Research Article

A Constructive Blended Approach to Ethical Reasoning: The Impact on Medical Students' Reflection and Learning

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Abstract

Background: Teaching medical ethics is currently one of the most essential parts of medical education.

Objectives: The present study aimed to design a blended learning program based on a constructive approach to ethical reasoning and determine its effect on the students' reflection and learning.

Methods: This quasi-experimental, single-group, pretest-posttest study was conducted on 35 students who took the medical ethics course in a university of medical sciences. Case studies were presented to the students in a discussion forum, and the main concepts in question were then addressed through interactive lectures and group discussions. Data were collected using the Self-Reflection and Insight scale (SRIS) developed by Grant et al. to assess reflection, with 20 items in three domains. The students' ethical reasoning was assessed using multiple-choice and open-ended questions and the Objective Structured Clinical examination (OSCE). The relationships between the tests were assessed by calculating the correlation between them. The results of the multiple-choice questions were compared with those of students in the previous year (with the same teacher and content), using the independent *t*-test.

Results: Assessing the mean scores before and after the intervention showed a significant increase in the students' reflection in all three domains, including the need for self-reflection, encouraging reflection, and insight after the intervention. The findings also showed a significant relationship between the students' final scores and their virtual round and OSCE scores (P < 0.05). In the final theoretical test, the students' mean scores were significantly higher than those of students in the previous year (P < 0.001).

Conclusions: The proper use of technology with a blended learning approach can help improve the students' quality of learning and reasoning.

Keywords: Blended Learning, Medical Ethics, Ethical Reasoning, Constructive Approach, Reflection

1. Background

Teaching medical ethics is currently one of the most essential parts of medical education. Medical ethics is the science of assessing which desirable behaviors the medical professionals should possess and which undesirable behaviors they should avoid (1). Medical ethics is a branch of practical professional ethics that attempts to incorporate ethical principles into the physicians' and medical teams' practices and medical decision-making. As such, medical ethics is no longer just the expression of desirable ethical attributes and behaviors for physicians concerning patients or the mere development of professional rules for the physicians' conduct and the declaration of religious rules alone. A conflict between clinical and ethical reasoning complicates the process of decision-making about the patients' treatment. Providing the best patient care is one of the objectives of decision-making, but most often, one cannot easily claim that the treatment provided to a certain patient has been the best possible choice. Ethical decision-making is one of the skills expected of medical students that are currently emphasized as a subject that needs to be taught. Medical professors know perfectly well that they should allocate time and resources to learning ethics and ethical reasoning. This need has guided medical schools toward improving their quality of education and care training for the higher goal of developing ethically rich students (2, 3). Based on research, medical stu-

dents believe that medical ethics has a vital role in proper medical treatment ([4]).

A very welcome educational approach in modern times is the constructivist approach that makes constructivist teaching. The constructivist approach refers to the fact that knowledge is a constructive matter, meaning that the learners combine their previous knowledge and available information (gathered from teachers, books, and academic experiences) to create new knowledge ([5]). Situational learning is one of the concepts related to constructivism that is essential to medical education. The followers of the constructivist view believe that cognition is situational, meaning that knowledge depends on situations, intentions, and tasks that they entail ([6]).

In other words, all forms of knowledge depend on the intentions and situations for which they have been constructed. Given these explanations, the constructivist approach may have important implications for medical education. In terms of teaching, student-oriented teaching methods such as participatory learning and exploratory learning should be valued. Due to their emphasis on students as active learners, constructivist strategies are sometimes referred to as student-oriented education. In addition, according to the constructivist approach, teaching should take place in natural and original settings ([7]).

The effective formation of ethical indicators is very important in constructivist strategies designed for teaching medical ethics. Problem-solving-based teaching, such as case-based learning (CBL), is one of the key factors in the formation of these ethical indicators. Professional medical education needs to develop the students' analytical and diagnostic thinking skills rather than merely encouraging them to accumulate knowledge. For the same reasons, CBL is used in medical education because it helps students use the medical problems and challenges they are faced with for improving and developing their analytical skills. The other benefit of this method includes more effective and better learning. By another definition, CBL is an active learning tool that complements educational lectures and aims to develop reasoning skills based on clinical scenarios that act as stimuli to help better understand the importance of some topics in medicine ([8]).

Using this method reinforces the participatory learning and systematic reflection by providing real cases, thus paving the way for the students' more in-depth learning ([9]). With an emphasis on the process (individual reflection, team-building, enhancement of the team's attitude and skills, and development of critical thinking) or the product (product, question-answer, and performance), CBL can be used in teaching ethics and assessing ethical challenges ([10]).

Reflection is a basic educational method proven to be effective in promoting awareness and skills in clinical situations. The four-stage model of reflection includes description, analysis, theorization, and practice. In this method, the individual refers to his previous experiences, and based on the current situation, collects and analyzes the data. The teacher's role in this approach is to provide proper guidance and feedback. Using this approach in educational settings can have many benefits for learners in terms of knowledge-building and improve the possibility of self-management in education and learning. This approach is a smart and motivating idea in the management of learning that helps the learners link their previous and new learning ([11]).

One of the active educational methods is blended learning. Blended learning is an approach that combines various educational methods, such as online learning and traditional (face-to-face) learning ([12]). Blended learning fosters the interaction between students and teachers through emails and asynchronous chat rooms, and gives the learners greater control over their speed of learning, the flow of teaching, choice of resources, and management of time. It can also be effectively used in various learning styles ([13]). The benefits of this type of learning include longer-lasting knowledge, improved efficacy of learning, lower costs, improved education, and increased interactions ([14]).

Reflection has been proposed as a sign of professionalism and is used to reinforce clinical skills and professional behaviors. Wilson writes, "working with reflection connects practice to thought, and involves thinking about one's actions and their critical analysis to improve a given professional activity". In clinical guidelines, reflection has been introduced as a tool for the development and improvement of awareness out of knowledge. Using reflective methods has increased the students' ability to use thinking strategies ([15]).

Many evidence-based strategies have been suggested including (1) humanities curricula for increasing non-prejudice; (2) mentoring by older students, faculty, and professional volunteers; (3) ethical case study discussions in the class; and (4) task-based learning activities ([16]). Furthermore, reflection, writing, team-based activity and discussion, and media could be used to increase curriculum learning ([17]).

A study suggested brief didactic lecture, CBL with assignments, and group discussion for clinical ethics education. Some peer instruction research suggested a highly effective method of engaging students in their reflection to increase the student's understanding of clinical ethics debate ([18], [19]). Others emphasize content-evaluated programs and empowered teachers for teaching medical ethics to increase the quality of the course in medical edu-

cation (20). Furthermore, longitudinal assessments of students' skills in the practical environment through ethical reasoning are emphasized as an integral part of the curriculum moving forward (21).

Improving medical ethics education can be accomplished by the adoption of active methods such as CBL, as previous research suggests the design of localized value models that can improve students' reflection, ethical reasoning, and learning through electronic modalities, debates, and discussions in a forum environment. The development of ethical reasoning should be treated as a compulsory element of medical education for a good professional prospect.

2. Objectives

Given the importance of emphasizing the active student-oriented learning methods and the need for the learners' participation in the process of education to acquire professional capabilities and competences, the present study was conducted to design and develop teaching medical ethics based on the blended constructivist approach and assess its effect on the students' learning and reflection in Jahrom University of Medical Sciences, Iran.

3. Methods

The present quasi-experimental pretest-posttest study was conducted to determine the effectiveness of a blended learning program based on the constructive approach in medical ethics and assess its effect on the students' reflection and learning. The study sample included all medical students of Jahrom University of Medical Sciences (JUMS) who were taking the medical ethics course in the second semester of the academic year 2017 - 2018 (n = 35), selected by the census method. We included all students who took the medical ethics course and wished to participate in the study. Students who were enrolled as guest students during the semester and had no desire to complete the questionnaires were excluded. All the participants (35 students) completed the study, and we did not have any missing data during this educational intervention.

3.1. Implementation Stages of the Research

Before the training, the level of self-reflection and insight skills of the students was investigated. Then, one case study on ethical reasoning was designed in the discussion forum, and the students were given one week to participate, interacting with one another, and answering the questions presented virtually. Then, the research sample underwent five two-hour sessions of in-person class for one week.

The instructional content included the principles of medical ethics, medical jurisprudence, ethics in medical research, ethics in psychology, ethics in gynecology, doctor-patient relationship, end-of-life care, and a review of methods of decision-making in ethical challenges. In each session, a case was presented associated with the subject of the lesson, and the students were encouraged to participate in the discussion. Then, the instructors provided additional information on the presented cases in a class lecture. Also, all educational contents and additional information were uploaded on the learning management system (LMS) for students. The students could study the learning materials at their own time, place, and pace.

One week after the completion of training, students filled out the Self-Reflection and Insight scale (SRIS) to assess their reflection and insight, as well as a multiple-choice questionnaire. They also answered one open-ended question to measure their knowledge and participated in the Objective Structured Clinical examination (OSCE) to measure their competency and evaluate their ethical reasoning skills.

3.2. Data Collection Tool

3.2.1. Self-Reflection and Insight Scale

Self-Reflection and Insight scale (SRIS) was developed and used by Grant et al. for the self-assessment of students' reflection. This scale assesses individuals' propensity to reflect on, and their level of insight into their thoughts, feelings, and behavior. It relates towards a specific goal and has been positively related to an individual's evaluation progress and struggle to improve performance (22). This questionnaire consists of 20 items in three domains, including encouraging reflection and the need for reflection (12 items) and insight (eight items), which are scored based on a six-point Likert scale from "totally agree" (six points) to "totally disagree" (one point). A study was conducted by Naeimi et al. (22) to analyze the validity and reliability of SRIS in Iran. The findings indicated that SRIS has adequate reliability for measuring students' reflection in Iranian society (22).

3.2.2. Objective Structured Clinical Examination

Objective Structured Clinical examination (OSCE) test questions were utilized as a tool to assess the students' competency. The OSCE stations are composed of five individual stations and one Team Objective Structured Clinical examination (TOSCE). Simulated patients were used in all stations for evaluating ethical reasoning. The participants were observed by the researchers during examination in

all stations and scored based on a prepared checklist (from no performed = 0 to completely performed = 4). The checklist consisted of seven to nine questions in each station. It took five to 10 minutes for each student to pass each station and 30 seconds for going from one station to another. In every station, one skill was evaluated as follows:

The first station: Confidentiality and interaction with patients (five minutes, two points);

The second station: Obtaining consent before surgery (five minutes, one point);

The third station: Delivering bad news (seven minutes, two points);

The fourth station: Skill of making a relationship with patients of the opposite sex (five minutes, two points);

The fifth station: Responding the false requests (five minutes) (Box 1);

Box 1. Example of the Checklist for the Fifth Station

Checklist
Starting communicating with a brief introduction (0.25 points)
Listening to patients' talk (0.25 points)
Providing good interpersonal relationship with the patient (nonverbal/verbal) (0.25 points)
Good, respectful communication with patients (0.25 points)
Giving more information about the problem legally (0.5 points)
Expressing a negative response to a request with respect (0.25 points)
Good finishing the communication process (0.25 points)

The sixth station: TOSCE (10 minutes, two points);

TOSCE for the evaluation of ethical reasoning and clinical decision-making. This station assessed group discussion skills in six student groups. In each group, five students discussed with one another to solve an ethical dilemma. This station was about resource allocation in the condition that needed to make clinical reasoning about admitted patients with bad physical conditions in the Intensive Care Unit (ICU). At this station, a challenging case in the field of medical ethics was presented, as follows:

"Two poor condition patients are hospitalized. They are candidates for admission to the ICU. As there is only one empty bed in the ICU, you had to decide which one should be admitted to the ward sooner. One patient is 62-years-old with Cerebrovascular Accident (CVA), low level of consciousness, and hypertension, and another one is younger with head trauma and Glasgow coma scale of eight". At this stage, students should use clinical decision-making and ethical reasoning skills to make decisions. Thus, this station was to assess two skills of clinical and ethical decision-making. These skills were intertwined and interconnected at this stage. All observers were physicians.

At this station, each group was evaluated based on performance in the following items: Assessing the first patient, assessing the second patient, reasoning for an emergency condition, ethical challenge of condition, and decision about a moral dilemma.

The content validity was assessed using the views of five experts in the field of ethics to determine the weights of each item at each station. We also used the modified Angoff method to determine the pass level for the standardization of OSCE. The construct validity of the test was estimated by the relationship between the mean score in each station and the total score of the OSCE (0.78 - 0.86). Furthermore, the reliability of the test was approved using the OSCE in two consecutive years with a standard checklist.

3.2.3. Multiple-Choice Questions

Multiple-choice questions were used to measure the knowledge of students prepared and designed based on educational content. Five case-based open-ended questions were emailed to each student. They had three days to respond and send their answers to the teacher. The validity of the test was approved by five faculty members of the Department of Ethics.

The total score was calculated on a scale of 20. This score consisted of OSCE (nine points), multiple-choice questions (nine points), and the open-ended (CBL) question (two points).

The statistical analysis was performed in SPSS21 using descriptive statistics (mean and SD), correlation coefficient, and paired t-test to assess the effect of the intervention by comparing the pretest and posttest. A P value of < 0.05 was considered as an acceptable significance level. To prevent bias, the validity and reliability of the tools were assessed.

3.3. Ethical Consideration

After obtaining permission from the college officials, the training program began at the Medical Ethics Department, Faculty of Medicine, Jahrom University of Medical Sciences. The ethical considerations of the study included the voluntary nature of participation and withdrawal, the confidentiality of the data, and the anonymity of the questionnaires. Also, the participants gave their verbal consent for participation in the study. This research was approved by the Ethics Committee of the Jahrom University of Medical Sciences, and all subjects signed informed consent forms before the study.

4. Results

Of the 35 students, 65% were female. The students' mean age was 22 ± 1.22 years. One of the hypotheses was

that educational intervention positively affects the students' reflection.

As shown in Table 1, comparing the mean pre- and post-intervention scores showed a significant increase in the students' reflection in all three domains after the reflection intervention (P < 0.0001).

Table 1. The effect of Blended Learning Program on Students' Reflection[a, b]

Index	Values	Paired *t*-test	Level of Significance
Encouraging Reflection			0.01[c]
Before	21.29 ± 3.21	2.48	
After	22.47 ± 2.78		
Need for Reflection			0.0001[c]
Before	19.93 ± 3.08	3.66	
After	21.61 ± 3.27		
Insight			0.01[c]
Before	24.46 ± 3.17	2.46	
After	25.54 ± 3.55		
Total			0.0001[c]
Before	63.34 ± 8.65	4.97	
After	72 ± 7.43		

[a]Values are expressed as mean ± SD.
[b]Paired *t*-test analysis through pretest-posttestst.
[c]significant at P < 0.05.

To determine whether the educational intervention increased the students' scores on learning and ethical reasoning, the relationship was examined between the overall obtained scores and the assignment and OSCE scores (Table 2).

Table 2. The Relationship Between the Students' Overall Scores, Their Assignment, and Objective Structured Clinical Examination Scores[a]

	Assignment	OSCE
Final score	r = 0.56	r = 0.0078
	P = 0.0054[b]	P = 0.0001[b]
OSCE	r = 0.34	
	P = 0.002[b]	

[a]Analysis of the reliability coefficient test (Pearson reliability coefficient test).
[b]Significant at P < 0.05.

These results showed that the students' overall scores had a relationship with their OSCE scores. There was also a significant relationship between the assignment scores and OSCE scores (P = 0.002). Besides, students, who scored higher on the assignment and OSCE, also scored higher on multiple-choice questions (Table 3).

Table 3. The Students' Mean Scores in the Medical Ethics Course[a]

Score	Values	Minimum	Maximum
Assignments	1.67 ± 0.59	0	2
OSCE	8.47 ± 0.70	6.50	9.56
Multiple-choice questions	18.77 ± 1.29	13.85	20

[a]Values are expressed as mean ± SD.

5. Discussion

The results of our study showed that the students' learning significantly improved after the intervention. Also, the results showed significant differences between the mean scores of the students' reflection before and after the intervention (P < 0001). This finding is in line with similar results regarding the positive effects of blended learning on the level of knowledge (23, 24), clinical skills, and capabilities (25, 26) of students. The results revealed that blended learning was an effective approach to promote active and deep learning in medical students. Research also suggests the effectiveness of blended learning in improving the students' critical thinking and cognitive indicators and its positive effects on the components of individual learning and clinical reasoning (25, 27), such as the students' documentation style and personality (28). The effect of blended learning was confirmed on cognitive and metacognitive indicators by another study (29). One reason is that blended learning provides the learners with the opportunity to learn and practice at their proper time, speed, and location (30).

We developed our blended program based on a constructive approach. In this regard, we designed a case-based environment through a discussion forum. In this environment, the students were allowed to discuss and collaborate to solve a problem within their own time. The effectiveness of discussion in the forum with the collaboration of students in case-based learning was confirmed by some research (31, 32). This method is based on the constructive theory. Constructivist theorists believe that learners can make their knowledge through collaboration and discussion with each other. Therefore, in a blended constructive environment, students can learn and solve a problem at an appropriate time, place, and speed.

Our study also indicated that constructed blended learning led to an improvement in the medical students' reflection. The concept of reflection has been widely applied in various fields of medical education. Self-reflection is the process of going back and reviewing what is being learned to interpret or analyze it (33). This process is usually created through encountering an experience or situation and, consequently, increasing the knowledge. Reflec-

tion is a process of metacognition that deepens the learning of the situation (34).

The clinical environment of medical schools provides an opportunity for reflection and reasoning in complex and challenging situations. One of the main missions of medical education institutions and schools of medical sciences is to create the required capabilities and skills in students and prepare them for delivery of health care services to all people, including those who need such services (35). Studies have shown that universities currently lack a safe environment that takes account of the patients' views or accepts the role of emotions when dealing with them. These environments do not offer a proper ethical role-model that is conducive to the development of emotional control skills or reasoning with empathy. The existing environments fail to support the students in integrating cognition and emotional skills, which is essential to the development of their ethical reasoning and higher-level thinking (16).

A study conducted by Lew et al. (33) showed that reflection increases awareness during and after acquiring experiences and increases the students' enthusiasm for learning from experience. This finding can be explained by the fact that reflection following learning opportunities and learning experiences and the ongoing self-evaluations that follow these experiences guide the students toward finding the strengths and weaknesses of their performance and improving their professional performance (23). In a study conducted by Abedini et al. (24), most students did not limit reflection to the early years of their education and agreed that reflection has to be used in clinical settings, as well. Green and Holloway (25) also found that students regarded reflection as an empirical learning method. Our results showed that students who scored higher on OSCE also had better final scores on multiple-choice questions, which showed the positive effect of constructive-based blended learning on ethical reasoning in the students of this university.

In conclusion, efforts made to improve and validate medical ethics education should become more organized. Since this study was conducted in a limited scope, more extensive studies are required on this method of education to update its content. It is upon the authorities to use new teaching methods and consistently evaluate and revise them because any deficiency in this area threatens the career prospects of physicians due to the legal and ethical problems that could occur out of negligence.

The limitations of this study include the rather limited number of participating students, the failure to compare the variables between two different groups, and the students' lack of familiarity with ethical reasoning tests in OSCE.

5.1. Conclusions

In the present study, the results showed that the constructivist blended approach can have a favorable effect on the students' clinical reasoning. The model, thus, appears to be an appropriate method for teaching medical ethics. Paying particular attention to these models alongside others and considering effective methods of teaching that take advantage of modern problem-oriented methods can contribute to the richness and quality of medical education and help students internalize some key concepts and issues.

Acknowledgments

Footnotes

Authors' Contribution: NZ and LM devised the study concept, designed the study, supervised the intervention, data collection, and analysis, participated in the coordination of the study, and critically revised the manuscript. AME collected data, ran the study intervention, participated in the study concept, performed the analyses, and revised the manuscript. MT contributed to the design and analysis of the study data and drafted the manuscript.

Conflict of Interests: On behalf of all authors, the corresponding author states that there is no conflict of interest.

Ethical Approval: This study was approved by the Review Board of the Vice-Chancellor's Office for Research at Shiraz University of Medical Sciences (ethics approval ID: IR.SUMS.REC1396.S592). After obtaining permission from the college officials, the training program began at the Medical Ethics Department, Faculty of Medicine, Jahrom University of Medical Sciences. The ethical considerations of the research included the voluntary nature of participation and withdrawal, the confidentiality of the data, and the anonymity of the questionnaires.

Informed Consent: The participants gave their verbal consent for participation in the study.

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