

Original article:

Educational Game: A Fun and team based learning in psychiatric course and its effects on Learning Indicators

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Abstract

Background: Using traditional and inactive methods in medical education can cause fatigue, lack of attention, frustration, lack of motivation and decrease the level of students' learning. games in education is one of the interactive, active and fun methods that has its own educational purpose that translates the special features and highlights the special capabilities by deepening the skills. In this article, the effect of the instructional game as a educational puzzles and the effect of this program on students' self-regulation and team learning has been investigated. **Method:** This research is a pre test – post test semi experimental study. The population of this study was Jahrom University of Medical Sciences students and samples were 39 nursing students which studied psychiatric course. Sample was selected from available class to the teacher. Initially, the content of the course was presented as a presentation of the main content of the lecture. After the completion of the lessons, contents prepared through puzzle and this program was given to small groups in all sessions. The groups, while answering the questions, checked the collection of information and the searched for the answers, and then the correct answer was provided by the teacher. The combination of teamwork with small groups and solving puzzles which contained learned lessons provided an attractive environment in the form of teamwork. Four questionnaires included: self-directed learning readiness scale (SDLRS), Burrford's self-regulatory questionnaire and a Questionnaire for assessing the value of team work and then a questionnaire of self-reflection were used in two stages (before and after) of intervention. **Results:** The results of the study showed that self-regulatory indicators ($p = 0.17$) and self-directed (including self-control motivation) and self-management ($p=0.15$, $p=0.0$, $p=0.001$) were meaningful after improving intervention respectively. Other results show that intervention has affected team-based learning scales (including attitudes- team learning and team-learning skills (0.73, 0.46, 0.62) although it is not significant. Also, the mean increase in all subdomain of self-reflection were significant ($p < 0.05$). Other results indicated that the intervention increased the mean scores of self-regulation and self-directed of students. But it is only in self-management was significant. **Conclusion:** The results of the study showed that the use of instructional game can affect the individual and participation learning by creating entertaining and interactive environment. Therefore, it is recommended that the mentioned method be used in medical science education

Keywords: game in Education; self-directing; Self-Regulating; self- Reflection; Team based Learning

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Introduction

Using traditional and inactive methods in medical education can cause fatigue, lack of attention, frustration, lack of motivation and decrease the level of students' learning. Nowadays, traditional

and old methods of teaching and learning, with the advent of new technologies and methods, lose their effectiveness. Learners need to look for new ways and means to transfer knowledge and increase learning to keep pace with the changing environment around

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them. They have to work with new approaches to build their knowledge and play a valuable role in their learning¹.

Using problem-based methods in an effective and efficient manner can contribute to the development of self-directed learning. This type of learning is accompanied by active learning experience, self-direction, motivation, critical thinking, and learning from the search and research path. Also, using problem-based methods as methods based on personal experience has the greatest effect on student learning. choosing the appropriate teaching method is one of the effective factors in student progress and acquisition of professional skills².

Active learning enhances students' ability to study their learning needs, gain an active role in the learning process, enhance critical thinking ability, increase decision-making ability in different clinical settings and strengthen problem-solving skills³.

The ever-increasing changes in science and technology have already made it necessary to take advantage of the new ways of problem-based teaching and the use of an inclusive-oriented approach. Therefore, it is recommended that a suitable learning environment be created, and the new skills of training methods developed and current methods improved⁴.

The instructional and game based learning method is one of the active learning methods. In this method, using a learning strategy in small groups, learners are trying to achieve a common goal, in order to improve their learning ability and other members of the group⁵.

The advantages of this educational method can be to reduce students' fatigue, increase their participation in learning and develop deeper learning⁶.

One of the active learning methods is using of instructional game. Breuer (2011) in his study on digital game based learning emphasizes the necessity to integrate the evaluation of both; the learning objectives or learning content in this method⁷.

Games can help to change the roles by providing alternative, it makes novel environments where the regular roles of students "dissolve"; they can become just players and learners in a game that engages them all in topics that can help to create funny environments in which they, can co-exist and co-create together as a team⁸.

Wilson and colleagues (2009) identified 18 game elements as potentially leading to learning outcomes. They identified 18 game elements. This comprehensive list includes many of the game attributes list conclude (adaptation, assessment,

challenge, conflict, control, fantasy, interaction, language communication, location, mastery, pieces and play, progress, representation, rules, goals, safety, sensory, stimuli). They attempted to link these attributes to specific learning outcomes (e.g., application, knowledge, automaticity and so on⁹.

A digital game for learning in the classroom aided to constrictive learning in students in a fun and meaningful way. Also it is a valuable mediating tool as it strengthens collaborative learning and team based learning to improve engagement¹⁰.

One of game attribution is design game by rules/ Goals. It is consist of the degree to which the game has clear rules, Specific goals, and information on progress toward goal topics, also, it constitutes the goal makeup of the game . Furthermore, specific rules and clear learning goals determine this method by which a player can solve problems in the game¹¹. Admiraal, et al in research with aim of The Concept of Flow in Collaborative Game-Based Learning" reported that this method decreases distraction in team based learning and the more they were engaged in group competition and team based learning. Also, the more students learned about topic¹².

Domingue, et al expanded Gamifying Learning Experiences. They showed that the Students who completed the gamified experience got better scores in practical assignments and in final score in course¹³. Today, the need of using active learning methods that deepens student learning should be considered in medical science education. Applying active methods helps to strengthen critical thinking and reinforce problem-solving skills in students and helps them to cope with clinical decisions in professional settings^{14,15}. The use of interactive and collaborative approaches is also an active approach to the perceived need for medical education, and in contrast to the usual methods, students take an active part in the learning process and take on the responsibility of learning for themselves and their friends^{16,17}.

Regarding the relationship between active and student-centered learning on self-regulatory and self-directed development, application of the game based learning method (one pf board game learning as a puzzle based learning) can be effective in enhancing these dimensions in learners. Educational game related with many learning indicators as a self regulated learning and self directed learning . Also it may be related to team based learning and student self reflection. We will continue to define and briefly illustrate these two issues:

self-directed learning is a process in which students ingeniously share their learning in identifying needs, formulating and compiling learning goals, identifying resources for learning, selecting and implementing learning strategies, learning, and evaluating learning outcomes. The role of educating the movement from a wise person in the learning scene. It is guided by its learning environment¹⁸.

Self-Regulatory Learning: It is a multi-faceted structure that involves complex interactions between the use of cognitive, meta-cognitive and motivational strategies and is a type of learning that results from the effects of students' self-production thoughts, emotions, strategies and behaviors that are directed towards achieving goals¹⁹. In this article, the effect of the instructional game and the effect of this program on students' self-regulation, self-directed learning, self-reflection and value of team learning has been investigated.

Methods: This is a descriptive study. The population of this study was Jahrom University of Medical Sciences students and samples were 39 nursing students with psychological disorders course study. Samples were selected from class available to the teacher. The purpose of this study was designing, implementing and evaluating the instructional game (role –goal attribution) in teaching process of psychiatric course. Initially, the content of the course was presented as a presentation.

After the completion of the lessons, the questions (board game as a role –goal attribution) were given to small groups. The groups answering the tables, while reviewing the content collection and the searching for answers and then the correct answer was told by the teacher.

Combining teamwork with small groups and educational game that contained the learned lessons provided an attractive environment in the form of teamwork to allow students to review the contents of the coursework at the same session. Teamwork score (as midterm score) was given to every single student according to the sum correct answers. In order to complete students' learning and develop self-reflection, in each topic, cases of disorders were placed in the forum. Its management was also arranged in such a way that the individual first responded to the questions individually, and then other students could access them. This process provided self-reflection and interactive environment to complete and console of students' learning.

At the end of each topic, the related short films that were previously prepared by the students were

broadcasted and the necessary explanations were presented by the teacher. The questionnaires were given to the students at the appropriate time, regarding not to interference with the educational programs and considering the students' satisfaction in the study, at the beginning or end of the classroom. In each case, after initial justification and explanation of how to respond to the questionnaires, the students answer the questions, and the ambiguities were resolved. Then, enough time to answer was given to them, and at the end the completed questionnaires were collected.

Four questionnaires including: the self-directed learning readiness questionnaire, the self-regulatory learning questionnaire, a questionnaire on evaluating the value of team working (value of work in the group and working with peers) and self-reflection were used in this study. Standard questionnaires were used for measuring the rate of students' readiness for self-directed and self-regulatory learning.

The S-SDLRS (A short questionnaire about self-directed learning): The Gagliimino Self-Directed readiness scale is a self-report questionnaire with 41 items in 5-part Likert type (rarely to always) that includes three domains: self-management, self-control and learning motivation. The internal correlation of the questions was 0.95 and the reliability of the present method was 0.68. Scores for each field are calculated from 100 and scores less than 33.3 were low, between 33.3 to 66.7 is considered moderate and more than that were high. Cronbach's alpha coefficient for self-management subscales was 0.81, learning motivation was 0.78, and self-control was 0.84.

This questionnaire was assessed by Nadi and Sajjadian in 2013 on 1135 medical and dental students and the reliability and validity of the questionnaire were confirmed. The maximum score of this tool was 205 and at least 41²⁰⁻²¹.

Self-Regulatory Questionnaire (Buffard's Self-Regulatory Questionnaire): Buffard's Self-Regulatory Learning Questionnaire was used to measure the amount of participants' (students') use of self-regulatory learning strategies. This scale has 14 items by Buffard, et al (1995). In this test, for each question, there are 5 options that include fully agree, agree, disagree, disagree, and completely disagree, which has 1 to 5 points, respectively.

Meanwhile, the scoring of questions 5, 13, and 14 is inversely. This questionnaire has standardized by Kadivar. The total reliability coefficient of the questionnaire that obtained on the basis of Cronbach's

alpha of was 0.71. In the research of Talebzadeh-Nobariyan et al., Its reliability was obtained through an experimental test on 30 students and using Cronbach’s alpha (which equaled 0.76). The results of factor analysis showed that the correlation coefficient between questions was appropriate and the measurement tool was composed of two factors²². In the current research, the total reliability coefficient of the questionnaire was obtained by Cronbach’s alpha (0.72). Two of the questions in this questionnaire are as follows: “When I study, I clearly identify my goals.” And, “When I do not understand a story, I do not know how to make myself out to trouble (1²³). Value of Teamwork Questionnaire (VTs) : was first developed by Haidate, *etal*, (in2002) in 17 items on a 5-point scale(absolutely agree the absolutely disagree). It also concludes two sub-scales of team working and work with peers. Cronbach’s alpha coefficient for the entire questionnaire was 0.79 to 0.8²⁴⁻²⁵.

Results:

Table 1: The effect of a instructional game on case study in students’ self-reflection N=39)T: paried t test p < 0.05*(

Self reflection subscale	Mean ± SD	T	P value
Encourage to self-reflection	Before:3.21±21.29 After:2.78±22.47	2.48	0.01*
Need for self-reflection	Before 3.08±19.93 After 3.27±21.61	3.66	0.0001*
Insight	Before3.17±24.46 After3.55±25.54	2.46	0.01*

P from paired T- Test

As shown in the table above,intervention in the features of self-reflection and after that upgrading them had mean valuesand it shows that the intervention had a positive effect on all three self-reflection subscales(Table 1)

Table 2:The effect ofa educational game on the value of team subscale

Value of team subscale	Mean ± SD	T	P value *
Team learning	Before27.30±2.41 After27.69±5.4	3.42	0.73
Team Attitude	Before 24.42±4.56 After4.47±25.04	4.34	0.66
Team skill	Before34.80±4.77 After36±6.54	0.82	0.42

P from paired T- Test

Other results indicate that intervention has affected value of teamincluding attitude, learning and team-learning skills(increases mean level of score), Although its values are not meaningful (Table 2).

Table 3: The effect of educational game on the features of self-directed learning subscale

features	Mean ± SD	T	P value
Self-reglatory	Before6.85±46.50 After7.67±48.25	1.38	0.17
Self-motivation	Before.75±51.04 After7.85±54.29	1.45	0.15
Self-control	Before.60±52.00 After7.34±55.00	1.48	0.15
Self-management	Before9.33±4550 After5.51±56.72	5.78	0.001

Other results indicated that the intervention increased the mean scores of self-regulatory and self-directed of students but only in self-management had mean value. Therefore, it can be concluded that in general, intervention can promote self-directed feature of students (Table 3).

Discussion

This research has designed, implemented and evaluated instructional game in psychiatric course. Results from this method showed that this method effect to learning indicators as a self reflection, self regulation and self directed learning.

The positive effect of instructional game reported by some researcher.As a research by Vogel et al., 2006, instructional game lead to greater cognitive outcomesamong participant. It may be related to learners more engaged inthe learning process when they are required to interact with it²⁶.

It is necessary to apply such methods as instructional game in this courses and also engage students more in active learning methods because the psychological disorders’ intangibility and similarities of signs and symptoms.Also teamwork and learning from peers make exciting learning environment for learning and sufficient reflection of what the students learned. It is clear that today the traditional role of teachers and learners has changed in the learning process and active participation of learners is emphasized²⁷.

Also evidence showinstructional game may lead to greater cognitive, attitudinal gainsand skill-based over traditional instructional methods.Also when informational content combines with the appropriate gaming characteristics, the combination of the two increase learner motivation²⁸.

When informational content combines with the appropriate gaming characteristics, the combination of the two elicits a motivated learner²⁹. Our study the effect of instructional game in promotion of students' self regulation.

The findings from Tominey, et al showed that the efficacy of the game in terms of improving preschoolers' behavioral self-regulation and improving specific skills in preschool³⁰. The results of many studies showed that students tended to participate in environments where attention was paid to individual characteristics of learners, interaction, collaboration, innovation and creativity³¹. Hays in the investigating effectiveness of instructional game as a review showed that (1) there are varied empirical research on the effectiveness of games (2) Some games provide effective for some tasks (3) No evidence confirmed that games are the preferred in all situations. (4) It is more effective if they are embedded in instructional programs that students give feedback from teacher (5) Instructional support by teacher has main role during play game³².

The results of study by Sweygnir et al showed the positive effect of the game method on learners' learning, which is consistent with the results of the present study³³. However, in contrast the results of this study and the studies above, the findings of Maskowitz et al showed that the use of the game doesn't have a positive effect on learners' learning because of teachers' weakness in implementing of this method⁶.

Also Jürgen, et al study did not show a significant difference in the performance of trained students with participatory learning and the students who trained with traditional method³⁴. The study of Payami et al showed that the students feel more satisfied with this method because of their activeness and relevance in the classroom. Therefore, they expressed more interest and motivation in learning process, and they described this method as a more attractive and

exhilarating method of learning³⁵. Game method leads to the enhancement of the students' interest in and positive feelings about the study subjects³⁶. Salomon et al. Reported positive effects of this type of learning on interpersonal attitudes, behaviors, values, and skills of learners. These results are consistent with the findings of the present study³⁷.

Other evidence showed that that games can help prepare students to create deeper, more robust understanding while improving their perceptions of learning concept, also this method for teaching SCRUM in computing courses was an engaging way, keeping students immersed in the learning task³⁸.

Guillen et al to investigating Sirius game and effectiveness reported that the relation between in the creation of serious games and instructional content, game dimensions, debriefing, perceived educational value, and role this method to transfer of learned skills in students through intrinsic motivation³⁶.

Limitations of research include the lack of team learning culture and the need for specific planning. Also, due to the need for full-time student engagement in learning, this method requires the teacher's time and energy more than traditional ones to implement it. Educational game method face classroom management and traditional teaching curriculum (which for many years has been managed by teacher-center method and student learned their subjects by this method for a long time) challenges.

Conclusion:

Considering the positive effects of the mentioned method, and also the importance of new methods in learning, the use of these teaching methods in medical education courses is recommended so that it can be used to improve the quality of learning, team learning abilities and features.

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References:

1. Mehdain M, Moniri R, Vakili Z, Ramzani Y. Survey of Educational Objectives of Kashan University of Medical Sciences Departments in 2002. *Iranian Journal of Medical Education* 2002 ;2, 38-38.
2. Namvar F, Naderi E, Shariatmadari A, SeyfNaraghi M. The Impact of Web-Based Learning with a Problem-Solving Approach on Reflective Thinking Development in English Language Students of Islamic Azad University of Ardabil. *Research in Curriculum Planning* .2011; 8(1,2), 84-95.
3. Bowles DJ. Active learning strategies not for the birds! *Int J NursEducScholarsh*. 2006.
4. Young L, Paterson B. *Teaching Nursing*. Philadelphia: Lippincott Williams &Wilkins; 2000.
5. Wood DF. Teaching and learning in a large group. *Diabet Med*. 2003; 20(3): 2-4.
6. Moskowitz JM, Malvin JH, Schaeffer GA, Schaps E. Evaluation of jigsaw, a cooperative learning technique. *Contemporary educational psychology*. 1985; 10(2): 104-12
7. BREUER, Johannes: Spieled lernen? EineBestandsaufnahmezum (Digital) Game-Based Learning. <http://www.lfmrw.de/fileadmin/lfm-nrw/Publikationen-Download/Doku41-Spielend-Lernen.pdf> Retrieved February 19, 2013.
8. EszterTóth M.A. Pop-up Pest: An Educational Game for Active Participation of Children and Youth in Urban Planning. *Proceedings REAL CORP 2013 Tagungsband20-23 May 2013, Rome, Italy*. <http://www.corp.at>
9. Wilson K A, Bedwell WL, Lazzara E H, Salas E, Burke C S, Estock, J,etalRelationships between game attributes and learning outcomes: Review and research proposals. *Simulation & Gaming: An Interdisciplinary Journal* ,2009, 40, 217-266.
10. Gömleksi Z. Effectiveness of cooperative learning (jigsaw II) method in teaching English as a foreign language to engineering students (case of first university, turkey). *European Journal of Engineering Education*. 2007; 32(5): 613-25.
11. Blunt R.Does game-based learning work? Results from three recent studies. In *Pro-ceedings of the Interservice/ Industry Training, Simulation, & Education Conference*. 2007. (pp. 945-955). Orlando, FL: NDIA.
12. Admiraal w, HuizengaJ,Akkerman S, Dam G. The concept of flow in collaborative game-based learning, *Computers in Human Behavior*;2011; 27(3):1185-1194.DOI10.1016/j.chb.2010.12.013
13. DomíNiguez A, Saenz-De-Navarrete J, De-Marcos L, FernáNdez-Sanz L, PagéS C, MartíNez-HerrálzJJ. Gamifying learning experiences: Practical implications and outcomes. *Computers& Education*. 2013 Apr 1;63:380-92.
14. Titus S ; Ng’ambi D . Exploring the use of Digital Gaming to Improve Student Engagement at a Resource Poor Institution in South Africa. *European Conference on Games Based Learning*;2014; ; 2: 742-748.
15. Gelu M, Muza M. The strengthen knowledge of atomic physics using the “mosaic” method (The Jigsaw method). *Procedia Social and Behavioral Sciences*.2011; 15: 1605-10.
16. Young L, Paterson B. *Teaching Nursing*. Philadelphia: Lippincott Williams &Wilkins; 2000.
17. Debessay A, Lerner A. . Creating a deeper learning environment using group based active interactive collaborative learning. 2004. Available from: URL: <http://www.udel.edu/pbl/PBL2004/files/debessaypaper>.
18. Fischer S, Shachar H. Cooperative learning and the achieve-ment of motivation and Perception of Student in the grade Chemistry Classes .2004.
19. PayamiBousari M, Fathi E, Moosavinasab N. Comparing the Effect of Lecture Combined with Question and Answer, and Team Member Teaching Design on Nursing Student’s Achievements. *Iranian Journal of Medical Education*. 2006; 6(2): 45-51. [Persian].
20. Nadi M A, Sajadian I. Validation of a Self-directed Learning Readiness Scale for Medical and Dentistry Students. *Iranian Journal of Medical Education*. 2011;11(2):174–183. [Prsion]
21. Fisher MJ, King J. The self-directed learning readiness scale for nursing education revisited: a confirmatory factor analysis. *Nurse Educ Today* 2010 Jan; 30(1): 44-8.
22. Murad M. H, Coto-Yglesias F, Varkey P, Prokop L. J, Murad A. L. The effectiveness of self-directed learning in health professions education: a systematic review. *Med Educ*. 2010;44(11):1057–1068. <http://dx.doi.org/10.1111/j.1365-2923.2010.03750.x> .
23. Zimmerman BJ, Schunk D H. *Self-regulated learning and academic achievement: Theoretical perspectives*. 2nd ed. New York: Springer-Verlag; 2013.
24. Haidet P, O’Malley KJ, Richards B, 2002. An initial experience with “team learning”in medical education. *Academic Medicine*, 2002, 77: 40–44.
25. Levine RE, O’Boyle M, Haidet P, Lynn DJ, Stone MM, WolfDV, Paniagua FA. Transforming a clinical clerkship with team learning. *Teaching and Learning in Medicine* ,2004,16: 270–275.
26. Vogel JJ, Vogel DS, Cannon-Bowers J, Bowers CA, Muse K, Wright M. Computer gaming and interactive simulations for learning: A meta-analysis. *Journal of Educational Computing Research*. 2006 Apr;34(3):229-43.
27. Clarke JA, Chant D, Dart BC. The influence of learning environment on the satisfaction of pre-serviceteacher education students. *Proceedings of the annual conference of the Australian Association for Research in Education* 1998. Adelaide University. [cited 2010 Jan 12]. Available from:<http://www.eric.ed.gov/ERICWebPortal/>
28. Doymus K, Karacop A, Simsek U. Effects of jigsaw and animation techniques on students’understanding of concepts and subjects in electrochemistry. *Educational Technology Research andDevelopment*. 2010; 58(6): 671-91.

29. Souvignier E, Kronenberger J. Cooperative learning in third graders' jigsaw groups for mathematics and science with and without questioning training. *British Journal of Educational Psychology*. 2010; 77(4):755-71
 30. Jürgen-Lohmann, J, Borsch F, Giesen H. [Kooperatives Lernen an der Hochschule: Evaluation des Gruppenpuzzles in Seminaren der Pädagogischen Psychologie]. *Zeitschrift für Pädagogische Psychologie*. 2001; 15: 74-84. [Turkey]
 31. Payami Bousari M, Fathi E, Moosavinasab N. [Comparing the Effect of Lecture Combined with Question and Answer, and Team Member Teaching Design on Nursing Student's Achievements]. *Iranian Journal of Medical Education*. 2006; 6(2): 45-51. [Persian]
 32. Egenfeldt-N S. Third generation educational use of computer games. *Journal of Educational Multimedia and Hypermedia*, 2007; 16(3), 263-281.
 33. Solomon D, Watson MS, Battistich VA. Teaching and schooling effects on moral/prosocial development. Washington DC: American Educational Research Association; 2002.
 34. Michael E, Tiffany B. Experimental evaluation of an educational game for improved learning in introductory computing. *The ACM Digital Library* is published by the Association for Computing Machinery. 2018, ACM, Inc.
 35. Wangenheim V, Gresse C, Savi R, Ferreti Borgatto A. "SCRUMIA—An educational game for teaching SCRUM in computing courses." *Journal of Systems and Software* 2013; 86(10): 2675-2687.
 36. Guillen-Nieto, Victoria; et al. Serious Games and Learning Effectiveness: The Case of It's a Deal. *Computers and Education*, 2012; 58(1): 435-448. doi: <http://dx.doi.org/10.1016/j.compedu.2011.07.015>.
 37. Solomon D, Watson MS, Battistich VA. Teaching and schooling effects on moral/prosocial development. Washington DC: American Educational Research Association; 2002.
 38. Von Wangenheim CG, Savi R, Borgatto AF. SCRUMIA—An educational game for teaching SCRUM in computing courses. *Journal of Systems and Software*. 2013 Oct 1; 86(10): 2675-87.
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