Full length article

Exploring the role of e-learning readiness on student satisfaction and motivation in flipped classroom

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A B S T R A C T

Decrease in student satisfaction and motivation in flipped classroom (FC) model of instruction is among frequently observed problems. And these problems could reduce the efficiency of FC model. It is believed that the problems related to student satisfaction and motivation in FC model of instruction are related to the e-learning readiness of the students. The purpose of the current study was to explore the impact of the e-learning readiness of the students on student satisfaction and motivation in FC model of instruction. The study was carried out with 236 undergraduate students taking Computing I class taught using FC model of instruction. Data were collected from three self-report instruments: E-learning Readiness Scale (subscales: 'computer self-efficacy', 'internet self-efficacy', 'online communication self-efficacy', 'self-directed learning', 'learner control' and 'motivation towards e-learning'), Satisfaction Scale and Motivated Strategies for Learning Questionnaire. The path analyses with structural equation modelling (SEM) further verified that students' e-learning readiness were related to their satisfaction and motivation while undertaking academic tasks in FC model of instruction. The results of the study indicated that students' e-learning readiness was a significant predictor of their satisfaction and motivation in FC model of instruction. Findings were presented and discussed for future studies and applications.

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1. Introduction

The flipped classroom (FC) model of instruction has become popular in recent years. In an FC environment, students can access to learning contents related to the new topics that they will learn through such materials as lecture videos outside the classroom where they have face-to-face classes. Later, students work on assimilating the new material they learned through such methods as cooperative learning activities in the classroom, project work and group discussions and through videos (Smith, 2015). The objective in this model is to provide online access to learning contents and materials and to help students' in-depth and active learning in the classroom. Studies revealed that active learning strategies increase students' participation in the learning environment and improved learning process and results (Freeman et al., 2014; Yılmaz, 2016). However, the strategies, methods and techniques used within the scope of active learning could consume the time that should be saved for the student in the classroom. In addition to many other benefits, FC model of instruction offers a

solution to this problem as well. Thus, the concept of FC becomes a new fad with the need to reconstruct the learning environments in the light of the technologies advances and around student-centred instructional approached (Yemma, 2015).

However, to get the expected performance from the active learning activities to be carried out in the classroom and to enable student satisfaction and motivation towards these activities, students should attend face-to-face classes at a certain prior knowledge and readiness level and this is one of the hypothesis in ensuring the efficiency of FC model (Hao, 2016a; Wilson, 2013). In addition, students are expected to show a similar motivation and satisfaction in online and in-class activities of the course to ensure the efficiency of the FC model of instruction. Otherwise, this could reduce the efficiency of FC model. Although the results of the research on FC model of instruction indicate that it has certain advantages on learning outcomes, the results also show that it could lead to differentiations in students' learning satisfaction and motivation, it could result in decreases in the satisfaction and motivation of the students contrary to what is expected, that the frequency and their willingness to participate in the activities could decrease in time, that they had concerns about/showed resistance to participating in the activities and this, in turn, could reduce the

efficiency of FC model of instruction (Gençer, 2015; Grabau, 2015; Hao & Lee, 2016; Herreid & Schiller, 2013; Missildine, Fountain, Summers, & Gosselin, 2013; Öztürk, Karademir, Karaoğlan Yılmaz, & Yılmaz, 2015; Smith, 2015; Strayer, 2007; Wilson, 2013; Yemma, 2015). Researchers state that it is necessary to determine the factors causing to the aforementioned problems in the application of FC model of instruction and take the necessary measures during the design, implementation and evaluation processes of FC model (Chen, Wang, Kinshuk, & Chen, 2014; Chen, Yang, & Hsiao, 2015; Hao, 2016a, Hao, 2016b; Hao & Lee, 2016; Yemma, 2015).

It is believed that one of the factors effecting student motivation and satisfaction in FC model of instruction is the e-learning readiness of the students. Because, successful completion of the online requirements of the course, which is considered as the first step of FC courses, is paramount in ensuring the student satisfaction and motivation in FC model of instruction (Alsancak Sırakaya, 2015; Gençer, 2015; Grabau, 2015; Öztürk et al., 2015; Turan, 2015). For instance, Grabau (2015) states that learners need to have intrapersonal skills such as self-efficacy, self-regulation skills, good communication skills, time management skills, teamwork, and goal directed behaviors to some extent and FC courses' online requirements could be completed successfully. Hao (2016a) points that it is important for learners to reach and use online learning sources in order to ensure the effectiveness of FC model. For this, learners' technology self-efficacy, self-directed learning, communication skills need to be developed. Hao (2016b) expresses that the factors such as whether learners have used the online learning sources, the accessibility of off-campus support and learning sources and the reasons for the main goals of learners to use the internet could be decisive on the effectiveness of learners' FC courses. These results indicate that learners need to have some responsibilities, skills and opportunities about especially FC courses' online processes to provide the effectiveness of FC courses. Otherwise, without completing the prerequisites of the course, it will not be possible to significantly participate in active learning activities in the classroom; top utilize these activities effectively and to get the desired results from these activities. Therefore, in FC model of instruction, it is paramount that students fulfil the online prerequisites of the course before coming to the class. And in fulfilling the online prerequisites of the course, it is stated that such factors as computer self-efficacy, internet self-efficacy, online communication self-efficacy, self-directed learning, learner control and motivation towards e-learning could be efficient (Demir, 2015; Hao, 2016a; Hung, Chou, Chen, & Own, 2010; Moftakhari, 2013). Therefore, it is considered that e-learning readiness could also be an important factor in ensuring student satisfaction and motivation in FC model of instruction. The purpose of this study, accordingly, is to discover the impact of e-learning readiness on student satisfaction and motivation in FC model of instruction. When the literature is reviewed, it is seen that there is a need for studies towards identifying factors effecting student satisfaction and motivation in FC model of instruction. So, this study aims to discover the structural relationships between student satisfaction and motivation in FC model of instruction and e-learning readiness and thus, to expand the depth and flow of research on this topic.

2. Theoretical framework

2.1. Flipped learning instruction and E-learning readiness

One of the hypothesis to effectively apply FC model is that students should complete the online requirements of the course and they should come to the class prepared. And the main thing teachers do about the online phase of the class in FC model is to open the contents and materials of the class online for student access. However, this is not the indicator of the adequacy of the completion of online requirements of the class in FC model. Since students are required to preview materials before coming to a flipped learning class, the ability to regulate one's own learning is crucial for success (Hao, 2016a). In the literature, it is seen that students fail in e-learning because they do not complete e-learning classes and do not follow online classes due to such reasons as not being motivated for e-learning programs and not being able to manage one's own learning process (KaraoğlanYılmaz & Keser, 2016; Yılmaz & Keser, 2016; Yılmaz, 2014). This case which is true for e-learning environments is believed to be experienced in the online phase of the class in FC model and that, in turn, could negatively affect the face-to-face in-class activities of the course. Hence, researchers indicate that the factors related to e-learning readiness such as learner control and self-directed learning, technology self-efficacy, communication self-efficacy are significant for both online courses and FC courses (Hao, 2016a, 2016b). As for the researchers, students' e-learning readiness is an important indicator in carrying out and completing e-learning classes successfully (Demir, 2015).

According to Kaur and Abas (2004) e-learning readiness is the ability of individuals to utilize e-learning resources and multimedia technologies to improve the quality of learning. When the literature is reviewed, it is seen that the e-learning readiness comprises of computer such elements as self-efficacy, internet self-efficacy, online communication self-efficacy, self-directed learning, learner control and motivation towards e-learning (Demir, 2015; Hao, 2016a; Hung et al., 2010; Rovai, 2003; Yurdugül & Alsancak-Sırakaya, 2013). According to Demir (2015), computer self-efficacy as one of these components is defined as the beliefs of computer users about their skills to use basic computer programs. Another component is that internet self-efficacy is defined as the trust of the internet users for internet using skills (Hung et al., 2010). Online communication self-efficacy is defined as the perception towards how much an individual understands the communication language and culture peculiar to e-learning environments and how well an individual can express himself/herself in such environments (Demir, 2015; Yurdugül & Alsancak Sırakaya, 2013). Self-directed learning, another component of e-learning readiness, is defined as a process in which learners take initiative with or without any help from others in finding out learners' learning needs, determining learning objectives, choosing and applying appropriate learning strategies, evaluating learning results (Knowles, 1975). According to Demir (2015), self-directed learning is shortly defined as to see the learning responsibility in himself/herself instead of an external source such as teacher and to take his/her own learning responsibility acting upon that. Shyu and Brown (1992) defined learner control as individual's own learning experience and the level of directing this process in accordance with his/her desire. Motivation towards e-learning, another component of readiness for e-learning, is defined as the desire and refreshment state having physical, cognitive and affective components inside and prompting people to do things for e-learning (Demir, 2015). According to the researchers, these components reveal the readiness conditions of individuals for e-learning (Demir, 2015; Yurdugül & Alsancak Sırakaya, 2013). As for Moftakhari (2013) as long as the e-learning readiness levels of the students is insufficient, the chance to succeed in e-learning is low. Guglielmino and Guglielmino (2003) indicate that pushing individuals, who are not ready for e-learning, to learn online will not only make them experience a negative e-learning experience but also will lead them to have prejudices for e-learning activities in the future. Similarly, Piskurich (2003) states that there are various reasons behind individuals' failure in e-learning environments and often the reason of the failure is that the students are not ready for e-learning.

Today, it is believed that all students are digital natives and therefore, they use the technology well (Prensky, 2001). And this is sometimes interpreted as all students are ready for e-learning. However, this hypotheses is questioned, nowadays (Valtonen, Kukkonen, Dillon, & Vaisanen, 2009). In fact, it could be true that all students are digital natives and therefore, they tend to use technology more compared to the students in the past. For instance, almost everyone knows how to send e-mails, share stuff on social networks and how to use search engines, at a basic level. However, this knowledge is at a basic level and considering the fact that online environments could be complex, their knowledge could be insufficient. Besides, the self-efficacy in using technology is only one component of the e-learning readiness construct (Demir, 2015).

In the literature, it is seen that there are studies looking into the effect of e-learning readiness in both online learning and traditional learning. However, in FC model of instruction, it is only recently that there are studies carried out towards determining the readiness of the students. And it is seen that students' readiness levels is worked to be determined in the mentioned studies, as well as factors affecting their readiness and the relationship of these with personal characteristics and individual circumstances. In Hao's (2016a) study, it is found that readiness is a predictor of course grades, self-directed learning readiness, and group work preference. In another study by Hao (2016b) carried out with middle school students during English classes, it was seen that students readiness could differ depending on personal characteristics and individual circumstances. In addition, it was seen that students' readiness levels could cause differences in language beliefs, student perceptions of teacher characteristics, the availability of outside-school support and resources, learning performance, study time and net-surfing time. With these results at hand, researchers indicate that there is a need for new research to determine the impact of readiness in FC model of instruction on learning outcomes. Starting from this point of view, this study examines the relationship between e-learning readiness and motivation and satisfaction.

2.2. E-learning readiness and motivation

Motivation is defined as a concept which affect the direction and magnitude of a behavior and which affects the efforts occurring as a result of the behavior (Keller, 1983). Motivation has a significant impact on learner attitudes and learning behaviors in educational environments (Fairchild, Jeanne-Horst, Finney, & Barron, 2005). It is given that in case the learner motivation is low, learning cannot occur at the desired level (Dick, Carey, & Carey, 2005). Motivation could be the most important element of an instructional design (Keller, 1979). Because although an instructional environment is designed well, if you cannot motivate students, it will cause students to be unsuccessful. Researchers and teachers agree that the participation and efforts of those students with high levels of motivation to learning is higher compared to those with low motivation (Keller, 1979).

Because the structure of online curriculum is largely automatic, motivation, as in traditional education is an important part of the learning process in online learning (Khan, 2009) and it is a requirement for successful online learning (Lim, 2004). Because learning in online learning process is more individual and independent, motivation is a must for efficient learning (Kaya, 2002). In fact, studies about online learning environments reveals relationships between motivation and performance (Saadé, He, & Kira, 2007), success (Bilgiç, Doğan, & Seferoğlu, 2011), dropout rate (Vallerand & Bissonnette, 1992) and qualified learning (Grolnick & Ryan, 1987). These results emphasize the importance of motivation for online learning. On the other hand, Newby, Stepich, Lehman,

and Russell (2006) indicate that using technology in a learning environment have both advantages and disadvantages for motivation depending on the teaching method. Therefore, it is highly important to look into its effect on motivation in FC model of instruction. In FC model of instruction because students have their habits they had from the period when they were instructed with traditional teaching methods, it takes time for them to get used to FC model of instruction. In addition, in order to be successful in FC model of instruction, students are required to watch lecture videos before they come to the class. This is extra work for students (Chen et al., 2014). Students should have high levels of motivation in order to watch these videos. Therefore, motivation arises as an important factor in the completion of both online and face-to-face classes in FC model of instruction.

When studies on motivation in FC environments are examined, it is seen that FC model of instruction is more efficient in ensuring motivation compared to traditional methods of learning (Chao, Chen, & Chuang, 2015; Chen et al., 2014; Davies, Dean, & Ball, 2013; Strayer, 2012; Turan, 2015). However, when the literature is reviewed in terms of the factors effecting motivation in FC model of instruction, it is seen that this topic is one to be studied further and there is a need for research results on this topic. In the light of this, when motivation is examined in terms of the sub-factors of e-learning readiness (computer self-efficacy, internet self-efficacy, online communication self-efficacy, self-directed learning, learner control and motivation towards e-learning), it is believed that these sub-factors could affect motivation and determine the sustainability in the learning process. Because it is possible to say that these components could effect particularly the online processes of FC classes. Thus, Hao (2016b) found that there were significant relationships between secondary school students' motivation and expectations; learner control and self-directed learning, technology self-efficacy, communication self-efficacy in FC teaching for language classes supporting this idea. The characteristics of the learning environment and the duties and responsibilities of the individuals in such environments impact student motivation to learn (Ünsal, 2012). As a matter of fact, Ryan and Deci (2000) claim that students have the freedom to set their own learning ways in e-learning environments and these freedoms could increase their intrinsic motivation. This means learner control could effect motivation (Demir, 2015). It is believed that online communication self-efficacy is effective in participation to virtual learning communities used for knowledge sharing and discussions in FC classes and in realizing student-student, student-teacher interactions. According to Gülbahar (2009), the individuals communicating more efficiently and comfortably are able to be more successful in e-learning environments. Therefore, Hung et al. (2010) state that online communication self-efficacy is an important dimension for the effectiveness of online learning and the interactions to be established in this environment. On the other hand, Uysal and Kösemen (2013) state that individual motivation, feelings, ideas and behaviors are among the constructs that self-efficacy belief effects. As a result, it is believed that e-learning readiness of the learners is an important predictor of motivation in FC classes. In the light of this, the research hypothesis related to motivation are as given below.

H1. Students' e-learning readiness will positively affect their motivation.

H1a. Students' computer self-efficacy will positively affect their motivation.

H1b. Students' internet self-efficacy will positively affect their motivation.

H1c. Students' online communication self-efficacy will positively

affect their motivation.

H1d. Students' self-directed learning will positively affect their motivation.

H1e. Students' learner control will positively affect their motivation.

H1f. Students' motivation towards e-learning will positively affect their motivation.

2.3. E-learning readiness and satisfaction

Student satisfaction, in general, could be defined as the satisfaction and blessedness of the student related to the various aspects of the service s/he receives (Karataş, 2005). In this respect, satisfaction is a factor that is directly effected from the elements of the service. When the research are examined, it is seen that there are many factors effecting student satisfaction. Interaction in online and face-to-face classes, feedback, student and teacher behaviors, activities, materials, online discussions, instructional and technical support, technological features, students' learning styles, online discussions, self-efficacy, knowledge and skills, and demographic characteristics can be counted among some of these factors (Karataş, 2005). As for Hackman and Walker (1990) understanding the level of satisfaction of the students towards a course or a learning activity is paramount for efficient course design and for understanding its efficiency.

When student satisfaction in terms of FC environment is examined, it can be said that many factors during online and face-to-face classes will have a determining effect. It is possible to say that students' e-learning readiness is one of those factors. Hence, Kuo, Walker, Schroder, and Belland (2014) found in their online learning study that learners' internet self-efficacy, self-regulated learning, learner-learner interaction, learner-instructor interaction, and learner-content interaction were interrelated with their satisfaction. Liaw and Huang (2013) found that satisfaction was interrelated with self-efficacy, anxiety, and interactive learning environments. All in all, it can be said that these variables are interrelated with the variables about e-learning readiness. When the sub-factors of e-learning readiness are examined, it is believed that student with high e-learning readiness can, first of all, complete the online requirements of FC classes successfully, and thus, they will come prepared for the activities in face-to-face classes and complete the activities in this class successfully, as well. So, it is believed that if students' have high e-learning readiness, they will be more satisfied with the FC classes. For instance, Lim (2001) found that students' computer self-efficacy, which is one of the sub-factors of e-learning readiness, is a predictor of their satisfaction in web-based distant learning classes. And similarly, Talbert (2012) indicates that the communication between the teacher and the student, asking questions and giving feedback affect student satisfaction in FC model. It is interesting that these are factors related to the online communication self-efficacy, one of the sub-factors of e-learning readiness. In the light of these, the research hypothesis related to satisfaction are given as below.

H2. Students' e-learning readiness will positively affect their satisfaction.

H2a. Students' computer self-efficacy will positively affect their satisfaction.

H2b. Students' internet self-efficacy will positively affect their satisfaction.

H2c. Students' online communication self-efficacy will positively

affect their satisfaction.

H2d. Students' self-directed learning will positively affect their satisfaction.

H2e. Students' learner control will positively affect their satisfaction.

H2f. Students' motivation towards e-learning will positively affect their satisfaction.

3. Method

This study was designed as a correlational research to enable the researchers to evaluate the relationships and effects between dependent and independent variables.

3.1. Participants

The participants of the study were 236 undergraduate students at a state university taking Computing I class taught using FC model of instruction during fall semester in 2015–2016 academic year. Of the participating students, 38% (n = 89) were male; and 62% (n = 147) were female. These students as participants of the study are studying in the departments of science teaching, social sciences teaching and islamic sciences.

3.2. Instruments

Data in the study were collected using personal information form, E-learning Readiness Scale (ELRS), Satisfaction Scale (SS) and Motivated Strategies for Learning Questionnaire (MSLQ).

3.2.1. Personal information form
In this form, which was developed by the researcher, students were asked such demographic information as their gender, the department they study, and age.

3.2.2. E-learning readiness scale
To find out the e-learning readiness of the students, the E-learning Readiness Scale developed by Yurdugül and Demir (in press) was used. The scale has 6 sub-scales and 33 items in total. The sub-scales are taking Computing I class taught using FC model of instruction computer self-efficacy (5 items), internet self-efficacy (4 items), online communication self-efficacy (5 items), self-directed learning (8 items), learner control (4 items) and motivation towards e-learning (7 items). It is a 7-point likert scale in which (1) indicates "It is completely not true for me" and (7) indicates "It is completely true for me". The Cronbach alpha reliability coefficients calculated for this study are calculated as 0.85 for the computer self-efficacy sub-dimension, 0.82 for the internet self-efficacy sub-dimension, 0.80 for the online communication self-efficacy sub-dimension, 0.89 for the self-directed learning sub-dimension, 0.88 for the learner control sub-dimension, 0.92 for the motivation towards e-learning sub-dimension. The Cronbach alpha reliability coefficient calculated for the whole scale was 0.94. High scores from the scale indicates a high e-learning readiness.

3.2.3. Satisfaction scale
In order to determine student satisfaction from the course, the satisfaction scale developed by Eryılmaz (2012) was used. The scale includes 42 items in total and has only one factor. The Cronbach Alpha reliability coefficient which was calculated once again for this study was found as 0.94. The scale is a 5-point likert scale in which (1) indicates "I strongly disagree" and (5) indicates "I

strongly agree". High scores from the scale indicates high student satisfaction from the course.

3.2.4. Motivation questionnaire

To find out students motivation towards the course, Motivated Strategies for Learning Questionnaire (MSLQ), originally developed by Pintrich, Smith, Garcia and McKeachie (1991) and adapted into Turkish by Büyüköztürk, Akgün, Özkahveci, and Demirel (2004) was used. It is a 7-point likert scale in which (1) indicates "It is completely not true for me" and (7) indicates "It is completely true for me". The questionnaire includes 6 factors which are intrinsic goal orientation, extrinsic goal orientation, task value, control beliefs, self-efficacy for learning and performance, and test anxiety. The Cronbach alpha reliability coefficients calculated for this study are calculated as 0.70 for the intrinsic goal orientation sub-dimension, 0.72 for the extrinsic goal orientation sub-dimension, 0.82 for the task value sub-dimension, 0.78 for the control beliefs sub-dimension, 0.88 for the self-efficacy sub-dimension, 0.81 for the test anxiety sub-dimension. The Cronbach alpha reliability coefficient calculated for the whole scale was 0.86. High scores from the scale indicates high motivation towards the course. While motivation towards e-learning as one of the sub-dimensions of e-learning readiness determines learners' motivation towards e-learning, in other words their motivation states about FC courses' online processes; MSLQ is used to determine learners' motivation states about FC courses' all dimensions (online and face to face).

3.3. Process and data collection

The study was carried out during the Computing I course conducted according to FC model of instruction. The research process lasted for 14 weeks in total and in the first week, the course and the FC model of instruction was introduced to the students. Accordingly, first of all, students were asked to register to the course through learning management system (LMS). Later, the lecture videos of the week prepared by the lecturer were opened for student access and they were asked to work on these videos before they come to the class. And in the face-to-face classes in the computer lab students were asked to do the relevant activities related to the topic of the week. The aim in doing so was to turn the subjects learned through the lecture videos into skills at the lab. In FC model of instruction, during the completion of the face-to-face activities in the class, students were made to work cooperatively while doing the activities in order to utilize active learning strategies. In this context, students completed the activities in groups of two. The reason for making groups of two was that the interaction and cooperation among group members as well as the transactive memory that occurs accordingly could be higher in dyads (Noroozi, Weinberger, Biemans, Mulder, & Chizari, 2012). In addition, in order to make students cooperate with other groups in the process of doing the activities, to engage in knowledge sharing and to create discussion environment, a virtual learning community was created over the forum integrated on LMS. Students, on this platform, shared knowledge on lecture videos and activities. In the process of completing the activities, the teacher followed the groups closely and provided guidance and counselling for them. In addition, through the forum, the teacher asked students questions that would necessitate the use of high-end thinking skills related to the lecture videos and activities and thus, started discussions. The 14-weeks course process was thus, completed and at the end of this period, the data collection instruments were administered to the students and the data were collected.

3.4. Data analysis

The data set of the study was examined in terms of sampling size, normality, linearity and multiple linearity, structural equation modelling (SEM) and its necessities, and it was seen that the data set was suitable for SEM. It was seen via Skewness and Kurtosis analysis that the scale data did not show normal distribution, and the values showed distribution between the range of +1-1. Therefore, it was seen that the data showed normal distribution. Whether the sampling and data were suitable for factor analysis was examined via KMO (Kaiser-Meyer-Olkin) coefficient and Barlett Sphericity test. According to Hair, Anderson, Tatham, and Black (1998), the fact that KMO was higher than 0.60 and Barlett test was found significant showed that the data were suitable for factor analysis. KMO coefficient values was found as 0.85 for ELRS, 0.92 for SS and 0.76 for MSLQ. It was determined that these values were suitable for factor analysis as they were higher than 0.60. Bartlett test was found significant (p < 0.05). Based upon these results, questionnaire factor analysis was seen appropriate.

Multiple correlation analysis was done to find out the relationships between the structures presented the study's hypotheses. Then, principal component analysis was utilized to find out the structural relationships between the scales. Descriptive statistics (e.g., frequency, percentage, correlation) and SEM were conducted for the data analysis. Chi-square ($x2$) goodness of fit test, RMSEA, GFI, AGFI, NFI, NNFI and CFI values were calculated for conformity assessment of the model to the data.

4. Findings

4.1. Students' responses to ELRS, SS and MSLQ

Descriptive statistics are presented in Table 1.

When Table 1 is examined, it is seen that the average of the total scores of the students from the ELRS scale is 178.52 (5.40 over 7), whilst their average from the SS scale is 162.66 (3.87 over 5) and their average from the MSLQ is 149.60 (4.82 over 7). Looking at this information, it is possible to say that students' scores from ELRS and SS scales is high; whilst their score from MSLQ scale is moderate.

4.2. Relations between students' ELRS, SS and MSLQ

Pearson correlation coefficients were calculated to investigate the relationships between ELRS, SS and MSLQ. The results were shown in Table 2.

When Table is 2 examined, it is seen that the correlation values between ELRS scale scores and other scales is ELRS - SS (r = 0.607, p < 0.01), and ELRS - MSLQ (r = 0.501, p < 0.01). As for Pallant (2001) r = 0.10 to 0.29 indicates a small; r = 0.30 to 0.49 indicates a moderate; r = 0.50 to 1.0 indicates a strong correlation. Based on these findings, it is possible to say that there is a strong correlation between ELRS and SS; ELRS and MSLQ.

4.3. Path analyses

In this stage of SEM analysis, path analysis was done in order to identify the relationships between latent structures. Path analysis results were given in Fig. 1. According to the analysis results, it was seen that X^2/df was 2.06; GFI was 0.98; AGFI was 0.91; RMSEA was 0.06; NFI was 0.99; NNFI was 0.98 and CFI was 0.99 (see Table 3). Indexes indicate an appropriateness that is acceptable in terms of structural model suggested in this study.

When the structural model in Fig. 1 is examined, it is seen that e-learning readiness is related to student satisfaction most. The regression coefficient is $\beta = 0.61$ ($R^2 = 0.43$). And secondly, it is
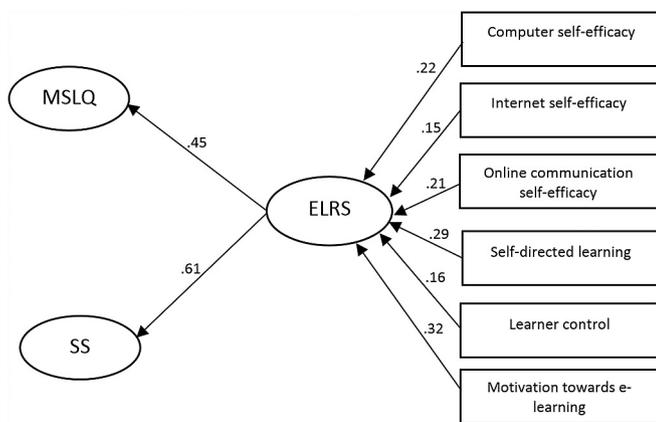
Table 1
Descriptive statistics.

Scale	Number of items	Minimum score	Maximum score	$\overline{X}$	sd	$\overline{X}/k$
ELRS	33	33	231	178.52	21.85	5.40
Computer self-efficacy	5	5	35	25.07	4.77	5.01
Internet self-efficacy	4	4	28	24.19	3.27	6.04
Online communication self-efficacy	5	5	35	27.60	4.57	5.52
Self-directed learning	8	8	56	43.52	6.33	5.44
Learner control	4	4	28	22.38	3.55	5.59
Motivation towards e-learning	7	7	49	35.73	7.07	5.10
MSLQ	31	31	217	149.60	12.50	4.82
Intrinsic goal orientation	4	4	28	20.40	3.09	5.1
Extrinsic goal orientation	4	4	28	19.16	3.60	4.79
Task value	6	6	42	31.39	4.40	5.23
Control beliefs	4	4	28	20.69	3.02	5.17
Self-efficacy for learning and performance	8	8	56	40.89	6.06	5.11
Test anxiety	5	5	35	17.05	5.98	3.41
SS	42	42	210	162.66	16.73	3.87

Table 2
Correlations between ELRS, SS and MSLQ.

		ELRS_1	ELRS_2	ELRS_3	ELRS_4	ELRS_5	ELRS_6	ELRS	SS	MSLQ
ELRS_1	r	1								
ELRS_2	r	0.535**	1							
ELRS_3	r	0.435**	0.537**	1						
ELRS_4	r	0.479**	0.532**	0.510**	1					
ELRS_5	r	0.437**	0.504**	0.475**	0.718**	1				
ELRS_6	r	0.334**	0.201**	0.351**	0.435**	0.401**	1			
ELRS	r	0.708**	0.680**	0.723**	0.838**	0.771**	0.691**	1		
SS	r	0.386**	0.456**	0.413**	0.592**	0.547**	0.333**	0.607**	1	
MSLQ	r	0.326**	0.269**	0.241**	0.426**	0.376**	0.315**	0.501**	0.393**	1

**Correlation is significant at the 0.01 level (2-tailed).
ELRS_1: Computer self-efficacy, ELRS_2: Internet self-efficacy, ELRS_3: Online communication self-efficacy, ELRS_4: Self-directed learning, ELRS_5: Learner control, ELRS_6: *Motivation towards e-learning.*

Fig. 1. The hypothetical model of structural relations between ELRS, MSLQ and SS.

related to motivation towards learning. Regression coefficient is $\beta = 0.45$ ($R^2 = 0.34$).

Acceptance/rejection of the hypothesis are shown in Table 4.

Acceptance and rejection of the research hypothesis are shown in Table 5.

When Table 5 is examined, it is seen that all hypothesis are accepted. Accordingly, it is possible to say that e-learning readiness and its sub-factors which are computer self-efficacy, internet self-efficacy, online communication self-efficacy, self-directed learning, learner control and motivation towards e-learning are important predictors of student satisfaction and motivation in FC model of instruction.

5. Discussion

5.1. The structural relationships between ELRS, SS and MSLQ

The findings of the current study, which was carried out to identify the impact of students' e-learning readiness on their satisfaction and motivation in FC model of instruction, indicate that e-learning readiness is an important predictor of satisfaction and motivation. The research model shows that increase in students' e-

Table 3
Evaluation of model fit indices.

Fit Index	Criteria for acceptable fit	Model Value (standard)	Resource
x^2/df	$0 \leq x^2/df \leq 3$	2.06	Kline (2005); Sumer (2000)
RMSEA	$0 \leq RMSEA \leq 0.08$	0.06	Hooper, Coughlan and Mullen (2008)
NFI	$0.90 \leq NFI \leq 1.00$	0.99	Thompson (2004)
NNFI	$0.90 \leq NNFI \leq 1.00$	0.98	Tabachnick and Fidell (2007)
CFI	$0.90 \leq CFI \leq 1.00$	0.99	Tabachnick and Fidell (2007)
GFI	$0.90 \leq GFI \leq 1.00$	0.98	Tabachnick and Fidell (2007); Miles and Shevlin (2007)
AGFI	$0.90 \leq AGFI \leq 1.00$	0.91	Tabachnick and Fidell (2007)

Table 4
Standardized direct and indirect effects.

Antecedents	Direct	Indirect	Total
ELRS → MSLQ	0.45	–	0.45
Computer self-efficacy → MSLQ	–	0.10	0.10
Internet self-efficacy → MSLQ	–	0.07	0.07
Online communication self-efficacy → MSLQ	–	0.09	0.09
Self-directed learning → MSLQ	–	0.13	0.13
Learner control → MSLQ	–	0.07	0.07
Motivation towards e-learning → MSLQ	–	0.15	0.15
ELRS → SS	0.61	–	0.61
Computer self-efficacy → SS	–	0.13	0.13
Internet self-efficacy → SS	–	0.09	0.09
Online communication self-efficacy → SS	–	0.13	0.13
Self-directed learning → SS	–	0.18	0.18
Learner control → SS	–	0.10	0.10
Motivation towards e-learning → SS	–	0.20	0.20

Table 5
Results of hypotheses tests.

Hypothesis	Antecedents	Supported?
H1	ELRS → MSLQ	Yes
H1a	Computer self-efficacy → MSLQ	Yes
H1b	Internet self-efficacy → MSLQ	Yes
H1c	Online communication self-efficacy → MSLQ	Yes
H1d	Self-directed learning → MSLQ	Yes
H1e	Learner control → MSLQ	Yes
H1f	Motivation towards e-learning → MSLQ	Yes
H2	ELRS → SS	Yes
H2a	Computer self-efficacy → SS	Yes
H2b	Internet self-efficacy → SS	Yes
H2c	Online communication self-efficacy → SS	Yes
H2d	Self-directed learning → SS	Yes
H2e	Learner control → SS	Yes
H2f	Motivation towards e-learning → SS	Yes

learning readiness levels will increase student satisfaction and motivation in FC model of instruction.

When the results are examined in terms of the sub-factors of e-learning readiness, it is seen that student satisfaction and motivation effect motivation towards e-learning and self-directed learning sub-factors. This indicates that as the motivation of the students towards e-learning increases and as students have more self-directed learning skills, they will be more satisfied with the classes designed according to FC model of instruction and their motivation will increase. When the literature is reviewed, although there are no research findings on FC model of instruction, the findings of online learning studies support these results. The research indicate that as the motivation of the students towards e-learning increases and as students' self-directed learning skills improve, they will have more meaningful results from technology-supported learning environments. Otherwise, students might stop e-learning and get unsuccessful results (Demir, 2015; Gülbahar, 2009; Saadé et al., 2007; Teo, 2008; Teo et al., 2010). In the light of these findings, it will be useful to take measures towards increasing students' motivation towards e-learning and their self-directed learning skills in order to ensure satisfaction and motivation in FC model of instruction.

The results of the model indicate that the other readiness variables effecting satisfaction and motivation are computer self-efficacy and online communication self-efficacy. This finding could be an expected result for Computing class. Because, when the fact that the activities in face-to-face classes in FC model of instruction are towards developing basic computer skills is taken into consideration, it is possible to say that developed computer self-efficacy skills increases satisfaction and motivation towards Computing class in FC model of instruction. Similarly, Lim (2001)

found that students' computer self-efficacy levels predicts their satisfaction in web-based distant education classes.

With regard to the model results, it is seen that another e-learning readiness variable, which has an impact on satisfaction and motivation, is online communication self-efficacy besides motivation for e-learning, self-learning and computer self-efficacy. According to Demir (2015), online communication self-efficacy is related to how much an individual understands the communicative language and culture exclusive to e-learning environments, and to how good he/she expresses himself/herself in these environments. When evaluated from this aspect, it is considered that online communication self-efficacy can be effective on student-student, student-teacher interactions in virtual learning community created within the scope of FC course in particular. Thus, in their study, Demir Kaymak and Horzum (2013) concluded that there is a significant positive relationship between online communication self-efficacy, online learning readiness and interactions (teacher-student, student-student, student-content) perceived in online learning. . According to Yılmaz (2014) high-quality interactions in the community and finding answers to the learning needs will increase learning satisfaction and motivation. And to do that, developed online communication self-efficacy of the students could be an important factor. Because in order to establish efficient interactions with other participants in the virtual community, students are required to have developed online communication skills. As for Gülbahar (2009) students who can communicate more effectively and comfortably in online environments could be more successful in e-learning environments. Similarly, the results of this study indicate that online communication self-efficacy has positively affected satisfaction and motivation towards the course in FC model of instruction. The FC model research by Hao (2016b) on middle school students for English lessons also support these results. According Hao's (2016b) study, it was found that there was a positive relationship between technology self-efficacy and communication self-efficacy with motivation and expectations.

The results of the model show that the other factors which have an impact on satisfaction and motivation are self-directed learning skills and internet self-efficacy. The results of the research show that the better the student's self-directed learning skills are, the higher the satisfaction and motivation of him/her from the class conducted according to FC model of instruction is. This could be particularly important for the online phase of the classes in FC model when individual learning activities take place. Because students who do not have self-directed learning skills in the process of doing the online requirements of the course will not know what to do in this process, and will have a feeling of being lost and feel helpless (Yılmaz, 2014). And this could affect the process and results of learning such as the attitudes, motivation, success, perseverance and satisfaction (Huang, 2002; Moore & Kearsley, 2011; Offir, Lev, Lev, Barth, & Shteinbek, 2004). Hao's (2016b) study indicates a significant relationship between motivation and learner control & self-directed learning. The results of this study, similar to the results of the studies in the literature, indicate that the self-directed learning skills of the students is an important predictor of satisfaction and motivation in FC model of instruction.

In FC model, in order to effectively use virtual learning community used for completing the online requirements of the course and for face-to-face classes, having developed internet self-efficacy could be important. The research show that developed internet self-efficacy in e-learning could positively reflect on learning processes and results. For instance, in their study, Tsai and Tsai (2003) found that individuals with high internet self-efficacy in web-based learning environments learn more than those with low internet self-efficacy skills. Similar with the findings in the literature, it is seen in this study that developed internet self-efficacy skills

increases student satisfaction and motivation in FC model of instruction.

5.2. Implications for educational practice

The results of the study indicate that e-learning readiness is an important predictor of satisfaction and motivation in FC model of instruction. Therefore, in order to increase the efficiency of FC model and to increase student satisfaction and motivation in FC classes, first of all it is necessary to determine students' readiness to e-learning. And to increase the readiness levels of those having a low level of readiness, it is necessary to provide them with trainings that will help them improve their knowledge and skills relating to the sub-factors of e-learning readiness scale and to help them have experience on these topics. Otherwise, it might not be possible to get the expected benefits from FC model and forcing students who are not ready to get education using this model might cause them to have negative attitudes. In addition, in order to improve student competencies related to the sub-dimensions of e-learning readiness, it might be necessary to update the curriculum of such courses as Computing and technology integration according to the requirements of FC model. It is also necessary to train teachers who will be the implementers of the FC model of instruction in order to increase the efficiency of the model. In their study, Hao and Lee (2016) examined the concerns of the teacher candidates regarding the FC model of instruction. The results of the study showed that teacher candidates had concerns about their self-efficacy and technology use. It is believed that these concerns could be more explicit among students of young age. Hence, it was found that primary school students' self-efficacy beliefs and computer attitudes were lower than high school students' in the study by Güzeller (2011). Therefore, it is necessary to determine the readiness of those students at young age and to take necessary measures before implementing FC model of instruction.

In order to increase the efficiency of FC model, in addition to providing instructions to students to increase their readiness, technology acceptance model's hypothesis should be considered to increase student self-efficacy of the technologies to be used in the online phase of the model. According to this, it is important that the media and tools to be used for online classes should have simple and easy-to-use interface and features in order to increase student self-efficacy and to create acceptance of the technology used and to make them believe its usefulness. This could also work in terms of reducing the transactional distance perception (Yılmaz, 2014). Here, in the online phase of the FC classes, social networks or YouTube channels, frequently used by the students of today, could be utilized. In addition, designing the videos to be used for online classes interactively will contribute to both the development of the student-content interaction and to increase student self-efficacy on the sub-factors of readiness which are self-directed learning, learner control and motivation towards e-learning. For instance, in their study KaraoğlanYilmaz and Keser (2016) found that videos and podcasts supported with reflective thinking activities increased student success and motivation.

In the study, the readiness conditions of learners for e-learning, their levels of motivation and satisfaction may have been affected by the quality, usability of the learning sources utilized in FC lesson and the suitability of these sources to students. In this case, FC may have affected the student motivation and satisfaction during the lesson. Similarly, it has been concluded in the research conducted that the learning content and materials used in online learning as well as the learning environment; its interactivity, quality, usability and suitability to students have a direct effect on student motivation and satisfaction (González-Gómez, Guardiola, Rodríguez, & Alonso, 2012; Kauffman, 2004; Kuo et al., 2014). For instance, Kuo

et al. (2014) reached the conclusion in the research they conducted that learner-content interaction is more effective than learner-learner or learner-instructor interactions on satisfaction. Liaw and Huang (2013), on the other hand, found that interactive learning environments are an important predictor of student satisfaction. The videos in the LMS environment used in the online phase of FC lesson are utilized as the online learning source in the present study realized. It can be said that the interactivity aspect in the design of the videos is limited. In this regard, it will be useful to create designs, through which users can give answers actively and instant feedback can be provided according to the answers. Besides, pedagogical agents can be benefited in order to develop inter-activity in the design of the videos. The research shows that pedagogical agent use can be benefited to increase interactivity in the learning environment and improve the learning outcomes (Kim, Baylor, & PALS Group, 2006; Yılmaz & Kılıç-Çakmak, 2012). The opportunity for downloading podcasts by also utilizing the learning contents designed as podcasts instead of videos, and reaching learning content in desired place and time can be provided (Karaoğlan Yilmaz & Keser, 2016). The individual development of students with respect to learning contents can be ensured by providing the contents through an adaptive LMS in the online phases of FC lessons. It is believed that these features will positively increase student motivation and satisfaction in FC lesson. The effect of this situation should be examined in future studies. Moreover, the discussions realized in the forum environment on LMS have been utilized in order to enable learner-learner, learner-instructor and learner-content interactions and information sharing between the learners. It is observed, however, when studying literature, that social network environments are used for these aims nowadays (Deng & Tavares, 2013; Yılmaz, 2016). It can be argued that these environments are more developed in terms of interactivity feature considering the structure of the social networks. Therefore, it is regarded as a condition to affect student motivation and satisfaction in FC model. It is considered to be useful to conduct experimental research to test the effect of the social network usage in FC model on student motivation and satisfaction.

5.3. Limitations and future directions

It is acknowledged that there are various limitations in this study. First of all, the data in the study were collected through self-report instruments. In future studies, qualitative research methods could be used to make an in-depth examination of students' opinions. In this context, by examining students' LMS log datas with learning analytics techniques, when students use online process of FC class, which online factors they are interacting (such as student-teacher interaction, student-student interaction, student-content interaction), the conditions of these interactions can be determined. Also by doing semi-structured interviews with students, their opinions about the effect of e-learning readiness and sub-factors on their satisfaction and motivation during both online and face to face learning process in FC class can be analyzed. Besides in this study, forum was used as platform and in face to face classes students performed cooperative works in pairs. Related with this, by performing semi-structured interviews with students, their opinions about using forum platform and effects of pair group work can be determined. These datas will direct instructional designers and practitioners about determining which FC setting design is the most suitable. Secondly, the study was carried out with undergraduate students in their computing class. Thanks to taking education in computing lesson, especially for students, their computer self-efficacy, internet self-efficacy and online communication self-efficacy skills might improve. In this case, it might contribute to raise their e-learning readiness level. So it would be

useful to study by considering students' present e-learning readiness in different classes apart from computing class (such as mathematical classes or verbal classes as literature). Because there will not be any extra intervention to students' computer self-efficacy, internet self-efficacy and online communication self-efficacy skills in these classes. In the future studies, the study could be repeated during different classes and target groups in order to ensure the generalizability of the findings. Thirdly, the study looked into the impact of readiness of the students related to the online requirements of FC model on the learning outcomes. Future studies could examine students' readiness relating to the active learning approached implemented during the face-to-face classes as well as the factors affecting it. Within this context, experimental studies are planned to determine the effect of learning approaches utilized in face-to-face lesson processes of especially FC courses on satisfaction and motivation, and precautions can be taken to increase the quality of face-to-face lesson stages of FC courses. Here in, teachers' preferences, expectations and concerns about face-to-face lesson stages of FC courses could be revealed by planning studies about the teachers conducting FC courses. And fourthly, readiness of the teachers' who will be the implementers of the FC model is as important as the students. So, studies on teachers' readiness can be carried out. Finally, this study looked into the impact of e-learning readiness on satisfaction and motivation. Future studies could look into the effects of learning outcomes such as success and learning performance.

6. Conclusions

This study examined the impact of students' e-learning readiness on their satisfaction and motivation within the scope of computing class delivered according to FC model of instruction. The results of the study revealed that e-learning readiness and its subfactors which are computer self-efficacy, internet self-efficacy, online communication self-efficacy, self-directed learning, learner control and motivation towards e-learning are predictors of student satisfaction and motivation. The results are expected to contribute to the awareness of the implementers about flipped learning and individual differences and to the problems encountered in the implementation of FC model.

Conflict of interest

The author declare that they have no conflict of interest.

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