



## Relative Factors Effectiveness on Learning of Medical Sciences Students

### KEYWORDS

discipline in class, lecturing method, teaching equipments

\* Syed Abbas Hosseini

Syed Ali Hosseini

Zahedan university of medical sciences, Zahedan , Iran  
\* is correspondent author

Shiraz Medical Science University, Researcher

**ABSTRACT** *Background: There were conflicting perspectives on adult learning. Objective: The purpose of this research was to determine relative factors effectiveness on learning of medical sciences students. Material and method: The study was cross-sectional on medical physics field in 2012-2013. The participated medical sciences students divided into two groups. The questionnaire was fulfilled by student group coincidence with described theory of learning. All chosen students passed medical physics exam for three times from two chapter of the medical physics book. Each group of students was in a real-life scenario involved an exam that a student with medical physics lesson might confront. Once the exam had been laid out for them, each student must respond to learning efficiency that might help them deal with the particular situation. The reply of the questions about medical physics lesson learning was certified by paired observation T-test. The evaluation quality was as factor of excellent and poor. Results: The learning efficiency were  $95\pm 5$ ,  $85\pm 1$  and  $89\pm 2$  for first group and  $45\pm 2$ ,  $55\pm 10$  and  $50\pm 12$  for second group in percent by three exam for two groups with/without applying three factors. The responses showed "agreement" first group and "disagreement" second group. Theoretical and practical evaluation showed factors of discipline in class, lecturing method, teaching equipments were effectiveness relatively. Conclusion: Three factors of discipline in class, lecturing method and new modern equipments were relatively effectiveness in learning medical sciences students.*

### Introduction:

Some aspects of teaching are appropriate when applied with adult learners. Medical physics is taught to medical student by a lecturer who is experienced in physics sciences or depended lessons (1). The lessons are the most basic and important than other subjects for medical sciences student. Although theoretical medical physics sciences lesson is necessary for medical sciences students, but they have been less interesting in medical sciences physics than biological and clinical lesson. Tomoyuki et al 2009 result medical physics learning is a failure if white-board, medical physics book and two dimension curves are used (2). This is in spite of the author belief that traditional learning styles are essential in student groups. Medical physics learning is influenced by many factors. There are six key variables in adult learning: prior experience, reflection, authentic experiences communication, dialog, discussion, self-assessment and correction, picture superiority effect and dual coding (3). Cheng et al 2010 reveal developing learning from its original proposal into some of its current refinements and applications today is the World Wide Web (the Internet) usage as a vast reference library(4). Many of us engaged in professional learning have a broad understanding of experience. Experience is source of learning and development. Bargerhuff et al 2010 found the effectiveness of science and math classes alongside their peers is largely dependent on the skill level of the general educator and the support afforded to this teacher through various channels(5).

Unalan et al 2009 reveal that using theatrical performance in medical education may facilitate learning and enhance empathy and team work communication skills (6). Visioli et al 2009 find integrated with other strategies for improving lecturing, such as student scoring, peer evaluation, and microteaching, observational research can be a cost-effective method to stimulate guided reflection and to improve the lecturing skills of faculty members (7). Rittle-Johnson and Koedinger 2009 show an iterative sequencing of lessons seems to facilitate learning and transfer, particularly of mathematical procedures (8). The findings support an iterative perspective for the development of knowledge of concepts and procedures. The study of Rittle-Johnson et al 2008 indicates that explanation prompts can facilitate transfer young (8). Rittle-Johnson

2006 results a correct procedure and self-explanation promoted transfer regardless of instructional condition(10). Micro genetic analyses provide insights into potential mechanisms underlying these effects. Kmicikewycz 2008 states students with low prior knowledge have higher accuracy in the generate condition, but as prior knowledge increased, the advantage of generating answers decrease (11). The benefits of generating answers may extend to unstudied items and to classroom settings, but only for learners with low prior knowledge. Cheng et al 2010 revealed that development and preliminary testing of a self-rating instrument to measure self-directed learning ability of nursing students are a better way of learning (12). The scale may also enable faculties to assess students' status, design better lesson plans and curricula, and, implement appropriate teaching strategies for medical students in order to foster the growth of lifelong learning abilities (13).

The purpose of research was to determine factors of applying modern equipment and abilities of lecturer in lecturing were important factors for students learning who were aimed to be known, because they were available hinders to students in learning medical programs in university.

### Material & Method:

Forty two medical sciences students were participated in this project. The students were divided into two groups with 21 persons, dental (1) and practical room students (2) with lower 24 years old. The three factors of discipline in class, lecturing method and new modern equipments were acted on group 1, but discipline in class, lecturing method and new modern equipments were not acted in group 2. All the two groups passed medical physics exam as mid term exam for three times. A questionnaire consisted of questions about discipline in class, type of equipment for teaching and lecturing in class was given to group 1 of students for fulfilling. Information about his background, current work and most well known publications - including references to his most well-known subject - experiential learning and learning styles were taken from them. The volunteer students, coached by experienced lecturer, were given a four-month preparation period to read and solve different chapters problems. A score

evaluation performance after taking exam was followed by the lecturer about medical physics. Finally, a group of questions led by lecturer deal with raised performance in learning. The evaluation of the education field of students was based on questionnaires and dental students learning efficiency of practical room students. The learning efficiency of practical room students was compared with the learning efficiency of dental students. A few students had replied either "poor" reply or no one has replied. The reply of the questions about medical physics lesson learning was certified by paired observation T-test. The evaluation quality was as factor of excellent, poor. Their learning efficiency in exam was analyzed by paired observation T-test with p-value < 0.5.

**RESULTS:**

The average frequency of dental students with the statement "Disciplines in class, lecturing method and new modern equipment performance was 85%, 85% and 82% by answering "excellent" for lecturing medical physics. Dental students were 15%, 15%, and 18% with above-mention statements as "poor". The factors of disciplines in class, modern equipments and lecturing medical physics were effective on dental students learn, but practical room students did not, because responses to questions were 13%, 15% and 46% as excellent; 87%, 65% and 54% as poor (table 1). The learning efficiency by taking medical physics exam for two groups with three factors were 95±5, 85±1 and 89±2 for first group and 45±2, 55±10 and 50±12 for group 2 without applying three factors (table 2). Comparing learning efficiency of two above mentioned groups showed performance of dental students with disciplines in class and new modern equipment showed higher than performance of practical room students without disciplines in class and new modern equipment. Questions analysis showed the medical physics lesson was thought of good lesson and useful by most students. The results of questionnaire showed frequency of students reply "excellent" related to other reply were 3-7 times depend on number of question and with/without applying factors. The responses of dental medicine to questions as "excellent" were more than responses of practical room, 85 to 39. On the contrary, the responses of dental medicine to the questions as "poor" were less than responses of practical room, 15 to 60.

**Discussion:**

Disciplines in class in medical physics are type of stimulation by activating students for teaching better to students. Stimulation contributes a better students learning. Discipline in class is designed by schedules for medical student. The designer of schedules for medical student should use modern equipment of education. The method of learning by use of computer helps to get more in learning (14, 15, 16). New modern equipment is increasing performance of student learning. Education providers and clinicians need to recognize that overuse of automated equipment may potentially de-skill future generations (17). Researches reveal effect of lesson type in medical physics learning (table 1). It is necessary to schedules before lecturing. For example; if nuclear physics lesson is accompanied with practice, it is better to be learnt and understood (18, 19).

Bargerhuff et al, 2010 result that opportunities equip teachers with the knowledge and skills need to provide students with physical, sensory and learning disabilities equitable access to laboratory and field experiences (7). Student will be skillful by practicing in theory as hospital potentially. The fright and hesitate cause student to decrease in learning a lesson. The new method is better than old method. In table 1, percentage of interesting individuals for learning by advanced equipment is 85%. In other word, the analysis of questionnaires show that student learn more by computer. However, it is necessary to active student by stimulation student. A lecturer teaches subject better during lecturing, because student is stimulated and prepared for learning. The class of a medical physics lesson should be elastic, it causes learning to student is to be more. The results show a com-

parative method among students (table 1). In really, these points can be understood from positive response in questionnaire. Following to oral learning, it should be practiced till learning would be more and student can learn better (20, 21). Shepherd CK et al 2010 reveal that simulation as a teaching strategy contributes to students' learning (17).

Strengths of discipline in class, lecturing method and new modern equipments give the learner a chance to work on medical physics lesson that is implausible on a real scale. Advantages allows for cooperative learning situations which build teamwork and collaboration skills important in many adult learning situations. Disadvantages may not always be the best learning factors when dealing with many different cultures and backgrounds because problem solving methods vary from culture to culture.

**CONCLUSION:**

There are a multitude of theories applicable to medical students learning. For each theory, there are many independent factors brought to the environment by the learner. Different factors can help student to learn medical physics more. Based on the research by the authors these factors are discipline in medical physics class, education in different ways, advanced equipments and activate student by good lecturing and speaking medical physics. However, all theories should be taken under consideration by facilitators and learners.

**Table 1- Responses related to reply of questions to questionnaire**

number of question	Responses of Dental students With applying three factors		Responses of Practical room students without applying three factors	
	excellent	Poor	Excellent	Poor
1	85	15	13	87
2	85	15	35	65
3	82	18	46	54
4	89	11	62	38

**Table2. The learning efficiency by passing exam in group of student in percent.**

student	Discipline in class	lecturing method	new modern equipments
Group 1	95±5	85±1	89±2
Group 2	45±2	55±10	50±12

**Questionnaire:**

Please answer the below questions by signing them:

- Starting class of medical physics with applying discipline was .....  
a- excellent      b- Poor
- At the first of class of medical physics, a review and future schedules were .... to student before starting the new lesson.  
a- Excellent      b- Poor
- Lecturing the medical physics to the medical physics class is.....if it is accompanied with new modern equipment.  
a- excellent      b- Poor
- Learning is ..... by lecturing  
a- excellent      b- Poor

## REFERENCE

- Espetern RM; Dunnefer EF; Notziger AC, et al Comprehensive the Rochester experiment Teach. *learner Med* 2004; 16:186-196 | | 2.Tomoyuki Hasegava, Haruna Kojima and et al Creation and application of three – dimensional computer graphic animations for introduction to radiological physics and technology, radiological physics and technology 28 July 2009 | 3.King, K.P. & Lawler, P.A. (2003). Trends and issues in the professional development of teachers of adults. *New Directions for Adult & Continuing Education*, v. 98, p. 5-13. | | 4.Cheng SF, Kuo CL, Lin KC, Lee-Hsieh JDevelopment and preliminary testing of a self-rating instrument to measure self-directed learning ability of nursing students. *Int J Nurs Stud*. 2010 Mar 9. [Epub ahead of print] | 5.Knowles, M.(2002). Lifelong learning: A Dream. *Creating the Future: Perspectives on Educational Change*, v. January. October 10,2003http://www.newhorizons.org/future/Creating\_the\_Future/cut\_knowles.html. | | 6.Wilhelm JE, Pihl MJ, Lonsdale MN, Jensen MAAn active learning approach to the physics of medical imaging. *Med Eng Phys*. 2008 Jun;30(5):607-14. Epub 2007 Aug 22. PMID: 17716937 [PubMed - indexed for MEDLINE] | | 7.Bargerhuff ME, Cowan H, Kirch SA.Working toward equitable opportunities for science students with disabilities: using professional development and technology. *Disabil Rehabil Assist Technol*. 2010 Jan;5(2):125-35. PMID: 20184529 [PubMed - indexed for MEDLINE] | | 8.Unalan PC, Uzuner A, Cifçili S, Akman M, Hancio Lu S, Thulesius HO.Using theatre in education in a traditional lecture oriented medical curriculum. *BMC Med Educ*. 2009 Dec 15;9:73. PMID: 20003493 [PubMed - indexed for MEDLINE]PMCID: PMC2803161Free PMC Article | 9.Visioli S, Lodi G, Carrassi A, Zannini LThe role of observational research in improving faculty lecturing skills: A qualitative study in an Italian dental school. *Med Teach*. 2009 Aug;31(8):e362-9. PMID: 19811200 [PubMed - indexed for MEDLINE] | 10.Rittle-Johnson B, Koedinger KIterating between lessons on concepts and procedures can improve mathematics knowledge. *Br J Educ Psychol*. 2009 Sep;79(Pt 3):483-500. Epub 2009 Feb 18. PMID: 19228442 [PubMed - indexed for MEDLINE] | 11.Rittle-Johnson BPromoting transfer: effects of self-explanation and direct instruction. *Child Dev*. 2006 Jan-Feb;77(1):1-15. PMID: 16460521 [PubMed - indexed for MEDLINE] | 12.Rittle-Johnson B, Kmicikewycz AO.When generating answers benefits arithmetic skill: the importance of prior knowledge. *J Exp Child Psychol*. 2008 Sep;101(1):75-81. Epub 2008 Apr 24. PMID: 18439617 [PubMed - indexed for MEDLINE] | | 13.Kmicikewycz 2008 Meyer J, Hartmann B, Kalet I.A 'learning-by-doing' treatment planning tutorial for medical physicists. *Australas Phys Eng Sci Med*. 2009 Jun;32(2):112-7. PMID: 19623863 [PubMed - indexed for MEDLINE] | 14.Gifford H, Varatharaj A The ELEPHANT criteria in medical education: can medical education be fun? *Med Teach*. 2010;32(3):195-7. PMID: 20218834 [PubMed - in process] | 15.Jenkins S, Goel R, Morrell DS.Computer-assisted instruction versus traditional lecture for medical student teaching of dermatology morphology: a randomized control trial. *J Am Acad Dermatol*. 2008 Aug;59(2):255-9. Epub 2008 May 21. PMID: 18499299 [PubMed - indexed for MEDLINE] | 16.Ruiz JG., Mintzer MS., Leipziny RM., The impact of E- learning in medical education *Acad. Med*. 2006, 81(3):207-12. | 17.Shepherd CK, McCunnis M, Brown L, Hair M.Investigating the use of simulation as a teaching strategy. *Nurs Stand*. 2010 May 5-11;24(35):42-8. PMID: 20509382 [PubMed - in process] | 18.Grantham V, Martin C, Schmitz C.Enhancing laboratory activities in nuclear medicine education. *J Nucl Med Technol*. 2009 Dec;37(4):244-9. Epub 2009 Nov 13. PMID: 19914977 [PubMed - indexed for MEDLINE] | 19.Grantham V, Martin C, Schmitz C.Enhancing laboratory activities in nuclear medicine education. *J Nucl Med Technol*. 2009 Dec;37(4):244-9. Epub 2009 Nov | 20.Garg A, Haley HL, Hatem D.Modern moulage: evaluating the use of 3-dimensional prosthetic mimics in a dermatology teaching program for second-year medical students. *Arch Dermatol*. 2010 Feb;146(2):143-6. PMID: 20157024 [PubMed - indexed for MEDLINE] | 21.Rotomskis R, Karenauskaitė V, Balzkeiene A.Biomedical physics in continuing medical education: an analysis of learning needs. *Medicina (Kaunas)*. 2009;45(11):918-28. |