

Learning pyramids in health students

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Accepted 10 May, 2018

ABSTRACT

Teaching and learning pyramid are demonstrated retention rate of educational subjects by passive or active educational methods. The objective of this study was comparison of teaching, learning pyramid and average retention rates in health students. This study was an experimental research which was done by using the curriculum of health, the course of occupational health was taught with attention to learning pyramid. Educational methods and average retention rates of subjects were determined and the results were compared between three groups of students, then data were gathered and analyzed by SPSS 16, with $P < 0.05$. In passive learning methods, lecture was the most type in group 1 and the least in group 3 but in active methods, teaching others was the most in group 3 and the least in group 1. The total grade of occupational health in group 1 was 12.93 ± 2.11 , in group 2 was 14.35 ± 1.42 and in group 3 was 14.75 ± 1.72 had significant differences ($P < 0.05$). Average retention rates of educational subjects were the most in group 3 and significant with $P < 0.05$. According to the total results, retention rates of educational subjects in the students' mind were the most in group 3 by using the active learning methods.

Keywords: Active learning, passive learning, occupational health.

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INTRODUCTION

Teaching and learning pyramid are demonstrated retention rate of educational subjects by passive or active educational methods (Ramani et al., 2016). Learning is important in educational institutes such as schools (Ramani et al., 2016; Lockspeiser et al., 2016). Some researchers studied the types of educational and learning methods in schools and universities (Usón-Gargallo et al., 2013; Tormey, 2015; Sood and Singh, 2012). Many methods were introduced for learning subjects and educational materials (Singh and Modi, 2013; Masters, 2013).

Learning pyramid was introduced in education (Duan et al., 2012; Erickson, 2008). Passive and active learning methods were introduced as well (Pereira et al., 2008; Stokes et al., 2008). Teaching and learning should be done with attention to educational methods that were used by teachers (Pereira et al., 2008; Stokes et al., 2008). In passive methods, we have lecture, reading, audio-visual and demonstration (Parekh et al., 2000; Fisher, 2000; Li and Zhang, 2004). Active methods or participatory teaching methods include group discussion, practice, immediate use and teaching others

(Brinchmann-Hansen et al., 2004; Dunlop and Radaelli, 2016). Researchers in education and learning have shown the average retention time in the use of each learning method (Kulakova et al., 2016, Okuda, 2015).

The average retention rates for passive methods were less than active or participatory methods (Zhang et al., 2016; Jun Zhu et al., 2016). It was 5 percent for lecture, 10 percent for reading, 20 percent for audio-visual and 30 percent for demonstration (Assadi, 2015). The average retention rate for group discussion is 50 percent, 75 percent for practice, and 85 percent for immediate use and teaching others.

In previous years, teachers had emphasized on lectures and many subjects were forgotten. In recent years they have taught with active methods. Occupational health course had subjects; definition, physical factors, chemical factors, toxicology, occupational diseases, biological factors, safety, ergonomics and industrial psychology. It was necessary for health students (Assadi, 2015).

In this study, the author tries to find the comparison of the average retention rates and learning pyramids in

industrial health students for learning of occupational health. The objective of this study is comparison of teaching and learning pyramid and average retention rates in industrial health students.

MATERIALS AND METHODS

This study was performed as an experimental study on health students in three groups. Group 1 had passive teaching, group 2 had passive and active teaching and group 3 had active teaching at the most. Each group had 40 students. Average of age was 22.34 ± 14.02 and 55 percent were women. The study was carried out from 2014 to 2017.

The inclusion criteria were health students in three entrance year in the field of industrial health and exclusion criteria were studying another subject of health. Course plan and lesson plans were written according to curriculum of the occupational health field and with educational and learning methods in learning pyramid.

Occupational health has theoretical and practical lessons: definition, physical factors, chemical factors, toxicology, occupational diseases, biological factors, safety, ergonomics and industrial psychology. Knowing them was necessary for health students.

Examinations of the three groups were at the same level at the end of term, these tests were prepared by faculties' opinions for the correction and validity and there had been a pilot study with correlation of 0.83 for the reliability in a sample of occupational health students.

These exams were according to educational learning methods. The teacher used passive and active learning methods but the average had difference between three groups. The passive learning methods were lecture, reading, audio-visual and demonstration. Participatory learning methods were group discussion, practice, immediate use and teach others.

The average retention rates of each educational subject were calculated with grades of standard exams from the quotas of true answers.

Data were gathered in SPSS 16 and analyzed for calculation of frequencies, percent, means, standard deviation, K-S test, ANOVA with $P < 0.05$.

In research ethics, the researcher got consent from students and their names were confidential. The author paid attention to ethical considerations and the Helsinki declaration.

RESULTS

In passive learning methods, lecture was the most type in group 1 and the least in group 3 but in active methods, teaching others was the most in group 3 and the least in group 1. The total grade of occupational health in group 1 is 12.93 ± 2.11 , 14.35 ± 1.42 in group 2 and $14.75 \pm$

1.72 in group 3 with significant differences of $P < 0.05$. Average retention rates of educational subjects were the most in group 3 and significant with $P < 0.05$.

Table 1 shows the comparison of learning methods from learning pyramid between three groups of students. Using lecture was highest in group 1 but it was the most important method in all of the groups. In participatory methods, practice was the least in group 1 but it was a little in other groups.

Table 2 shows the comparison of average retention rates of subjects between three groups of students. Average retention rates were highest for subjects in group 2 and most of the subject items in group 3 were the most of them.

The difference between mean grades of three groups was significant ($P < 0.05$). The total mean was 14.36 ± 1.71 (Table 2).

All the occupational health lessons were significant: definition, physical factors, chemical factors, toxicology, occupational diseases, biological factors, safety, ergonomics and industrial psychology; with $P < 0.05$.

DISCUSSION

According to the results, in passive learning methods, lecture was the most in group 1 and the least in group 3; while in active methods, teaching others was the most in group 3 and the least in group 1. The total grade of occupational health in group 1 was 12.93 ± 2.11 , in group 2 was 14.35 ± 1.42 and in group 3 was 14.75 ± 1.72 , with significant differences of $P < 0.05$. Retention rates of educational subjects were the most in group 3 and significant with $P < 0.05$.

In this article, the grades of students were the most in group 3 except for definition. Because learning of definition is not needed in using participatory methods. Average retention rates and grades were more in group 2 than group 1 because in group 2, they used some participatory methods such as teaching others more than group 1. Researchers defined the effects of learning pyramid on learning of students (Ramani et al., 2016).

In this study, the author demonstrated the effectiveness of attention to learning pyramid; especially participatory methods for having the greatest average retention rates.

Scientists showed the effectiveness of learning pyramid or using of related educational methods for better learning (Lockspeiser et al., 2016). In this article, the author has written about the effectiveness of participatory learning methods in learning.

In some studies were paid attention to learning pyramid and its effects in education (Usón-Gargallo et al., 2013). In this study, the author showed the effects of passive and active learning methods in students and in group with more participatory; students were successful in practical subjects more than others.

Researchers have studied the educational and learning

Table 1. Comparison the quotas teaching and learning methods between three groups.

Test Lesson	Group 1 $\mu \pm SD$	Group 2 $\mu \pm SD$	Group 3 $\mu \pm SD$	P
Lecture	50.01 \pm 0.10	45.01 \pm 0.10	30.12 \pm 0.10	0.01
Reading	20.01 \pm 0.02	15.02 \pm 0.04	15.14 \pm 0.01	0.03
Audio-visual	15.10 \pm 0.01	15.1 \pm 0.1	20.10 \pm 0.04	0.02
Demonstration	7.11 \pm 0.20	8.01 \pm 0.01	10.11 \pm 0.10	0.02
Group discussion	2.01 \pm 0.31	5.20 \pm 0.01	10.01 \pm 0.12	0.01
Practice	0	1.10 \pm 0.21	2.01 \pm 0.11	0.03
Immediate use	1.01 \pm 0.20	2.01 \pm 0.10	3.02 \pm 0.10	0.04
Teach others	5.02 \pm 0.05	9.10 \pm 0.12	10.20 \pm 0.01	0.01

Table 2. Comparison of the average retention rates of lessons between three groups.

Test Lesson	Group 1 $\mu \pm SD$	Group 2 $\mu \pm SD$	Group 3 $\mu \pm SD$	P
Definition	0.11 \pm 0.07	0.50 \pm 0.03	0.89 \pm 0.01	0.01
Toxicology	0.11 \pm 0.06	0.50 \pm 0.02	0.89 \pm 0.02	0.01
Ergonomics	0.11 \pm 0.05	0.50 \pm 0.01	0.89 \pm 0.02	0.01
Physical factors	0.10 \pm 0.04	0.50 \pm 0.001	0.89 \pm 0.01	0.03
Safety	0.10 \pm 0.02	0.49 \pm 0.01	0.89 \pm 0.04	0.03
Occupational diseases	0.10 \pm 0.02	0.49 \pm 0.02	0.88 \pm 0.08	0.03
Industrial psychology	0.10 \pm 0.01	0.49 \pm 0.03	0.89 \pm 0.04	0.02
Chemical factors	0.10 \pm 0.019	0.49 \pm 0.04	0.88 \pm 0.05	0.02
Biological factors	0.10 \pm 0.009	0.48 \pm 0.05	0.88 \pm 0.06	0.01

pyramid and found the usefulness of it in education (Dunlop and Radaelli, 2016). In this study, the author compared the results of exams for finding the average retention rates of learning subjects in students. Earlier studies have demonstrated the using of new and suitable educational methods and their effectiveness on education (Dunlop and Radaelli, 2016; Kulakova et al., 2016; Okuda, 2015). In this study, the researcher used new and suitable methods and determined the most suitable learning methods for each subject.

This study had few limitations which include low number of participants. Another study is recommended with more students. This study also recommends the use of active and participatory methods in occupational health learning.

Conclusion

According to the total results, retention rates of educational subjects in the students' mind were the most in group 3 by using the active learning methods.

ACKNOWLEDGEMENT

The author would like to express his thanks for

Mashhad University of Medical Sciences for all the support.

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- Citation** : Assadi, S. N. (2018). Learning pyramids in health students. *African Educational Research Journal*, 6(2): 69-72.
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