

Self-Directed Learning of Difficult Tracheal Intubation by Using an Educational Package

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Abstract

Background. Since tracheal intubation, especially in difficult situations, is considered as one of the crucial concerns and duties of anesthesia students, this study was designed to determine the effect of self-directed learning package on the learning of difficult tracheal intubation. **Methods:** Fifty five anesthetic students were divided in two groups. The effect of self-directed learning package on the learning of students was examined three consecutive times through pre- and post-tests on the study group. In the control group traditional approach was applied. T-test was used to compare score changes in the groups, while paired T-test was employed to compare the mean score changes of pre- and post- tests in both groups. **Results:** The results of analysis showed a significant difference in the mean scores of the two groups. Mean score for the students in the case group increased from 8.43 ± 2.3 to 20.82 ± 3.8 (total 32) [$P=0.001$]. Score changes were 12.39 ± 3.75 and -1.3 ± 1.9 in the case and control groups, respectively. Compatibility of the educational package with learning aims were 86.6%. Compatibility of the educational package with self-directed learning was 76%. Overall, satisfaction was 73.4%. **Conclusions:** Based on the findings of this research, self-

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directed learning packages were effective in improving the learners' knowledge of difficult tracheal intubations. The educational package may be employed in education of anesthesia students. They also reported satisfaction for using this method,

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Introduction

Educational psychologists believe that students can attain the highest degree of learning and receive the highest possible marks in their learning affairs. The main objectives of all the curriculum designers and planning is to provide an educational environment and opportunity which provides the milieu for student participation in such condition that maximizes learning. When the students are given the opportunity to participate and share in learning activities, such experiences provides the learning condition necessary for effective personal development (Majdfar, 2007; Shabani, 2007).

In the education process, different patterns of learning, and direct and indirect methods of teaching have been proposed. Student centered approach is one of the methods of teaching that have been employed in educational settings for the last three to four decades. Keller (1968) presented his exciting article regarding the structure of individualized education (Shabani, 2007). Orly and associates raised this issue again in 1980. The terms proposed in these strategies included "independent learning", "self-managed", "self-centered", "self-regulated", "reference-based", "self-directed" and so on (Yazdani, 2007). These terms have been named by the experts in medical education and have been considered as strategies in which skill development is necessary for lifelong learning, and consuetude one of the basic elements of higher levels of learning.

Considering the explosion of information in this century, the educational systems need to cultivate means by which students benefit in their education. According to Brofy, the output of education and its quality are reflected in three things; desirable

planning, methods, scientific approach and systematic way of presenting the lessons (Majdfar, 2007).

In regard to the individualized materials for learning that may complement the education process, the philosophy of learning focuses learners' needs. Karol defines talent as the time period necessary for complete learning of a subject. In this regard, talent is related to the time, and thus the educators should provide the condition in which the time for individuals who are interested in learning but have less talent, is provided. The educational psychologists have discussed and have proposed individualized learning materials for solving this problem in an educational system. Educational packages are the products of these experts for solving such problems. These packages are very varied and innovative and provide various learning opportunities for individualized practices, and change the role of teachers and instructors to facilitator. In addition, they place special emphasis on the application of the learning subjects.

Authors suggest six specifications for the educational systems and packages. These include: 1) emphasis on individualized education, 2) extensively organized and internalized concepts, 3) specific goals, 4) the possibility of selecting the learning tools, 5) creating appropriate interaction opportunities between the learners and teacher, and 6) facilitator role for the teachers (Majdfar, 2007).

Application of the educational software is the salient characteristic of educational technology in recent years. The main objectives of the educational software are to facilitate the quality of education. They permit individualization of instruction and development of learners as well as their potentials, provide scientific means of evaluation of the learning outcomes, and play a significant role in providing audio-visual and education facilities, resolving educational spaces, presenting the contents of curriculum and planning. Educational packages are a collection of learning software that more or less includes hardware too. It can serve as a tool by which to solve problems in an educational system, and has extensive application by teachers in the teaching-learning process. The educational packages can be employed as a suitable means in education process and assist the learners in reaching their highest level of potentials. The learners can definitely benefit from this tool and become capable of learning the subject comprehensively and obtain the highest possible grades in their subject of interest. According to Bloom's opinion in education, five factors need to be considered if comprehensive learning is the expected to occur: 1) difference in learning methods, 2) quality of education, 3) students' ability in benefiting from education as a social and economic component 4) the determination and resistance that Karol describes in the time period where the learner is willing to spend for learning a subject 5) the duration of study, which is the amount of time that the students are involved in learning the subject (Majdfar, 2007).

In regard to the educational packages, Karimin states that every student in the class, makes progress in his/her own time and effort, instead of all class making progress and identically

acquiring knowledge with the same rate (Majdfar, 2007). The individualized pattern of education is designed for specific objectives (Shabani, 2007) and the teacher's job is to participate as the facilitator and evaluator in the process of learning (Hiemstra, 1994).

The educational objectives of placing tracheal intubation within the airways, particularly at the presence of difficult airways, are one of the important subjects of education and duties of the anesthesiology students (Kashan, 2008) Learning this subject needs prolonged periods of time and training and frequent repetitions for through understanding of the physiology, anatomy, method and tools used for this purpose.

Considering these limitations and small academic spaces, frequent holidays, the need for special competencies, and different learning styles of the students, this research was designed to teach difficult airway intubation by presenting an educational package in addition to evaluating the attitude and knowledge of the students.

Research Methodology

A quasi-experimental research was designed, in which 55 second year students were selected by the census method. The educational packages designed, evaluated and modified for difficult tracheal intubation by the researcher, were used during three courses by the pre-posttest design. Two groups, experimental and control, participated. The procedure was performed as followed:

A. Preparing the package:

1. Goal setting: in the first stage, the educational objectives related to the needs of the learners, were designed in the educational package. Then, these objectives were discussed in a session with the instructors and experts in the field and modified if necessary. For learning the theory of difficult tracheal intubation, 26 objectives were foreseen in knowledge, attitude and practice domain.
2. The specific contents related to the objectives of the study were collected, summarized and classified; including the theoretical content about related anatomy, physiology, anesthesia highlights and some articles, in addition to pictures useful for explanation and further comprehension of the objectives. Pictures and films were prepared from the commonly used instruments in the hospital. All ethical conducts were obeyed by asking permission from the owners of the films and articles. The collected materials were edited according to the objectives of the study, while considering the opinions of the experts and instructors.
3. Determining the environment and education strategy: for the purpose of determining the environment, the well-known power point software was employed. The needed hardware were prepared and examined thoroughly.

4. The initial motivators for students' learning were addressed and their use was discussed and modified after they were examined.
5. Designing the method of the educational software's evaluation: a questionnaire related to the objectives was designed with Likert scale items, ranging from complete agreement to complete disagreement. The quality of the education software was evaluated by the professors of anesthesiology and students who had no part in managing this project.

Sessions for criticizing and discussing the education software were anticipated. Questions for evaluating the knowledge of the students were designed, and face and content validity of the items was determined by the instructors. Then, a selected group of students took the test in order to determine psychometric index such as item difficulty and discrimination index. The coefficient of reliability was determined by the software available at the educational development center of KaUMS.

SPSS software version 16 was employed. It was decided that the questioner include the demographic information about the students, and after collecting the pretest data, the package be presented, and following one month, the post test data be collected. The questionnaire was given to three different class of students. The students registered in 2008 served as the pilot subject whereas the students entered at 2009 were employed as the control group and finally the students entering the college at 2010 served as the case group.

B. Conducting the tests:

Following the completion of the consent forms, the package for the pilot study was presented to the students registered for anesthetic course in 2008 (n=15). These students were given the objectives and the lesson plans, but no practicum work was initiated for the operation room. Prior to the presentation of the educational package, the pretest was conducted and the compact disk containing the training was presented. One session was devoted to answering questions and four weeks later, the post test was taken. Simultaneously with the posttest session, the survey forms were also completed by the respondents. Following the collection of data, statistical analysis was performed.

After presenting the educational package for the first time, it was revised and the necessary modifications were applied based on the suggestions of the instructors and students. The observers proposed their view about better and more comprehensive methods. Following the revision, the final version of the educational package was presented to the first term undergraduate anesthesia students (n=17) of 2008. The pretest and posttest plus surveying was conducted like the previous procedure.

As was stated, the students registering in 2010 were selected to serve as the control group in order to assess the effect of the exam. The pretest-posttest evaluation was conducted after one month without receiving the compact disk. For ethical purposes, following the second test, the package was given to the students in control group.

For Analysis descriptive statistics were calculated and reported. Paired t-test was employed to compare the pre and -post test results. In addition, analysis was performed to compare the years and the groups.

Results

Overall, 15 (27%) male and 40 (73%) female students participated in this research. The results of pre-test and post-test of students, according to the occasion of assessment, are presented in table 1.

Table 1: The scores of case and control groups according to the time of testing

| Control $\bar{x} \pm S.D$ | Case $\bar{x} \pm S.D$ | Group Criteria |
|------------------------------|---------------------------|-------------------------|
| 23 | 32 | Number |
| 7.85 ± 3.1 | 8.43 ± 2.3 | Pretest |
| 6.56 ± 3.07 | 20.82 ± 3.8 | Post test |
| 0.004 | <0.001 | Within group P Value |
| -1.3 ± 1.9 | 12.39 ± 3.75 | Grade change |
| <0.001 | | Between group Value |

Table 1 shows that the difference between the two groups is statistically significant. The case group scored 8.43 marks higher than the control group. In addition, the change in pretest-posttest scores of the case group and control group were also significant.

Table 2: Results of pretest and posttest for the control and case groups

| P Value | Standard deviation | mean | number | Stat index | Groups grade |
|---------|--------------------|-------|--------|------------|----------------------------------|
| 0.44 | 2.3 | 8.43 | 32 | Case | At the beginning of the study |
| | 3.1 | 7.85 | 23 | control | |
| 0.0001≥ | 3.8 | 20.82 | 32 | Case | At the end of the study |
| | 3.07 | 6.56 | 23 | control | |

B: Evaluation results

Descriptive statistics related to the survey questioner in regard to their satisfaction from the educational package that completed by the students (N=55) is presented in table 3.

Table 3: Satisfaction results regarding the educational package for difficult tracheal intubation

| | Question | Mean | Std. Deviation | Satisfaction percent |
|---|---|------|----------------|----------------------|
| 1 | Can encourage me to learn and gain knowledge | 3.98 | 0.733 | 79.6% |
| 2 | Is suitable for learners with different talents. | 3.75 | 0.645 | 75.0% |
| 3 | The content matches the educational objectives | 4.33 | 0.546 | 86.6% |
| 4 | It is suitable for comprehension without the presence of instructor | 2.89 | 1.012 | 57.8% |
| 5 | Can save time when | 3.44 | 0.958 | 68.8% |

| | used for learning | | | |
|----|--|------|-------|-------|
| 6 | Its content is suitable with my style of learning | 3.47 | 1.052 | 69.4% |
| 7 | Its use decreases the need for facility and space | 3.51 | 0.836 | 70.2% |
| 8 | By using it, the planning and learning is up to me | 3.40 | 0.915 | 68.0% |
| 9 | It is suitable for self-centered approach | 3.80 | 0.755 | 76.0% |
| 10 | It needs problem solving at the presence of instructor. | 4.13 | 0.747 | 82.6% |
| 11 | It is easy to use. | 3.78 | 0.854 | 75.6% |
| 12 | I recommend its use to other instructors. | 3.84 | 1.067 | 76.8% |
| 13 | I would like to have access to other curriculums contents and education guidance | 3.49 | 1.169 | 69.8% |

Discussion

The main focuses of learning guide are on self-learning and independence of the learner from the absolute dependence on the instructor or teacher. That is, if a comprehensive learning guide includes all aspects of learning conditions such as educational objectives, content of learning and opportunities, introducing more references, making self-evaluation, and having time tables for the presentation to students, it can be hoped that the students are given appropriate clinical opportunity to acquire well qualification and constant use of such programs provides opportunity for self-guidance. (Saedinejat et al., 2011; Zobeiri et al., 2010; Dadgostarnia & Vafamehr, 2010; Dadgostarnia M, Vafamehr et al., 2010; Zolfaghari et al., 2010) In this manner, the learning process becomes purposeful and meaningful and thus gives the learner a higher motivation and consistency in their effort to learn. (Gordanshekan et al., 2010) Educational package can serve as a desirable learning tool that individualizes the learning pace, develops students' potentials and capability to its highest level (Majdfar, 2007).

This was the reason we prepared the educational package for difficult tracheal intubation in order to improve their attitude and knowledge through a different approach to learning a motor skill.

The difference scores of two groups in two tests was significant comparing to the control group. The mean score of student in the case group was 8.43 and increased to 20.82 (from the total of 32) whereas the mean of the control group in pretest was 7.85 ± 3.1 and changed to 6.56 ± 3.07 . Thus, the mean changes in the case group was 12.39 ± 3.75 while in the control group it was -1.3 ± 1.9 .

It should be added that the ideal performance of students in placing difficult trench will definitely need the guidance of the instructor plus the high motivation of the learner; both of which will result in the perfection of the skill execution. The importance of motivation emphasized in this research through the use of software is in agreement with what was reported by

Zolfaghari and Khorasani (Zolfaghari et al., 2007; Khorasani et al., 2011).

In a study, Khakbazan and associates compared methods of teaching a subject by lecture versus educational package and concluded that educational package in addition to other methods is preferred method of teaching in schools. However, other researchers have also compared the two methods of instructions and have not reported significant differences between the two methods and have concluded that the two methods are equally effective in learning outcomes (Zobeiri et al., 2010; Dadgostarnia & Vafamehr, 2010; Abdolmaleki et al., 2010; Zolfaghari et al., 2010). Despite these results, there are research reports that show virtual academic education provided the existence of proper academic content and effectiveness and successfulness of the evaluation (Dadgostarnia & Vafamehr, 2010).

In this research, the learners claimed that learning through this package with individual center approach is suitable for various methods of learning and results in saving time and facilities and is easy to use; these specifications are named as the necessities of educational package (Majdfar, 2007; Shabani, 2007; Hiemstra, 1994). Approximately 86.6 percent of the individuals in this research considered the package relevant to the topic of learning, however, 82.6 percent of the respondents also claimed that there is a need for the instructions for answering questions related to matters such as reference location, evaluation of outcomes, and promoting critical thinking (Hiemstra, 1994).

Overall, the satisfaction claimed for this educational package was 3.67 ± 0.369 (73.4%) and was very close to the percent of satisfaction (76.8%) claimed by the respondents in table 3.

Education through computer application has its own limitation. It cannot be a good substitute for the instructor, has no emotional interaction with the learner and does not allow face to face contact (Shabani, 2007). Perhaps the most important component of using this method is its culture building and knowledge building of the learners regarding the computer technology. In addition, it may lead to the search for locating the available found to own a computer through the available means within the university such as the student loan.

According to the results of this research, the educational package for difficult tracheal intubation was effective in improving the knowledge of students significantly and increased the grades of the students who benefitted from this type of educational experience. The students also reported satisfaction for using this method, thus its application in teaching of this skill within the college is recommended.

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References

- Abdolmaleki M, Ashoorioun V, Momeni S, Zarezadeh Y, rokhzadi m. The influence of study guide on clinical education of nursery students. *Iranian Journal of Medical Education* 2010 winter ;10(5):1289-1295 [Persian]
- Dadgostarnia M, Vafamehr V. Comparing the Effectiveness of Two Educational Approaches of "Electronic Learning and Training in Small Groups" and "Training Only in Small Groups" in Teaching Physical Examination. *Iranian Journal of Medical Education* 2010 Spr; 10(1): 11-17. [Persian]
- Gordanshekan M, Yarmohammadian M, Ajami S. The Effect of Teaching Meta-cognition Package on Self-Directed Learning in Medical Records Students of Isfahan University of Medical Sciences. *Iranian Journal of Medical Education* 2010 Sum; 10(2): 131-139. [Persian]
- Hiemstra, R. (1994). Self-directed learning. In T. Husen & T. N. Postlethwaite (Eds.), *The International Encyclopedia of Education* (second edition), Oxford: Pergamon Press.
- Kashan University.(2008). Sharhe vazayef kardan va karshenas bihoshi. Available at: http://_www.kaums.ac.ir/library/sharhvazaief_kaumsposth88.pdf
- Khorasani A, Abdolmaleki J, Zahedi H. Factors Affecting E-Learning Acceptance among Students of Tehran University of Medical Sciences Based on Technology Acceptance Model (TAM). *Iranian Journal of Medical Education* 2011 winter ;11(6) 664-673 [Persian].
- Majdfar.M.(2007). What is the educational package? .version2. pp 11-127.[Persian]
- Saeedinejat S, Vafaenajar A. The Effect of E-Learning on Students' Educational Success. *Iranian Journal of Medical Education* 2011 Spr; 11(1): 1-9. [Persian]
- Shabani. H.(2007). Learning skill (teaching method and technologies). Version3. Pp 208-218.[Persian]
- Yazdani.SH. (2007).eslahate barname amozesh pezeshti omomi. EDC shahid beheshti university. part 4 &5 .pp 60-80 .[Persian]
- Zobeiri M, Amolaei K, Rezaei M, Olfatizadeh M, Khoshaei A, Rostami M, Abdolmaleki P. Comparison Lecturing Method And Self-Learning on Knowledge of General Practitioners Participating in Continuing Education Course for Irritable Bowel Syndrome. *Iranian Journal of Medical Education* 2010 winter; 10(4) 483-490 [Persian]
- Zolfaghari M, Mehrdad N, Parsa Yekta Z, Salmani Barugh N, Bahrani N. The Effect of Lecture and E-learning Methods on Learning Mother and Child Health Course in Nursing Students. *Iranian Journal of Medical Education* 2007 Spr & Sum; 7(1): 31-38. [Persian]