The Effect of Peer Feedback and Formative Feedback on the Design and Production of the Instructional Project

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ABSTRACT

Background: The present study aims to create web-based learning with peer feedback and formative feedback and web-based learning without peer feedback and formative feedback in the design and production of educational projects. It also aims to investigate the role of peer feedback and formative feedback in the design and production of instructional projects.

Methods: quantitative approach with quasi-experimental design is used in this research. Research population is all students of Farhangian University of Ardebil in the course of ICT for instruction and learning, who entered university in 2018. Sample of the study includes 40 students, selected by random cluster sampling method. First, pre-test is performed by an 8-item test. Then, the experiment group receives training via web-based learning with peer feedback and formative feedback and control group receives training by web-based learning without the peer feedback and formative feedback. Post-test is performed with the same questions. SPSS software, version 19, is used for ANCOVA analysis.

Results: According to the results, the experimental group receives high scores in designing and producing of educational projects (mean=13.50 and 18.50. P=0.001). Findings of this research suggest that using peer feedback and formative feedback in web-based learning in designing and producing projects must be designed implemented by instructors. Also, taking into account their important features and functions is a necessity for attaining effectiveness in the instruction.

Conclusion: This research has shown that peer feedback and formative feedback in web-based learning have positive effect on the learning. Thus, it is suggested that peer feedback and formative feedback must be applied in web-based learning environment.

Keywords: Learning, Formative feedback, Peer feedback, Design, Project, Instructional

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Introduction

Information and communication technologies have changed learning methods and these developments in the network contribute to collaborative learning (1). Online learning which has emerged with the advent of internet is growing year by year, and so many platforms have been created by educational practitioners (2). The advent of web technologies has made it possible for educational systems and learners to use technologies for their learning goals, which makes web-based learning possible (3). Nowadays, web-based learning is effective in education and its popularity is increasing (4). The importance of web-based learning for leaning and instructional environments has increased in research projects (5).

ICT makes it possible for people to learn from and communicate with other people. (6). Using technology in the classroom has changed the learning and instructional situations (7). E-learning and web-based learning must integrate good instructional strategies and practices. In other words, instructional design must be integrated with these technologies.

With regard to the sixty-year history of research about media, the result of the comparisons and studies of media is that instructional strategies and methods affect learning (8). One of these valuable instructional methods for improving learning is peer feedback that can be integrated with web-based learning for improving student's learning. As Shute (2008) said, "there have been hundreds of articles written about feedback and its role in knowledge and skill acquisition" (9).

Peer feedback, as an instructional strategy, is an excellent strategy that is used to improve students' writing, learning, and motivation in specific domains (10). Peer feedback can support students to find the gap between their current and desired states in the learning of any content (11). Another type of feedback, named formative feedback, has also been used in this research.

Formative feedback is defined as "information communicated to the learner that is intended to modify his or her thinking or behavior for the purpose of improving learning". According to researches, formative feedback must be just in time, supportive, and particular (9). Designing effective formative feedback must consider learning context and characteristics of the learners for providing appropriate feedback (12). In this research, task-level feedback, which is different from general summary, is used. (9).

There is a little research on the integration of feedback with new technologies in the design and production of any instructional projects, such as instructional posters, infographics, learning carts, instructional videos, podcasts, animations, virtual reality, augmented reality, and multimedia. In other words, researchers have only focused on feedback or technology. When researchers attempted to integrate technologies with any type of feedback, they did not focus on the instructional projects. However, this research has simultaneously focused on all these three issues (i.e., technology, feedback, and instructional projects).

In a research entitled "students' online argumentative peer feedback, essay writing, and content learning: does gender matter", results have shown that there were significant differences between female and male students in the peer feedback's quality in some variables. In this research, results also showed that peer feedback affects content learning, and this kind of feedback has significant role in the learning (13). In another research entitled "the e-ects of online peer feedback and epistemic beliefs on students' argumentation-based learning", results have revealed that "argumentative peer feedback improves students' argumentative essay writing and domain-specific learning (14).

In a research entitled "personal learning environments based on web 2.0 services in higher education," results revealed that PLEs present tools for learning skills, improving social interactions, and help manage and organize the content of the specific domain and learning resources (12).

The results of another research entitled "relations between scripted online peer feedback processes and quality of written argumentative essay" showed that online argumentative peer feedback script enhances the quality of students' written argumentative essay (13). In a research entitled "using peer feedback to enhance the quality of student online postings: an exploratory study", the results showed that peer feedback affects online posting quality and also understanding of the content (15). Results of another research entitled "use of web-based learning modules for a general medicine advanced pharmacy practice experience" showed that using WBT modules improves baseline knowledge of pharmacy students (16). Authors of a paper entitled "formative assessment in mathematics: mediated by feedback's perceived usefulness and students' self-efficacy" indicated that feedback is perceived as one of the useful strategies in the formative assessment situation (17).

In another research entitled "the design of web-based learning environments enhancing mental model construction", results showed that "constructivist web-based learning environment, mental model development, mental-based characteristics, and cognitive factor for web design" are five elements for designing effective WLEM (18). Results of another research entitled "the effects of web-Based language learning on university students' grammar proficiency" revealed that integration method (i.e., traditional and web-based materials) is the best method for language learning (19).

All the researches have only considered two aspects of issues at stake (i.e. online learning and peer feedback) and did not consider the instructional projects. This research aimed at considering new technologies, peer feedback and formative feedback in learning, and designing and developing instructional projects. On the other hand, this research has integrated hardware aspect of educational technology (i.e. web-based learning) with its software aspect (i.e. instructional design) for designing and producing instructional

projects (i.e. instructional projects using adobe Photoshop and PowerPoint). Also, this research is different from past researches with regard to the time of intervention and also learning outcomes. Therefore, according to the research subject, the research question addressed here is:

Does web-based learning with peer and formative feedbacks have an effect on designing and producing instructional projects?

Methods

Methodology of this research was quantitative and its research method was quasi–experimental with pre-test and post-test design with control group. The population of this research included all students of Farhangian University of Ardebil in the course of ICT for instruction and learning, who entered university in 2018. Of this population, 40 people were selected by cluster random sampling method. It means that 2 colleges were first selected and of each college, two classrooms were selected by random sampling method. Then, they were divided into 20 people and embedded in experimental and control groups. These students age were in range of 19-21. All of them were in the second year of the university and were elementary school teacher student. All of students that participated in this study were man. The data collection tool was an 8-item researcher-made checklist for evaluating instructional infographics.

Students were informed that their class would be in the research design and all of them agreed to join the experiment. Also, there was no conflict or dissatisfaction among them for joining and inclusion in the research. If each of students had learning problems or had not interested in learning and joining to the research, we excluded them. All students were informed about the goals of the research after the course was completed. Students also were given this information that in the process of course and instruction, they are free to exit from research and they can leave the class. After research and class, students

were given a short lecture on the end of the class and research.

Pretest was given to students with regard to the content of the PowerPoint, Adobe Photoshop, and design principles in designing and producing instructional projects (i.e., instructional infographics). After pretest, the course started in both groups. Both experimental group and control group used the same website and Instagram page for learning PowerPoint and Adobe Photoshop (i.e., www.tarhan.com, www.faradars.com, www.sariasan.com, and Photoshop page on Instagram). Their teacher also guided them with regard to the designing principles. During the course, experimental group completed transformative evaluation and received informative feedback.

In this research, formative feedback is derived from transformative evaluation. Instructor gave information about weak point and strong point of infographic project. In other words, after individual learning, students have been evaluated and received formative feedback from their teachers on the infographic and instructional principles of designing infographic. students were able to see their scores on the five principles of designing principles such as: emphasize principle, harmony principle, simplicity principle, multimedia principle, and appropriate using of color. In the formative feedback, teachers gave students a sheet and it shows their scores on the principles learning and utilization and that sheet had recommendation, guidance, and worked examples for further study and practice in regard to the designing principles, how to work with Adobe Photoshop, and acceptable example of the infographics. In fact, worked example had the good features of using designing principles and Adobe Photoshop. In other words, students were also given formative feedback in regard to the designing principles, subtasks such as appropriate use of the toolbox, menu, adjustment colors, and filters in the Adobe Photoshop as well as worked example (i.e., Infographic). These recommendations, guidance, and worked examples were based on the recommendation of Shute in regard to the formative feedback.

The experimental group also received peer feedback from their classmates during learning, but the control group did not receive any formative feedback and peer feedback. They also did not complete any transformative evaluation. The procedures of giving and receiving of peer feedback was in regard to the five principles of designing principles and how to use from Adobe Photoshop tools. Students were given a checklist by their teachers in regard to the how to give feedback to each other. instructor was responsible to observe the process of giving feedback by the classmate in the experimental group.

After completing the course, posttest was given to them in the form of a project. This project was about instructional infographic. This infographic illustrates a content that was designed in the form of an infographic. Students were given information the process of course and the end of course were declared by instructor. There is no conflict or dissatisfaction among the students and instructor after the end of the course.

In this research, analysis of covariance (ANCOVA) was used for analyzing the effect of web-based learning with peer feedback and formative feedback on designing and producing instructional projects. In the ANCOVA, the scores of the post-test (evaluating instructional infographics) were entered into the equation as the dependent variable, group as an independent variable, and scores of the pre-test were entered as a covariate variable.

The validity of the 8-item test of instructional project was tested by experts. Content validities of test were confirmed by 7 lecturers of educational technology and ICT. The reliability was calculated as .89 by Cronbach's alpha, indicating a significant reliability. The procedure of this research is shown in Table 1.

Results

The results of Table 2 show that mean scores in the pre-test of two groups are

Table 1: Overview of the procedure of the study for experimental group

Months	Phases	Activities	Time
Month 1	Introduction, pre-test, and start of instruction	Introductory explanations on the aims and nature of the study	9 hours
Month 2	Individual learning	Students engaged in web-based learning and presentation of teacher about adobe Photoshop and PowerPoint	12 hours
Month 3	Peer feedback and formative feedback	Learners gave their feedbacks to each other based on the guidelines and teacher gave formative feedback to the student of experimental group	8 hours
Month 4	Receiving projects	Projects received via e-mail	6 hours

Table 2: Mean and standard deviation of experimental and control groups in the pre-test and post-test in designing and producing instructional project (i.e., instructional infographic)

Factor	Groups	Test	F	Mean±SD
Design of instructional projects (i.e., instructional infographic)	Control	Pre-test	20	2.30±1.68
		Post-test	20	13.15±3.03
	Experimental	Pre-test	20	3.15±2.32
		Post-test	20	18.15±1.22

Table 3: The results of the analysis of covariance (ANCOVA) for the effect of web-based learning with peer feedback and formative feedback on designing educational projects

Factor	Degree of freedom	Mean Square	F	P
Pre-test scores	1	9.35	1.82	0.135
Group	1	219.36	41.93	0.0001
Error	37	5.23	-	-

not highly meaningful (2.30 and 3.15), but the mean scores of the post-test in control group and experimental group are highly meaningful (13.15 and 18.15, P=0.001).

The results of the analysis of covariance are shown in Table 3.

The results of Table 3 show that the scores of pre-test in the both groups (i.e., experimental group and control group) are not meaningful. In fact, the scores of pre-test of the group that had been in the web-based learning with peer feedback and formative feedback and the group that had not been in this situation (i.e., web-based learning without peer feedback and formative feedback) are not meaningful. Although the pre-test scores were not meaningful, the post-test scores after intervention were significantly meaningful between two groups (i.e., the post-test for control group was 13.15 and the post-test for experimental group was 18.15, P=0.001). It

is shown that membership in different groups (i.e. experimental group and control group) has had different effects on the scores of designing and producing of instructional projects in two groups.

Discussion and Conclusion

Although E-learning is a new tool and advancement in regard to the instruction and learning, it is not the game changer in the learning and instruction. It needs the design science of instruction and learning and this research is along with that idea. Theses research findings has shown the synergy of E-learning and instructional design. The result has shown the positive and meaningful impact of the peer feedback and formative feedback on the learning in the web-based learning environment. In fact, effectiveness of instruction and learning (i.e., attaining to the goal of instruction) were high in the

experimental group and this result and consequence is because of the synergy of web technologies and instructional design principles.

"I have fleshed out the instructional design scheme in the first chapter. I was glad to do so because my experience as a consultant, since the first edition, has taught me that most failures of e-learning projects can be traced back to flawed instructional design"(20)."media will never influence learning" (21). These statements focus on the good instructional design and using good and appropriate instructional strategies. In fact, those researchers have focused on the design and on the strategies of instruction, not technologies and media. However, there is great body of knowledge with regard to the role of instruction and instructional design in the e-learning environment and all of them have one common point that the effectiveness of e-learning environments is extremely dependent on the good instructional design. In other words, instructional strategies and instructional design have great effects on the e-learning and web-based learning (22, 23). This research has covered some of those good instructional strategies. As the results showed there are differences between two groups in the design and production of instructional projects. The group that received web-based learning with peer feedback and formative feedback achieved higher scores in the design and production of instructional projects.

The results of this research are similar to the majority of body of knowledge in relation to the peer feedback and formative feedback. This research has used capabilities of technologies and instructional design. Results of this research are similar to the research which has investigated the effect of student's online peer feedback (13). These research findings also are similar to the research which has investigated the effect of peer feedback on the quality of online posting (15). The results of this study showed that peer feedback affects learning and quality of online posting. These research findings are also similar to the other researches that investigated the effects

of web-based learning, peer feedback or formative feedback (14, 16-19).

As mentioned above, these research findings are similar to numerous studies in this area. However, the contribution of this research is that this study integrated all of them in the instructional design program for designing and creating good instructional projects and the results were meaningful and valuable.

In the end, these research findings strongly suggest that teachers and professors in face-to-face and e-learning courses should use web-based technologies with evidence-based instructional strategies, such as peer feedback and formative feedback.

Conflict of Interests: Authors have not encountered any conflict of interests in this research. There is no conflict of interests in his study.

Ethical Considerations: All participants were fully aware of the nature and confidentiality of the study and were told in advance that the information provided by them would be kept confidential.

Conflict of Interest
None declared.

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