical conductivity of mine water [7]. The moving body in this magnetic field exerts little influence on the magnetic intensity and the influence can be neglected. The force of the moving body about its position can be calculated in static analysis and then be imported into the impact calculation to obtain the velocity and displacement [8].

4. Conclusion

In this study, 20 items used in achievement test of magnetic field were analyzed by B-index Program, The result is Difficulty (P) = 0.43-0.63, Discrimination = 0.13-0.68 and Reliability(r) = 0.28. The achievement of PIT's students learning PAL is higher than that of PIT's students learning TM at level of 0.01 which is related to the specified hypothesis that is consistent with study of this research has shown that it is better for students' experience cognitive from directly observed experiments than by reflecting on reported experience from popularization papers or writings found on the internet [9]. The present study shows that PAL strategy is more effective to the students' learning and retention than lecture. These differences were clearer in the comprehension and application levels. PAL learning scores are significantly are higher than lecture by overall and knowledge level [10]. PAL has benefits of collaborative and cooperative learning experience which was manifest in the strong social congruence among PAL groups in the present study [11]. In addition PAL creates a learning environment which allows students to ask questions and PAL as part of the solution and not as part of the problem.
Future research will develop PAL provides a comprehensive in Physics I and Physics II to ensure continuity and coherence in learning physics.

Acknowledgment
The author would like to thank Pathumwan Institute of Technology for the financial support and permission to experiment.

Reference

[1] Ludovic Howald,Mathieu Taupinand Dai Multigap 2014 Superconductivity in the Ferromagnetic Superconductor UCoGe Revealed by Thermal Conductivity Measurements *Hindawi Publishing Corporation Physics Research International* Volume 2014, 7 pages.
[2] Marian Puttscher and André Melzer, 2014 Paramagnetic dust particles in rf-plasmas with weak external magnetic fields, *New Journal of Physics* 16 , 13 pages.
[3] Hai Zhong et al, 2008 Non-contact magnetic force microscopy of recording media by *ex situ* tip magnetization reversal method, *Journal of Physics D: Applied Physics*, Volume 41, Number 8
[4] Thida Mosikarat et.al, 2005 Development of Cooperative Learning Method of Peer Assisted Learning for Students of Sukhothai Thammathirat Open University: Case Study of Thai Studies Course Samutsakorn Province, Sukhothai Thammathirat Open University.
[5] Van Dat Tran 2013 Effects of Student Teams Achievement Division (STAD) on Academic Achievement, and Attitudes of Grade 9th Secondary School Students towards Mathematics *International Journal of Sciences* Volume 2, Issue Apr (2013) 5-15.
[6] Shi Kun Zhu Shi Kun Zhu, Study on the Methods of Measuring Magnetic Field, *Applied Mechanics and Materials* Volume 214 ,(2012) 124-129.
[7] Zhe Guo, Jian Guo Cui, Gang Wei, 2014 The Effect of Applied Magnetic Field on the Mine Water Coagulation *Applied Mechanics and Materials* (Volumes 522 - 524) 1021-1026.
[8] Ya Ping Ding, Xiao Yan Tong, Yong Tao Liu, Yong Liao 2013 A Method of Impact Simulation in Permanent Magnetic Field *Applied Mechanics and Materials* (Volume 443) 129-133.

[9] Mirko Marušić and Josip Sliško 2012 Influence of Three Different Methods of Teaching Physics on the Gain in Students' Development of Reasoning International *Journal of Science Education* Volume 34, Issue 2.
[10] Mohammadreza Abediniet.al, 2013 A New Teaching Approach in Basic Sciences: Peer Assisted Learning, *Procedia - Social and Behavioral Sciences*, Volume 83, 4 July Pages 39–43.
[11] Seema Daud and Syeda Kauser Ali,2014 Perceptions of Learners about Peer Assisted Learning and Lectures, International *Journal of Science and Study* (IJSR) Volume 3 Issue 11, November.
[12] Ngoc-Loan Nguyen and David E. Meltzer 2005 Visualization Tool for 3-D Relationships and the Right-Hand Rule, *The Physics Teacher* , vol.43,March.
[13] Antonio Svedružić, 2008 Demonstration in teaching Physics, *Metodika* 17 ,442-450.
[14] Shafqat Hussain,2011 The Effectiveness of Teaching Physics through Project Method on Academic Achievement of Students at Secondary Level -A Case Study, *Journal of Education and Practice*, Vol. 2, No 8.