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Small group learning for understanding specialized languages in students of occupational health

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Abstract

Background: Learning methods are important in education, especially in some difficult lessons such as specialized or technical language. Instructors can use suitable and practical methods in these situations. The objective of this study was to compare the results of various educational methods for learning specialized language in occupational health students.

Methods: This study was a semi-experimental study conducted in the Health School of Mashhad among occupational health students using the approved curriculum; a course of specialized language was taught with attention to educational methods. Three educational methods were used: small group learning in group A (n=24), lecture in group B (n=26) and reading with use of audio-visual devices in group C (n=25). Change in learning was determined and results were compared among the three groups of participants, with results of exams analyzed using SPSS 16. analysis of variance (ANOVA) was used since the data was normalized, and significance was calculated at $P < 0.05$.

Results: The mean grade in specialized language in group A was 16.66 (2.19), 10.93 (2.41) in group B and 14.74 (3.25) in group C. All of the methods had significant differences among each other, with $P < 0.05$. Participatory discussion had the highest mean (group A). The relative risk for group A was 1.56 (1.12-2.51).

Conclusion: According to the total results, small group learning is the best educational method for learning specialized language for occupational health students.

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Introduction

Learning methods are important in education, especially in some difficult lessons such as specialized or technical language. Instructors can use suitable and practical methods in these situations. Use of suitable educational methods plays a major role in education.^{1,2} Medical sciences students should be read and translate specialized textbooks and journals and they need to learn and understand scientific language very well.^{3,4} Some studies have shown the effectiveness of educational methods on students' learning.⁵⁻⁷ One educational method often recommended is small group discussion learning or small group learning for students.

Since many methods of learning have been introduced in education, choosing a suitable and effective method is necessary.^{8,9} A typical method was small group discussion, including student participation in order to help students learn.¹⁰⁻¹² Other educational methods are also used, such as lectures by professors and teachers, self-directed

reading and use of audio-visual devices.^{13,14} Some lessons can be taught using all these methods,¹⁵⁻¹⁷ since many are applicable.¹⁸⁻²⁰ Specialized language is one course that could be taught using different educational methods.

Specialized language includes reading, comprehension, speaking, listening, and translation in textbooks and journals. Occupational health students must read about physical hazards, chemical hazards, toxicology, safety, ergonomics, occupational diseases, stress, and biological hazards in specialized language.

Using different methods, instructors can test different methods for teaching for the most effective learning. In specialized language, an instructor might want to conduct a participatory discussion with students because of the type of course. But other methods could also be used, for example, lectures or reading with use of audio-visual devices.²¹

In this study, the author examined a comparison between the results of small group discussion, lecture, and reading

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with audio-visual devices for students learning specialized language. Almost no studies have been conducted regarding this method with occupational health students. The objective of this study was to compare the results of various educational methods for learning specialized language in occupational health students.

Material and Methods

Study design and setting

This study was a semi-experimental study conducted between 2014-2016 which used an approved curriculum in occupational health students in Mashhad.

Population and sample size

By consensus all occupational health students in the health school were included the study. There were three groups of occupational students, with random sampling used to divide them in groups of 24 to 26 students.

Inclusion and exclusion criteria

The inclusion criteria were occupational health students attending between the three years of 2014 to 2016 and exclusion criteria were students who were studying in other health fields or entered occupational health in years outside 2014 to 2016.

Implementation of study

A course in specialized language was taught with attention to educational aims and methods. Three methods were used: small group participatory discussion in group A, lecture in group B and reading with use of audio-visual devices in group C. Changes in learning were determined and results were compared among groups of participants. Small group participatory discussion was defined as students divided into small, 5 to 10 person groups, which then discussed and worked on the specialized subject in the field. The groups read, translate, write and speak. In the lecture group, instructors prepared subjects and talked about it to the class as a whole. In reading with the use of audio-visual devices, students read the texts with multimedia devices such as compact discs (CDs).

Specialized language has many items for occupational health student such as, noise, vibration, industrial toxicology, metals, pesticides, solvents, biological hazards, ergonomics, stresses.

This course was assessed with attention to participation in discussion, preparation of translations, preparation of MSDSs, preparation of abstracts, preparation of reports, multiple choice questions, and essays.

Validity and reliability of tools

Examinations of the groups were at the same level and were done at the end of the course, these tests were checked by experts for face validity; opinions were taken by interview and filling a checklist about the questions in the tests. Many of the questions had positive opinion; content validity ratio (CVR) =0.80, content validity index (CVI)=0.90. Cronbach's alpha=0.9 for assigning reliability in occupational health students. These exams were administered according to educational aims and methods of specialized language.

Data statistics

Data were gathered and entered to SPSS 16 software and analyzed for calculation of means of grades, and standard deviation; for elimination of confounding factor effects, logistic regression was done. Kolmogorov-Smirnov test was used; for normalized data, analysis of variance (ANOVA) was used. If the data was not normalized nonparametric tests could be used and relative risk and confidence intervals were calculated at $P < 0.05$.

Results

The total grade of specialized language in group A (n=24) was 16.66 (2.19), 10.93 (2.41) in group B (n=26) and 14.74 (3.25) in group C (n=25) with significant differences ($P=0.01$). Demographic data is shown in Table 1. All methods were significant at $P < 0.05$. Small group participatory discussion (group A) had the highest mean, and relative risk for group A was 1.56 (1.12-2.51). For elimination of confounding variables, the number of students who attended language classes and means of previous grades had no significant differences. With logistic regression there were also no significant differences ($P=0.95$; $P=0.85$, respectively).

Table 2 shows the comparison of grades in specialized language lessons among the three groups of students and Table 3 shows the comparison of grades among the three groups in different duties for learning.

The difference between mean grades of lessons was

Table 1. Demographic data^a

Variable	Groups			P (ANOVA) or (Chi-2)
	Group A Mean (SD) or No. (%)	Group B Mean (SD) or No. (%)	Group C Mean (SD) or No. (%)	
Age	21.52 (1.02)	22.02 (0.10)	21.45 (1.15)	0.98
Gender				0.99
Men	4 (20)	2 (8.33)	3 (13.63)	
Women	20 (80)	24 (92.67)	22 (87.37)	
Last grades average	15.50 (1.24)	15.45 (1.02)	15.21 (1.42)	1.0
Previous language class	20 (80)	22 (84.8)	21 (84)	0.97

^a $P < 0.05$.

significant ($P < 0.05$). The total mean was 14.22 (3.52) from 20 grades.

All of the specialized language lessons were significant. Definition, Noise, vibration, toxicology, metals, pesticides, solvents, biological hazards, ergonomics, stress were all significant at $P < 0.05$. Definition, noise and toxic metals were the highest in group A.

This course was assessed by participation in discussion, preparation of translations, preparation of material safety data sheets (MSDSs), preparation of abstracts, preparation of reports, multiple choice questions, and essays; these were significant at $P < 0.05$.

Participation in discussion, preparation of translations, preparation of abstracts and preparation of reports were the highest in group A (small group discussion).

Discussion

According to the results, the total grade of specialized language in group A was the highest, at 16.66 (2.19) with a significant difference ($P = 0.01$). All of the lessons were significant at $P < 0.05$. Student participation was highest in group A. Confounding factors were previous studies in foreign languages and last grades. To address these effects, the author compared these variables between groups. The number of students who attended language classes and means of previous grades had no significant differences.

In this article grades in small group learning were the best. In this method students try to work with each other, discuss the lesson, and cooperate in learning, especially in

translation, writing and speaking.

Sammaraiet al¹ defined the effects of peer learning and discussing in learning of students as well as the effectiveness of small group discussion learning for education of medical sciences students.

Bauer JR et al demonstrated the effectiveness of teaching by attention to group work as a useful method.² This research also discussed the results of small group learning and working with others.

In some studies promotion of learning levels with new and suitable educational methods was emphasized.^{9,10} In recent research the author tried to introduce the best method for learning specialized language. Lecture and reading with use of audio-visual devices were mentioned as useful but seen as less than effective than small group discussion.

Bates et al studied group and peer learning and found it was an effective method for better learning.¹⁴ Similarly, researchers found the results of exams for effects of small group learning, lecture, reading with use audio-visual devices. Studies demonstrated the effect of educational taxonomy and use of new educational methods for learning.^{16,17} The author used some old and new educational methods for medical sciences students. By doing so, various methods could be examined and the best one selected.

According to this study, some learning methods could be used for specialized and technical language. For example, reading and writing specialized texts, listening to lecturers or speakers in this language, or talking together might be

Table 2. Comparison the grades between three groups of specialized language lessons^a

Lesson	Groups			P (ANOVA)
	Group A Mean (SD)	Group B Mean (SD)	Group C Mean (SD)	
Definition	2.95 (0.19)	0.53 (0.11)	1.37 (0.36)	0.04
Noise	2.96 (0.20)	0.85 (0.01)	1.37 (0.11)	0.04
Vibration	2.90 (0.10)	0.64 (0.13)	1.36 (0.09)	0.03
Toxicology	2.87 (0.30)	0.71 (0.01)	1.28 (0.41)	0.02
Metals	2.91 (0.24)	0.95 (0.11)	1.34 (0.38)	0.04
Pesticides	2.90 (0.01)	0.55 (0.08)	1.37 (0.10)	0.03
Solvents	2.90 (0.10)	0.43 (0.09)	1.34 (0.13)	0.03
Biologic hazards	2.89 (0.11)	0.73 (0.11)	1.25 (0.42)	0.02
Ergonomics	2.87 (0.30)	0.59 (0.18)	1.39 (0.37)	0.02
Stress	2.91 (0.22)	0.55 (0.15)	1.37 (0.30)	0.04
Diseases	2.91 (0.20)	0.55 (0.11)	1.37 (0.10)	0.04

^a $P < 0.05$.

Table 3. Comparison the grades between three groups in different duties for learning^a

Lesson	Groups			P (ANOVA)
	Group A Mean (SD)	Group B Mean (SD)	Group C Mean (SD)	
Participatory in discussion	2.91(0.90)	0.57(0.69)	1.63(0.40)	0.04
Preparation of Translations	2.91(0.80)	0.57(0.17)	1.43(0.38)	0.04
Preparation of MSDSs	2.90(0.10)	0.62(0.34)	1.43(0.30)	0.03
Preparation of abstracts	2.90(0.13)	0.62(0.30)	1.37(0.35)	0.03
Preparation of reports	2.88(0.07)	0.53(0.10)	1.37(0.11)	0.02
Multiple choice questions	2.90(0.01)	0.54(0.07)	1.33(0.40)	0.03
Assay	2.89(0.001)	0.53(0.05)	1.32(0.03)	0.02

^a $P < 0.05$.

more helpful in some contexts than in others for learning. Students in small groups were able to learn more than in regular lectures. Small groups are a more practical method for keeping participants' attention than lectures or reading. Many methods are used in education but small group discussions have an important role in student participation.

Over 50% of lecture or reading subject material is forgotten a few minutes after the session. But participatory discussion material could be remembered for days or weeks.²¹

This study had some limitations; the number of students with entrance years to university was 24 to 26, a low number. Use of audio-visual devices sometimes was not possible. Another study is recommended with participants from other educational fields for specialized language learning.

This study recommends that small group discussion be used for teaching specialized language in occupational health students. It was more effective than lecture or reading with use of audio-visual devices. Another study to examine other educational methods is recommended for specialized language learning.

Conclusion

According to the results, small group discussion was the best educational method for learning specialized language in occupational health students.

Ethical approval

It was related to scholarship and study in health school no 1978950 in 2014. The researcher obtained oral consent from participants in the study and the researcher assured, names of the students would be kept confidential.

Competing interests

The author declares no conflict of interest.

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