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Interaction between Group Work, Motivation and Instructional Feedback in Project-Based Courses

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Cover Page Footnote

We thank Engin Kursun for his contribution to the data collection process.

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Abstract

This study aimed to define the relationships between the factors affecting the learning processes of participants in project-based courses. The study sample consisted of 132 participants who had taken an instructional design course offered at the undergraduate level. The MSLQ, SAGE, and SPIF were used as data collection tools. The findings showed that the conflicts caused by the individuals with negative affect about instructional feedback diminished the quality of product and process during group work. Positive affect was found to be directly affected by "extrinsic goal orientation," which is one of the motivation variables.

Keywords: Project-based learning, collaboration, group environment, motivation, instructional feedback, structural equipment model

Introduction

There are various studies recommending the use of strategies such as case-based and project-based learning in providing effective learning environments (Jonassen & Rohrer-Murphy, 1999; Liu, Wang, Su, & Zhou, 2019). Due to its contributions to the learning processes, project-based learning is highly preferred in higher education, especially in courses involving design development (Alexander, Knezek, Christensen, Tyler-Wood & Bull, 2014; Gülbahar &Tinmaz, 2006; Mills & Treagust, 2003). A project is a group of tasks that incorporate various processes and activities (Hmelo-Silver, 2004). Project activities examine realistic problems (Peterson & Myer, 1995) and are usually carried out over a long term, individually or within a group (Petty, 1993). Throughout this process, students are expected to be equipped with practical skills such as coping with incomplete or imprecise information, self-regulation and commitment, cooperation and group work, and interdisciplinary issues as well as to achieve certain outcomes (Macías-Guarasa, Montero, San-Segundo, Araujo, & Nieto-

Taladriz, 2006). Teachers place students at the center during activities, thus playing a primary role in helping them define problems and guiding them towards achieving their goals (Howard, 2002). Project-based design courses focus on students' perception of the world around them (Marshall, Petrosino, & Martin, 2010). This process begins with a driving question, continues with research, problem-solving, and decision-making activities and ends with a design product (Prince & Felder, 2006; Thomas, 2000). During this period, in order for students to build their own knowledge, it is important to engage them in active learning and encourage them to interact with the environment, to be open to the suggestions of the teachers, and work independently or collaborate in teams (Frank & Barzilai, 2004; Thomas, 2000). In this sense, providing a suitable environment for performing project-based activities, design courses also increase the quality of education offered to students (Goldstein, 2016). The studies in the literature have shown that expectations and motivations concerning the course, team working skills, and the role of the project advisor are important for training qualified instructional designers (Karakus, 2011). Moreover, it has also been reported that academic success is affected by various factors such as the classroom environment, collaborative working, feedback, and motivation (Duncan & McKeachie, 2005). Some of these factors (e.g., motivation) are also known to be influenced by other factors (Beydoğan, 2016). This study examined the participants' expectations/motivations concerning project-based courses, attitudes towards group work, and perceptions of feedback received from the instructor in light of the factors reported in the literature on student training. In addition, all the sub-variables were analyzed to develop a theoretical framework. The hypotheses formulated within this framework are presented in the following section.

Group Environment

Group environment is a collaborative process in which individuals develop their own learning structures by means of interactions with other individuals (Dillenbourg, 1999). School is a social structure, in which activities may sometimes be carried out individually; however, at other times, establishing collaborative environments is necessary since these environments primarily define the quality of student learning by directly affecting their experiences and attitudes. Through collaborative environments, it is also possible to contribute to the cognitive and social development of students (Krol, Veenman, & Voeten, 2002). Such contribution may also positively affect other group members (Johnson & Johnson, 2000).

By the very nature of the field, it is a must especially for instructional design students to gain interdisciplinary working skills since it is impossible to develop projects individually. Therefore, group environments should be actively used. Indeed, our literature review shows that in environments where a student is not able to perform a task on his/her own, peer collaboration or adult guidance has a great role (Lin, Hong, & Chai, 2014; Stahl, Koschmann, & Suthers, 2006). However, carrying out certain tasks in groups does not guarantee the desired level of meaningful cooperation (Cooke, Gorman, Duran, & Taylor, 2007; Johnson & Johnson, 2002). Even if communication is established among group members, an interaction may still not be achieved throughout the cooperation process to the desired extent. Therefore, the collaboration process needs to be supported in order to yield performance and learning benefits (Diziol, Walker, Rummel, & Koedinger, 2010). At this point, task-specific feedback is recommended to encourage productive interactions among group members (Ge & Land, 2003; Zumbach, Reimann, & Koch, 2006). However, group work may cause some individuals with negative perceptions of feedback to feel uncomfortable, thus triggering in-group disturbance rather than contributing to interaction. In order to offer a deeper understanding of this issue, we developed Hypothesis 1.

Hypothesis 1: Students' "negative affect" about instructional feedback positively influences the factor of "frustrations with group members."

Group environments provide many benefits such as increased success in learning processes as well as the problem-solving skills, creative ideas, and development of higher-order thinking skills in various areas (Johnson & Johnson, 1999; Slavin, 1995). However, studies have also reported that when performing in groups compared to working alone, there are several disadvantages such as social loafing/exerting, less individual effort (Latane, Williams, & Harkins, 1979), restriction of independent working skills (Corliss, 2005; Panitz, 1997), or being dominated by dominant group members (Brown & Palincsar, 1989). Moreover, Richardson (2001) underlined the potential emergence of conflicts and disagreements during group working processes, which may result in reduced cooperation and support among peers. In order to examine this in more detail, we developed Hypothesis 2.

Hypothesis 2: The factor of "frustrations with group members" positively affects "peer support."

Individuals learning in group environments provide feedback to their partners and develop new ideas using brainstorming. At this point, group members must show respect to each other (Richardson, 2001). Such meaningful interactions among group members increase the prospect that learning will occur at the individual level (Nihalani, Mayrath, & Robinson, 2011). Increasing interaction and support among group members also help students achieve new outcomes at the individual level; however, conflicts among group members may diminish peer support. Therefore, we developed Hypothesis 3, considering that peer support might be adversely affected by intragroup conflicts.

Hypothesis 3: "Peer support" during group working positively affects the factor of "student interdependence,"

Increasing the performance of each group member makes the greatest contribution to group outcomes (Chidambaram & Tung, 2005). Here, the concept of student interdependence comes into play. Circulation of knowledge increases the accountability of each student and thus stimulates student detailing on the learning content and increases overall participation (Diziol et al., 2010). At this point, individually achieved outcomes also contribute to group outcomes and the process. To demonstrate the effect of intragroup collaboration on the quality of the learning process, we developed Hypothesis 4.

Hypothesis 4: The factor of "student interdependence" positively affects the "quality of product and process."

Studies on group learning usually report that interactions among students increase group performance. In the literature, creating an effective intragroup communication environment is considered an important factor in the development of quality material. The first step towards carrying out a successful project is to promote effective cooperation (Richey, Mathern, O'Shea, & Pierce, 1997) since weak intragroup support would not produce the expected interactions (Diziol et al., 2010) and would prevent the achievement of the desired outcomes concerning the content. We developed Hypothesis 5. The following hypothesis was constructed to show the dependence of the quality of the product and process on positive communication and support among group members:

Hypothesis 5: "Peer support" developed among students during group working positively affects the "quality of product and process."

Instructional Feedback

The quality of teaching is directly related to the achievement of the goals in the instruction programs. Such quality depends on the feedback or corrections provided by the teacher and other assisting staff to confirm whether learning has been achieved or to guide students to the right information, or to correct a mistake. Such feedback can be provided face-to-face, in the classroom and at the beginning, in the middle or at the end of a course as well as in an electronic environment outside the classroom (Hattie & Timperley, 2007; Parr & Timperley, 2010). Instructional feedback is an educational-instructional practice boosting students' skills motivation and skills motivation. Instructional feedback is an instructional practice enhancing students' skills and motivation (Kellogg & Whiteford, 2009). It also plays a prominent role in performing specific tasks assigned to students (Cleary & Zimmerman, 2004). The studies in the literature commonly report two types of feedback, i.e., direct and indirect (Cho, Schunn, & Charney, 2006; Shute, 2008). Direct feedback (e.g., directives) involves teachers making a correction or directly telling students what needs to be revised. In indirect feedback, teachers guide students to form their own concept. Examples of indirect feedback include queries and informatives (Shute, 2008). Although the two types of have their own advantages, direct feedback is considered to be more effective (Wilson & Czik, 2016). Therefore, in this study, we chose to focus on direct instructional feedback. In addition, we addressed the learners' "affective" responses to receiving feedback and "mastery" variables within the framework of feedback perception (Zumbrunn, Marrs, & Mewborn, 2016). In this sense, instructional feedback was examined in relation to negative affect, positive affect, and mastery factors.

The mastery category symbolised appreciation of students for instructional feedback as a way to advance themselves (Zumbrunn et al., 2016). Mastery and performance goals may be confused with each other. While a performance-approach objective centers on obtaining adequacy relative to others, a mastery aim is about the development of adequacy itself and of task mastery (Elliot & McGregor, 2001). Mastery experience is frequently related to academic outputs, success, and self-efficiency (Meece, Anderman, & Anderman, 2006). It has been reported that when students have strong mastery goals, they become more focused on developing their skills (Ames, 1992). Development of personal skills may be an indicator of positive affect about receiving instructional feedback. We developed Hypothesis 6.

Hypothesis 6: Students' "mastery" perception of instructional feedback received from the teacher positively influences their perception of "positive affect."

An interactive learning environment not only promotes in-depth learning but also increases students' motivation towards learning (Kester, Kirschner, & Corbalan, 2007). In addition, continuous instructional feedback affects students' motivation (Nicol & Macfarlane-Dick, 2006). Teacher feedback was found to promote students' motivation towards exerting more effort to achieve their learning goals (Harward et al., 2014). It also plays a crucial role in shaping the perceived self-efficacy beliefs of students (Pajares, 2003; Pilten, Pilten, & Sahinkaya, 2017). The studies on the effect of feedback on students' motivation have revealed that students' self-efficacy stances are prone to alter even after a single instance of feedback (Duijnhouwer, Prins, & Stokking, 2010). Even if a task is difficult, it can be accomplished. Therefore, we expected the mastery perception of instructional feedback to increase students' control of learning beliefs. We developed Hypothesis 7

Hypothesis 7: "Mastery" perception of instructional feedback provided by the teacher positively affects students' "control of learning beliefs" by increasing their motivation towards the course.

If the feedback is ambiguous, incorrect or misdirected, or processed ineffectively, students may sometimes be adversely influenced (Zumbrunn et al., 2016). Studies have reported that students generally fear critique, judgment, and getting a low grade. Thus, they may try to refrain from receiving instructional feedback since it makes them feel anxious (Zumbrunn et al., 2016). Individuals with negative affect about instructional feedback are likely to exhibit a negative approach towards mastery. In line with these findings, we developed Hypothesis 8.

Hypothesis 8: Students' "negative affect" about instructional feedback provided by the teacher negatively affects their "mastery" perception.

Instructional feedback given by an external agent provides a perspective intended to increase one's performance and modify his or her cognitive and motivational aspects (Shute, 2008). The success motivation of individuals with extrinsic goal orientation may lead them to have positive affect about instructional feedback. Individuals with positive affect feel good about receiving feedback (Zumbrunn et al., 2016). To provide a better understanding of this issue, we developed Hypothesis 9.

Hypothesis 9: Students' "extrinsic goal orientation" positively affects their "positive affect" about instructional feedback.

Motivation

Motivation is all behaviors and expectations of a human being. The situation of being motivated involves the behaviors that source from desires. A motivated person merges his/her knowledge and convictions with successful behaviors. Despite dependence on expectations, motivation also covers a person's perception of self-competencies and control over his or her efforts (Stipek, 1998). Motivation urges the organism to react in a particular way and to learn something (Selçuk, 1999). According to definition of Keller, motivation is the principal power and the direction of the goal that causes the student to be eager to learn (Keller, 2000). A motivated student is more likely to be more attentive in class, make increased efforts to learn, and be more resilient in the face of difficulties (Zimmerman & Schunk, 2008).

Extrinsic goal orientation is one of the elements of motivation. It is pertinent to the aspiration in learning tasks to obtain the consequences which are external to the task itself, such as receiving a reward or avoiding punishment (Ames, 1992). Test anxiety implies the anxiety experienced by students in an evaluation process such as an examination. Although there were broader conceptualizations, Meijer (2001) concentrated on fear-of-failure as the central characteristic. Several researchers have reported a positive relationship between extrinsic goal orientation and test anxiety (Osman & Lee, 2012; Shastri, Wang, & Gandhi, 2015; Wolters, Shirley, & Pintrich, 1996). Furthermore, Birenbaum (1997) found significant positive correlations between preference for oral exams and extrinsic goal orientation and test anxiety. Similarly, according to Wolters et al. (1996), extrinsic goal orientation is a significant predictor of test anxiety, and the positive relation between extrinsic goal orientation and test anxiety is stronger at high levels of learning goal orientation compared to when a learning goal is weakly supported. We developed Hypothesis 10.

Hypothesis 10: Students' "extrinsic goal orientation" positively affects "test anxiety."

Intrinsic goal orientation is related to the natural impulse in an activity itself, when a person is in an activity for its own sake, the enjoyment it provides, the learning it permits, or the feelings of accomplishment it evokes. Control of learning influences students' convictions that their endeavor to learn will result in positive outcomes. If students think that their efforts to study will make a difference in their learning, they will be more likely to study in a planned and effective way (Al Khatib, 2010). According to the reports on a positive relationship between intrinsic goal orientation and control of learning beliefs (Lawanto, Santoso & Liu, 2012; Shastri et al., 2015; Sungur, 2007), we developed Hypothesis 11.

Hypothesis 11: Students' "intrinsic goal orientation" positively affects their "control of learning beliefs."

Task value states the student's opinion of a task's attraction, emphasis, and usefulness. Therefore, it is expected that a high task value leads to students' greater involvement in their learning. Pintrich's research suggested that task value beliefs were positively correlated with self-efficacy (Pintrich, 1999). In line with the positive relationship reported in the literature between intrinsic goal orientation and task value (Lawanto et al., 2012; Sungur, 2007), we developed Hypothesis 12.

Hypothesis 12: Students' "intrinsic goal orientation" positively affects the "task value."

Self-efficacy refers to a self-appraisal of one's ability to complete a task and one's confidence in his or her skills to perform that task. There are studies that have examined the role of self-efficacy for learning and performance and task value in predicting motivation (Liem, Lau, & Nie, 2008; Yukselturk & Bulut, 2007). The researchers have reported a close relationship between self-efficacy and task value (Joo, Lim, & Kim, 2013) and suggested that these two also have a positive impact on motivation (Schunk, Meece, & Pintrich, 2012). We developed Hypothesis 13.

Hypothesis 13: "Task value" positively affects "self-efficacy for learning & performance."

Studies have reported a relationship between self-efficacy for learning and performance and learning beliefs (Appelbaum & Hare 1996) and their positive affect on both motivation (Freeman, Alston, & Winborne, 2008; Pintrich, 1999; Prat-Sala & Redford, 2010; Shim & Ryan, 2005; Yukselturk & Bulut, 2007) and positive learning outcomes (Araz & Sungur, 2007; García & de Caso, 2006). We developed Hypothesis 14.

Hypothesis 14: Within the scope of pre-service instructional design teachers' motivation towards the course, "control of learning beliefs" positively affects students' "self-efficacy for learning and performance."

The 14 hypotheses mentioned in the study are organized under three categories. The hypotheses H1, H7, and H9 contain variables which are out of their categories. This situation results from assuming hypotheses the role of transition hypothesis between categories. Accordingly, the visualization of 14 hypotheses formed among 13 variables examined under three categories are presented in Figure 1.

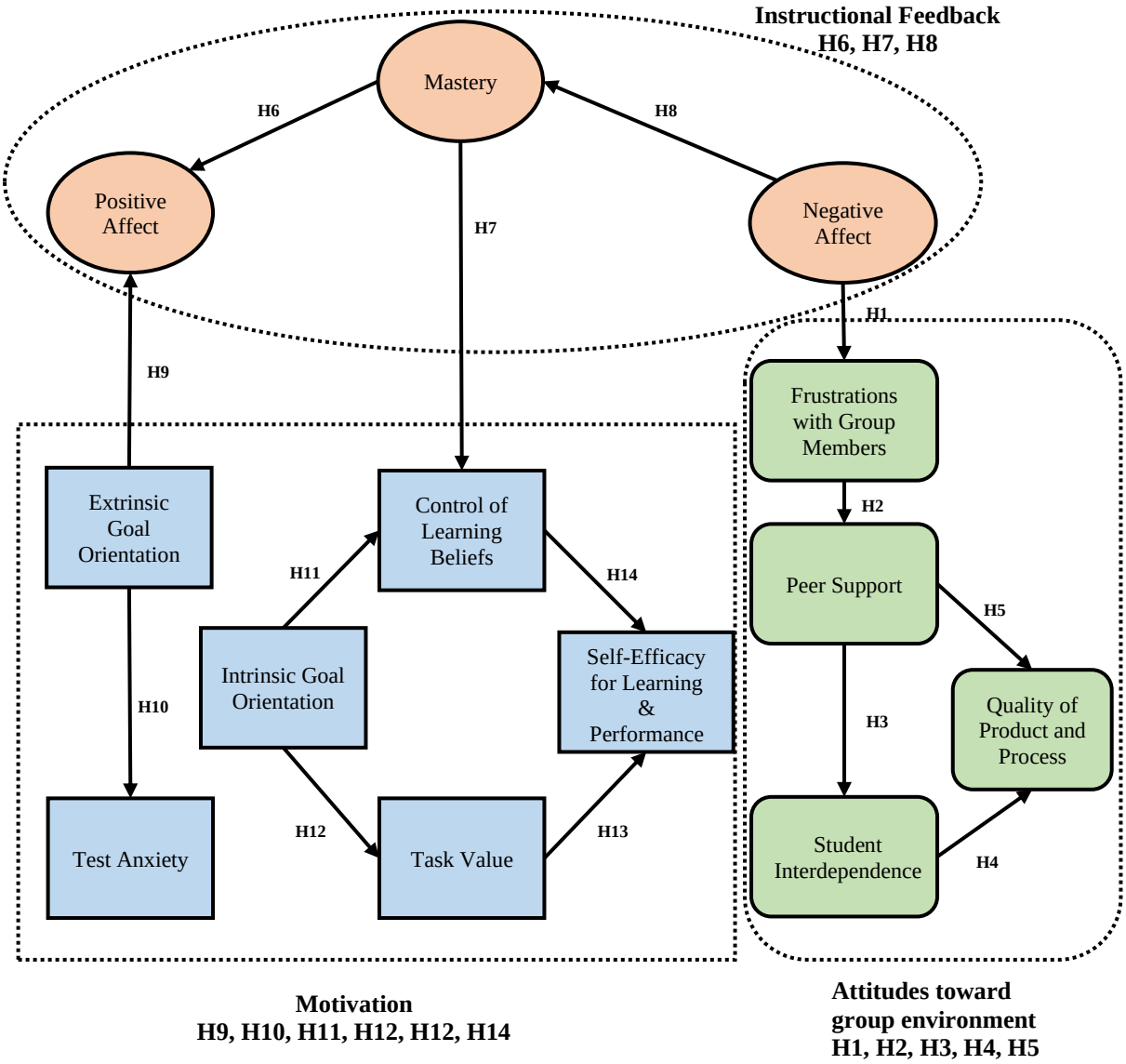

Figure 1. Visualization of variables, categories, and hypotheses

Expectations and motivations of individuals, their team working skills and the role of the project advisor are among the factors affecting the process of raising qualified instructional designers (Karakus, 2011). Studies have revealed different levels of association between these factors. Therefore, it is necessary to perform a deeper analysis of how these factors affect each other to make valid generalizations. Focusing on these relationships is also important since students' learning perceptions, methods, and outcomes are all interrelated (Dart et al., 2000). A deeper examination into these relationships within the practices undertaken in the instructional design course can also later be transferred to other project-based course content.

Method

Among the quantitative research methods, the correlational research design was used in this study to examine the effect of the variables on the process of training instructional designers.

The reason for employing this method was to determine and measure the relationships between the variables (McMillan & Schumacher, 2010).

Participants

The study was conducted with 132 sophomore participants from different two universities who had taken a course in instructional design offered at the Department of Computer Education and Instructional Technology during 2 years. Since the study was designed within the scope of courses delivered by the researchers, convenience sampling was employed. Of the 132 participants, 74 were male and 58 were female. A considerable number of participants had project design experience, and all were provided with feedback by their instructor. Table 1 shows detailed information about the study sample.

Table 1. Descriptive Data on the Participants

	f	%		*f*	%
Gender			**University**		
Male	74	56.1	University A (Teacher A)	94	71.2
Female	58	43.9	University B (Teacher B)	38	28.8
Project design experience			**Feedback Frequency**		
0–6 years	46	34.8	Twice a week	48	36.3
1 year	22	16.7	Once a week	52	39.2
1–2 years	30	22.7	Every two weeks	24	18.1
2–3 years	28	21.2	Every three weeks	8	6.0
Over 3 years	6	4.5			
Receiving instructional feedback from instructors			**Experience in collaborative working**		
Yes	116	87.9	0–6 years	45	34.1
Partially	16	12.1	1 year	26	19.7
No	-	-	1–2 years	33	25.0
			2–3 years	24	18.2
			Over 3 years	4	3.0

Data Collection Tools

The Motivated Strategies for Learning Questionnaire (MSLQ) and the Student Attitudes toward Group Environments (SAGE) questionnaire were used as data collection tools together with the Students' Perception of Instructional Feedback (SPIF) scale.

1. SPIF

In this study, the SPIF scale was used to determine the Students' Perception of Instructional Feedback developed by authors in the project-based course. This questionnaire consists of 19 items scored on a 5-point Likert scale under the following four factors; "mastery" (MA, 8 items, $\alpha = .96$), "positive affect" (PA, 6 items, $\alpha = .94$), and "negative affect" (NA, 5 items, $\alpha = .94$) as 5. The total variance explained by the factors was found to be 79.53% and the Cronbach's alpha was $\alpha = .92$.

2. SAGE questionnaire

In this study, the SAGE questionnaire developed by Kouros and Abrami (2006) was used to determine the participants' attitudes towards group working in the project-based course. This questionnaire consists of 43 items scored on a 5-point Likert scale under the following four factors; quality of product and process (QPP, 15 items), peer support (PS, 8 items), student

interdependence (SI, 12 items), and frustrations with group members (FGM, 8 items). Cronbach's alpha reliabilities for the factors ranged from .93 to .69. The questionnaire was adapted by Karakus Yilmaz, Baydas, and Kokoc (2017) to the participants' native language, and its validity (EFA and CFA) and reliability (Cronbach's alpha coefficients) were calculated. Since the results were not statistically significant for some of the items and there were problems in terms of cultural context (Hambleton, Merenda, & Spielberger, 2005), 22 items were excluded from the questionnaire. However, only the number of items was reduced and no change was made to the factors. As a result, the factor loadings for the accepted 21 items were 6 items under the quality of product and process, and 5 items under each of the remaining three factors. In our study, the reliability coefficient of SAGE was found to be .83, which was higher than that of the unmodified mother language version of the questionnaire (.73).

3. MSLQ

After long-term research on examining the factors that most affect college students' academic success, Pintrich, Smith, Garcia, and McKeachie (1993) developed MSLQ, which contains a total of 15 factors under two main sections, i.e., motivation and learning strategies. In the present study, only the motivation section of MSLQ was used, which consisted of 31 items under the following six factors; intrinsic goal orientation (IGO, 4 items), task value (TV, 6 items), control of learning beliefs (CLB, 4 items), extrinsic goal orientation (EGO, 4 items), self-efficacy for learning and performance (SLP, 8 items), and test anxiety (TA, 5 items). The items were scored on a 7-point Likert scale. The reliability coefficients of the factors ranged from .62 to .93. The questionnaire was adapted to the participants' mother language by Büyüköztürk, Akgün, Özkahveci, and Demirel (2004), and its validity (EFA and CFA) and Cronbach's alpha coefficients were calculated. The originality of the questionnaire was preserved with no changes being made. The Cronbach's alpha values for the mother language version of the questionnaire were reported to range from .52 to .86. In this study, it was found to be higher at .90.

The Process of Practice

The study was conducted by an assistant and a faculty member in the instructional design course (2-hour theory, 2-hour practice) offered to sophomore students in the Department of Computer Education and Instructional Technology at two different universities during two years. In the instructional design course, students are expected to identify an instructional problem primarily for projects carried out throughout the school term. The identified problem is analyzed and reported, the process and material for the solution of the problem are designed and developed, and applications and evaluations are conducted. Sample projects included such topics as the design of teaching processes appropriate to instructors or students who need detailed usage knowledge of software, as well as counting objects or rhythmic counting projects for special needs kids. Attention was paid to ensure that the one-term course was presented in similar steps at both universities. The steps followed in the course are given in Figure 2.

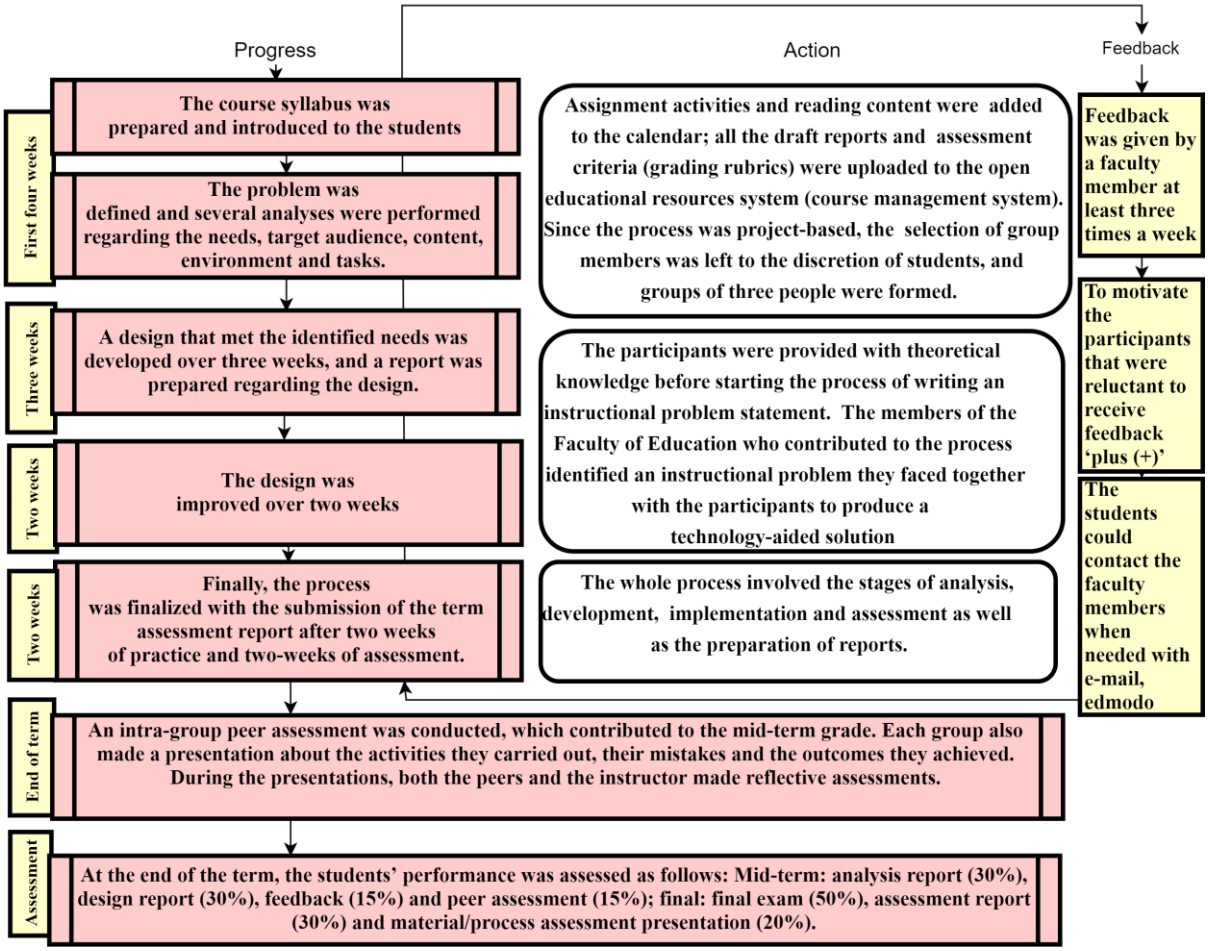

Figure 2. The weekly progression of the course

Data Analysis

First, descriptive statistics for the variables (e.g., arithmetic mean and standard deviation) were presented. Since the assumptions of normality and linearity were met for the relationships between these variables, Pearson's correlation coefficient was used for further analysis (Field, 2009).

Path analysis requires certain assumptions to be met regarding extreme scores, missing data, normality, multicollinearity, and the variances of variables. There was no missing data since it was collected through an online system. After we checked whether the variables were normally distributed, two extreme data points were excluded from the analysis. The coefficients of skewness and kurtosis estimated for 13 variables showed that the variables other than the "Student Interdependence," "Mastery," and "Negative Affect" variables had a normal distribution. In this sense, factors were found to be close to normal in the Q-Q and the Box-and-Whisker plots. The data that were not normally distributed were normalized in SPSS using square root transformation for positively skewed variables and applying a logarithmic transformation to variables with high positive skewness.

Following the normalization process, the variances were observed to be equal. The relationships between the variables were defined based on multicollinearity. No path was established between the variables that had a very high or very low correlation. All the paths in the model were based on the literature, correlations between the variables, and the

experience of the researchers (course observations). Bentler and Chou (1987) recommended sample size of five subjects per variable for a normally distributed dataset. From this, it can be deduced that data obtained from at least 65 participants is sufficient for a model with 13 variables to meet the assumption of normality. Since the data was obtained from 132 participants in this study, we can say that the sample size was sufficient.

The study was conducted on similar syllabuses for validity and reliability purposes. The questionnaires used to measure motivation and attitudes toward group work were those used in the literature and adapted to the participants' mother language. To ensure the content validity of SPIF, we performed EFA and CFA on separate samples to ensure construct validity and presented the reliability coefficients and used expert opinions and the findings of the studies in the literature. Data was collected from the participants on a voluntary basis at a time that was convenient for them.

Results

Table 2 presents the descriptive data on the variables of motivation, attitudes toward group environments and instructional feedback, which affect the project-based learning processes of participants. With regard to "motivation," the participants were found to have a positive affect about the following factors: Task Value (TV) (M = 5.51), Intrinsic Goal Orientation (IGO) (M = 5.41), Control of Learning Beliefs (CLB) (M = 5.27) and Self-Efficacy for Learning & Performance (SLP) (M = 5.23). However, they had certain concerns over the Test Anxiety (TA) factor (M = 3.64). Concerning attitudes toward group environments, the participants "strongly agreed" with the statements under the Student Interdependence (SI) (M = 4.29) factor. It was found that they had a positive effect on the feedback provided by the instructors.

Table 2. Descriptive Data on the Perceptions of Motivation, Attitudes towards Group Environment, and Instructional Feedback

	Factors	Mean	SD
Motivation	Task Value (TV)	5.51	1.17
	Intrinsic Goal Orientation (IGO)	5.41	1.17
	Self-Efficacy for Learning and Performance (SLP)	5.23	1.06
	Control of Learning Beliefs (CLB)	5.27	1.11
	Extrinsic Goal Orientation (EGO)	5.01	1.24
	Test Anxiety (TA)	3.64	1.37
	General	**5.01**	**1.16**
Attitudes toward group environment	Student Interdependence (SI)	4.29	.62
	Peer Support (PS)	4.16	.84
	Quality of Product and Process (QPP)	3.74	1.00
	Frustrations with Group Members (FGM)	2.14	.91
	General	**3.76**	**.80**
Instructional Feedback	Mastery (MA)	4.69	.49
	Positive Affect (PA)	4.43	.65
	Negative Affect (NA)	1.50	.71
	General	**4.20**	**.63**

The model was tested based on the relationships between the variables and the researchers' observations. The path analysis of 13 variables gave a value of $\chi^2 = 118.934$ (df = 61, $p<.05$). The ranges for the indices (RMSEA, CFI) were based on the studies by Schreiber, Nora,

Stage, Barlow, and King (2006), and Hooper, Coughlan and Mullen (2008). Table 3 shows them together with the goodness of fit values.

Table 3. Goodness-Of-Fit Statistics Ranges and Values

Goodness of Fit Statistics	Perfect	Acceptable	Values in the Model	Fit
χ^2/df	≤2	2–5	1.95	Perfect
RMSEA	≤.05	≤.08	.08	Acceptable
CFI	≥.95	≥.90	.92	Acceptable

Figure 3 presents the model tested in this study together with the standardized path coefficients. In this figure, the subfactors related to attitudes towards group environment and instructional feedback are grouped. The remaining variables belong to the motivated strategies for learning questionnaire. All the paths in the model were found to be significant (See Table 4 and Fig. 3).

Table 4. The Results of the Tested Hypotheses

Hypotheses	Paths	Standardized coefficient	*SE*	*p*	Results
H1	NA→ FGM	.418	.103	.000	Supported
H2	FGM →PS	-.455	.072	.000	Supported
H3	PS→ SI	.747	.044	.000	Supported
H4	SI → QPP	.463	.147	.000	Supported
H5	PS → QPP	.308	.110	.000	Supported
H6	MA → PA	.607	.096	.000	Supported
H7	MA→ CLB	.378	.150	.000	Supported
H8	NA → MA	-.616	.049	.000	Supported
H9	EGO → PA	.308	.038	.000	Supported
H10	EGO →TA	.254	.093	.003	Supported
H11	IGO →CLB	.385	.063	.000	Supported
H12	IGO →TV	.793	.051	.000	Supported
H13	TV →SLP	.676	.053	.000	Supported
H14	CLB →SLP	.245	.057	.000	Supported

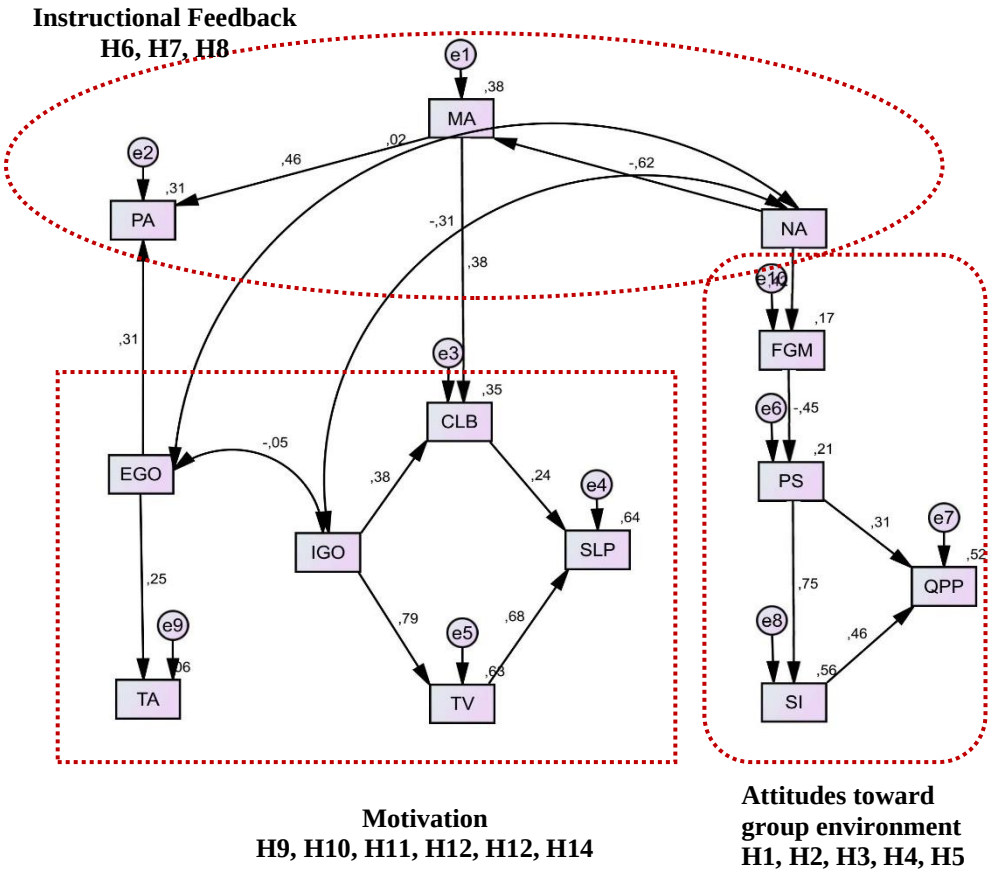

Figure 3. Presentation of the tested model (IGO: Intrinsic Goal Orientation, TV: Task Value, SLP: Self-Efficacy for Learning and Performance, EGO: Extrinsic Goal Orientation, TA: Test Anxiety, CLB: Control of Learning Beliefs, QPP: Quality of product and process, PS: Peer Support, SI: Student Interdependence, FGM: Frustrations with Group Members, MA:Mastery, PA: Positive Affect, NA: Negative Affect)

The model is developed in the instructional design course for the group working processes, perception towards instructional feedback and motivation towards the course. All the paths in the model were significant. The direct and indirect influences on the model were also defined by testing the model. Table 5 shows detailed information on these influences.

Table 5. Direct, Indirect, and Total Influences on the Model

Variables			
Self-Efficacy for Learning and Performance	**Direct Influence**	**Indirect Influence**	**Total Influence**
Intrinsic Goal Orientation	-	.630**	.630
Negative Affect	-	-.057*	-.057
Mastery	-	.093**	.093
Control of Learning Beliefs	.245**	-	.245
Task value R^2 = .636	.676**	-	.676
Quality of product and process			
Peer Support	.308**	.346**	.654
Student Interdependence	.463**	-	.463
Frustrations with Group Members	-	-.298*	-.297
Negative Affect R^2 = .522	-	-.124*	-.124
Control of Learning Beliefs			
Intrinsic Goal Orientation	.385**	-	.385

Mastery	.378**	-	.378
Negative Affect R^2 = **.348**	-	-.233**	-.233
Student Interdependence			
Peer Support	.747**	-	.747
Negative Affect	-	-.142**	-.142
Frustrations with Group Members R^2 = **.558**	-	-.339	-.339
Positive Affect			
Extrinsic Goal Orientation	.308**	-	.308
Mastery	.464**	-	.464
Negative Affect R^2 = **.308**	-	-.286**	-.286
Peer Support			
Negative Affect	-	-.190**	-.190
Frustrations with Group Members R^2 = **.207**	-.455**	-	-.455
Mastery			
Negative Affect R^2 = **.379**	-.616**	-	-.616
Frustrations with Group Members			
Negative Affect R^2 = **.175**	.418**	-	.418
Text Anxiety			
Extrinsic Goal Orientation R^2 = **.065**	.254**	-	.254
Task Value			
Intrinsic Goal Orientation R^2 = **.626**	.793**	-	.793

$^{**}p < .01$, $^{*}p < .05$

Discussion

This study aimed to define the relationships between the variables that affect the learning processes of participants in the instructional design course. The relationships were described by 13 variables under motivation towards the course, attitudes toward group working, and perception of instructional feedback.

We found that self-efficacy for learning and performance (SLP) was positively affected by control of learning beliefs (CLB) and task value (TV). At this point, the beliefs of self-efficacy for learning and and performance (SLP) are positively affected when a lesson is felt to be important. Therefore, the researchers have reported a close relationship between self-efficacy and task value (Joo, Lim, & Kim, 2013) and suggested that these two also have a positive impact on motivation (Schunk et al., 2012). In addition, the ability of students to take responsibility for their success/failures positively affects self-efficacy for learning and performance and learning beliefs (SLP).

In this study, we found that peer support (PS) affects student interdependence (SI) to a great extent. According to the model obtained in this study, peer support (PS) is one of the important elements in group working. Students working in harmony with their peers and feeling a sense of belonging in the group act in coherence with other group members. Such meaningful interactions among group members increase the likelihood that learning will occur at the individual level (Nihalani et al., 2011). Intragroup interactions require the improvement of communication skills for resolving, assessing and discussing different ideas that emerge in the group as part of common activities (Lin et al., 2014; Stahl et al., 2006). As these skills are improved, the quality of the product and process can also improve. In this study, we found that the quality of product and process (QPP) was affected by student interdependence (SI) and peer support (PS) positively. At this point, the group members who exhibited a powerful interaction in terms of peer support (PS) and student interdependence (SI) gradually began to enjoy project activities. Such interaction also promotes further learning and the development of high-quality products. To achieve effective relationships and

interactions during the cooperation process, it is important to resolve conflicts and maintain the relationships between group members (Richardson, 2001). Individuals who had conflicts and expressed frustrations with other group members (FGM) were found to fail to achieve high-quality outcomes during group work and project activities. In this study, "frustrations with other group members (FGM)" was found to have an indirect and negative impact on the quality of product and process (QPP). The findings also revealed that individuals who had conflicts with other group members were deprived of student interdependence (SI) and peer support (PS) as well as failing to achieve expected outcomes. However, there are also studies reporting that intragroup activities promote interaction among students and lighten the cognitive load on them (Wigglesworth & Storch, 2012). In this study, our results show that peer support (PS) affects student interdependence (SI).

We also found that the frustrations with group members (FGM) factor is affected by group members' negative affect (NA) about instructional feedback. At this point, task-specific feedback is recommended to achieve productive interactions among group members (Ge & Land, 2003; Zumbach, Reimann, & Koch, 2006). However, negative affect about feedback may have also caused them to fail to maintain group cohesion. Individuals with negative affect about instructional feedback are likely to exhibit a negative approach towards mastery. Sometimes, students may be negatively affected if the feedback is misunderstood, inaccurate or misdirected, or processed ineffectively (Zumbrunn et al., 2016). Furthermore, instructional feedback is reported to be much more effective when students volunteer for interaction (Price, Handley, Millar, & O'Donovan, 2010). Studies reported that students commonly fear criticism, judgment, and getting a bad grade. Thus, such students refrain from receiving instructional feedback as they feel bothered (Zumbrunn et al., 2016). As a result, group members evade their learning responsibilities, which at the end may cause them to have conflicts with other group members, thus also lowering their expectations for mastery.

In this study, group members with feelings of mastery about the feedback provided by instructors were also found to improve their positive affect (PA) about instructional feedback. From this point of view, mastery perception can be said to be related to students' mood (PA, NA). Therefore, students' mood needs to be analyzed to improve their perception of mastery towards receiving feedback. Positive affect (PA) is also affected directly and positively by extrinsic goal orientation (EGO), which is one of the motivation factors affected indirectly and negatively by negative affect (NA).

In this study, extrinsic goal orientation (EGO) was also found to trigger task value (TA). This finding conforms with the reports in the literature (Birenbaum, 1997; Osman & Lee, 2012; Shastri et al., 2015; Wolters et al., 1996). Students that compare their academic performance with the other students' extrinsic goal orientation (EGO) tend to have positive affect about receiving instructional feedback since compliments by the instructor and others are indicators of their success. Moreover, comparing their grades with those of others triggers students' text anxiety.

We found that control of learning beliefs (CLB) was highly and positively affected by intrinsic goal orientation (IGO) and mastery. There are various studies reporting the relationship between intrinsic goal orientation (IGO) and control of learning beliefs (CLB) (Lawanto et al., 2012; Shastri et al., 2015; Sungur, 2007). Improving the instructional feedback strategies aims to develop students' self-efficacy beliefs, mastery goals, and the skills of planning and revising (Duijnhouwer et al., 2012). At this point, increasing the student's effort and the development of planning and revising can be seen in the students

taking control of the learning process. Mastery perception gained through instructional feedback contributes to helping students increase their awareness of assuming responsibility for their learning. Furthermore, gaining an insight into how to access the materials that will help their learning may indicate that they have taken control of their learning.

In this study, task value (TV) was found to be greatly affected by intrinsic goal orientation (IGO). Other studies have also suggested a relationship between intrinsic goal orientation (IGO) and task value (TV) (Lawanto et al., 2012; Shastri et al., 2015; Sungur, 2007). Students who have access to materials to help them in their learning and who assume responsibility for their learning have increased motivation.

Conclusion and Suggestions

In this study, we examined students' attitudes toward group work, perceptions of instructional feedback and motivation for the course. The results of the study can be summarized as follows:

- "Control of Learning Beliefs" and "Task value" affect students' "Self-Efficacy for Learning & Performance."
- "Peer Support" and "Student Interdependence" affect students' "Quality of Product and Process."
- "Intrinsic Goal Orientation" and "Mastery" affect students' "Control of Learning Beliefs."
- "Peer Support" affects students' "Student Interdependence."
- "Mastery" and "Extrinsic Goal Orientation" positively affects students' "Positive Affect."
- "Frustrations with Group Members" affects students' "Peer Support."
- "Negative Affect" affects students' "Mastery."
- "Negative Affect" affects students' "Frustrations with Group Members."
- "Extrinsic Goal Orientation" affects students' "Text Anxiety."
- "Intrinsic Goal Orientation" affects students' "Task Value."

In light of the findings, the following suggestions are made:

- In order to improve the self-efficacy of the students in group work, it can be important to provide the control of learning beliefs and task value for students. As Intrinsic Goal Orientation and Mastery are important factors that affect Control of Learning Beliefs, these factors need to be taken into account in group work.
- Peer support should be provided and student interdependence should be tried to make Product Quality and Process effective. Peer support is important to ensure student interdependence. For this reason, group activities can be planned to ensure the support of students from each other.
- Students working in harmony with each other should be brought together in the same group, since frustration with group members affects the peer support of the students. In order to carry out the group work effectively, intragroup collaboration and interaction should be improved. Groups should also be formed on a voluntary basis.
- The level of interaction among the group members should be increased and peer support should be promoted through various activities that are carefully planned to sustain continuous communication and interaction among the students.
- The conflicts observed in the groups should be resolved by the instructor.

- Individuals with negative affect about instructional feedback are likely to feel that they could not achieve mastery through feedback. Their mood should be analyzed and their negative affect about instructional feedback should be eliminated.
- Regular feedback should be provided to prevent intragroup conflicts. In addition, course content should be revised to include individual activities that would change the negative attitudes of group members towards receiving feedback.
- Group members with feelings of mastery about the instructional feedback develop positive affect concerning instructional feedback. Therefore, if the individuals who are, at first, reluctant to receive feedback are provided with feedback with an emphasis on the improvement of project processes, their PA can improve and the continuity of providing feedback can be sustained.
- Activities should be performed and instructional feedback should be given to reduce the concerns of students about grades and being successful.
- Taking control of learning and having meaningful values on tasks/projects improves the self-efficacy beliefs of learners. Therefore, learners' responsibility for learning and views on the importance of their tasks/projects can be improved through feedback. In this way, their self-efficacy beliefs can also be developed.

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References

Alexander, C., Knezek, G., Christensen, R., Tyler-Wood, T., & Bull, G. (2014). The impact of project-based learning on pre-service teachers' technology attitudes and skills. *Journal of Computers in Mathematics and Science Teaching*, *33*(3), 257–282.

Al Khatib, S. A. (2010). Meta-cognitive self-regulated learning and motivational beliefs as predictors of college students' performance. *International Journal for Research in Education*, *27*(8), 57–71.

Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology*, *84*(3), 261–271.

Appelbaum, S. H., & Hare, A. (1996). Self-efficacy as a mediator of goal setting and performance: Some human resource applications. *Journal of Managerial Psychology*, *11*(3), 33–47.

Araz, G., & Sungur, S. (2007). The interplay between cognitive and motivational variables in a problem-based learning environment. *Learning and Individual Differences*, *17*(4), 291–297.

Bentler, P. M., & Chou, C.-P. (1987). Practical issues in structural modeling. *Sociological Methods and Research, 16*(1), 78–117.

Beydoğan, H. Ö. (2016). Öğretmen adaylarına yönelik dönüt–düzeltme algı ölçeği [Feedback correction perception scale for teacher candidates]. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi, 17*(2), 297–314.

Birenbaum, M. (1997). Assessment preferences and their relationship to learning strategies and orientations. *Higher Education*, *33*(1), 71–84.

Brown, A. L., & Palincsar, A. S. (1989). Guided, cooperative learning and individual knowledge acquisition. In L. B. Resnick (Ed.), *Knowing, learning, and instruction: Essays in honor of Robert Glaser*(pp. 393–451). New York, NY: Lawrence Erlbaum Associates.

Büyüköztürk, Ş., Akgün, Ö. E., Kahveci, Ö., & Demirel, F. (2004). Güdülenme ve öğrenme stratejileri ölçeğinin Türkçe formunun geçerlik ve güvenirlik çalışması [The validity and reliability study of the Turkish version of the motivated strategies for learning questionnaire]. *Kuram ve Uygulamada Eğitim Bilimleri, 4*(2), 207–239.

Chidambaram, L., & Tung, L. L. (2005). Is out of sight, out of mind? An empirical study of social loafing in technology-supported groups. *Information Systems Research*, *16*(2), 107–234.

Cho, K., Schunn, C. D., & Charney, D. (2006). Commenting on writing typology and perceived helpfulness of comments from novice peer reviewers and subject matter experts. *Written Communication*, *23*(3), 260–294.

Cleary, T. J., & Zimmerman, B. J. (2004). Self-regulated empowerment program: A school-based program to enhance self-regulated and self-motivated cycles of student learning. *Psychology in the Schools, 41*(5), 537–550

Cooke, N. J., Gorman, J. C., Duran, J. L., & Taylor, A. R. (2007). Team cognition in experienced command-and-control teams. *Journal of Experimental Psychology: Applied, 13*(3), 146 –157.

Corliss, S. B. (2005). *The effects of reflective prompts and collaborative learning in hypermedia problem-based learning environments on problem solving and*

metacognitive skills (Doctoral dissertation). Retrieved from ProQuest Digital Dissertations. (Order No. 3187842)

Dart, B. C., Burnett, P. C., Purdie, N., Boulton-Lewis, G., Campbell, J., & Smith, D. (2000). Students' conceptions of learning, the classroom environment, and approaches to learning. *The Journal of Educational Research, 93*(4), 262–270.

Dillenbourg, P. (1999). What do you mean by collaborative learning? In P. Dillenbourg (Ed.), *Collaborative-learning: Cognitive and computational approaches*, (pp. 1–15). Bingley, UK: Emerald Group.

Diziol, D., Walker, E., Rummel, N., & Koedinger, K. R. (2010). Using intelligent tutor technology to implement adaptive support for student collaboration. *Educational Psychology Review, 22*(1), 89–102.

Duijnhouwer, H., Prins, F. J., & Stokking, K. M. (2012). Feedback providing improvement strategies and reflection on feedback use: Effects on students' writing motivation, process, and performance. *Learning and Instruction*, *22*(3), 171–184.

Duncan, T. G., & McKeachie, W. J. (2005). The making of the motivated strategies for learning questionnaire. *Educational Psychologist, 40*(2), 117–128.

Elliot, A. J., & McGregor, H. A. (2001). A 2 × 2 achievement goal framework. *Journal of Personality and Social Psychology, 80*(3), 501–519.

Field, A. (2009). *Discovering statistics using SPSS* (3rd ed). Thousand Oaks, CA: SAGE.

Frank, M., & Barzilai, A. (2004). Integrating alternative assessment in a project-based learning course for pre-service science and technology teachers. *Assessment & Evaluation in Higher Education*, *29*(1), 41–61.

Freeman, K. E., Alston, S. T., & Winborne, D. G. (2008). Do learning communities enhance the quality of students' learning and motivation in STEM?. *The Journal of Negro Education*, *77*(3), 227–240.

García, J. N., & de Caso, A. M. (2006). Changes in writing self-efficacy and writing products and processes through specific training in the self-efficacy beliefs of students with learning disabilities. *Learning Disabilities: A Contemporary Journal*, *4*(2), 1–27.

Ge, X., & Land, S. M. (2003). Scaffolding students' problem-solving processes in an ill-structured task using question prompts and peer interactions. *Educational Technology Research and Development, 51*(1), 21–38.

Goldstein, O. (2016). A project-based learning approach to teaching physics for pre-service elementary school teacher education students. *Cogent Education, 3*(1), Article No. 1200833.

Gülbahar, Y., & Tinmaz, H. (2006). Implementing project-based learning and e-portfolio assessment in an undergraduate course. *Journal of Research on Technology in Education*, *38*(3), 309–327.

Hambleton, R. K., Merenda, P. F., & Spielberger, C. D. (Eds.). (2005). *Adapting educational and psychological tests for cross-cultural assessment*. Mahwah, N.J.: Lawrence Earlbaum Associates.

Harward, S., Peterson, N., Korth, B., Wimmer, J., Wilcox, B., Morrison, T. G., Black, S., Simmerman, S., & Pierce, L. (2014). Writing instruction in elementary classrooms: Why teachers engage or do not engage students in writing, *Literacy Research and Instruction, 53*(3), 205–224.

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of educational research, 77*(1), 81–112.

Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn? *Educational Psychology Review, 16*(3), 235–266.

Hooper, D., Coughlan, J., & Mullen, M. R. (2008). Structural equation modelling: Guidelines for determining model fit. *The Electronic Journal of Business Research Methods, 6*(1), 53–60

Howard, J. (2002). Technology-enhanced project-based learning in teacher education: Addressing the goals of transfer. *Journal of Technology and Teacher Education, 10*(3), 343–364.

Johnson, D. W., & Johnson, F. P. (2000). *Joining together: Group theory and group skills* (7th ed.). Boston, MA: Allyn and Bacon.

Johnson, D. W., & Johnson, R. T. (1999). *Learning together and alone: Cooperative competitive, and individualistic learning* (5th ed.). Boston, MA: Allyn and Bacon.

Johnson, D. W., & Johnson, R. T. (2002). Social interdependence theory and university instruction: Theory into practice. *Swiss Journal of Psychology, 61*(3), 119 –129.

Jonassen, D. H., & Rohrer-Murphy, L. (1999). Activity theory as a framework for designing constructivist learning environments. *Educational Technology Research and Development, 47*(1), 61–79.

Joo, Y. J., Lim, K. Y., & Kim, J. (2013). Locus of control, self-efficacy, and task value as predictors of learning outcome in an online university context. *Computers & Education, 62*, 149–158.

Karakus, T. (2011). *Exploration of instructional design process and experience of novice instructional designers through the framework of activity theory: A case study in an instructional design course* (Unpublished doctoral dissertation). Middle East Technical University, Ankara, Turkey.

Karakus Yilmaz, T., Baydas, O., & Kokoc, M. (2017). Grup çalışması ortamlarına karşı öğrenci tutumları ölçeğinin (GÇOÖT) Türkçeye uyarlanması. [The Turkish adaptation study of the Student Attitudes toward Group Environments (SAGE) Questionnaire]. *İlköğretim Online, 16*(3), 1049–1057.

Keller, J. M. (February, 2000). How to integrate learner motivation planning into lesson planning: The ARCS model approach. Paper presented at VII Semanario, Santiago, Cuba.

Kellogg, R. T., & Whiteford, A. P. (2009). Training advanced writing skills: The case for deliberate practice. *Educational Psychologist*, *44*(4), 250–266.

Kester, L., Kirschner, P. A., & Corbalan, G. (2007). Designing support to facilitate learning in powerful electronic learning environments. *Computers in Human Behavior, 23*(3), 1047–1054.

Kouros, C., & Abrami, P. C. (April, 2006). *How do students really feel about working in small groups? The role of student attitudes and behaviours in cooperative classroom settings*. Paper presented at the meeting of the American Educational Research Association, San Francisco, CA.

Krol, K., Veenman, S., & Voeten, M. (2002). Toward a more cooperative classroom: Observations of teachers' instructional behaviours. *Journal of Classroom Interaction, 37*(2), 37–46.

Latane, B., Williams, K., & Harkins, S. (1979). Many hands make light the work: The causes and consequences of social loafing. *Journal of Personality and Social Psychology, 37*(6), 822–832.

Lawanto, O., Santoso, H. B., & Liu, Y. (2012). Understanding of the relationship between interest and expectancy for success in engineering design activity in grades 9–12. *Educational Technology & Society*, *15*(1), 152–161.

Liem, A. D., Lau, S., & Nie, Y. (2008). The role of self-efficacy, task value, and achievement goals in predicting learning strategies, task disengagement, peer relationship, and achievement outcome. *Contemporary Educational Psychology*, *33*(4), 486–512.

Lin, K. Y., Hong, H.-Y., & Chai, C. S. (2014). Development and validation of the knowledge-building environment scale. *Learning and Individual Differences, 30*, 124–132.

Liu, H. H., Wang, Q., Su, Y.-S., & Zhou, L. (2019). Effects of project-based learning on teachers' information teaching sustainability and ability. *Sustainability*, *11*(20), 5795.

Macías-Guarasa, J., Montero, J. M., San-Segundo, R., Araujo, Á., & Nieto-Taladriz, O. (2006). A project-based learning approach to design electronic systems curricula. *IEEE Transactions on Education, 49*(3), 389–397.

Marshall, J. A., Petrosino, A. J. & Martin, T. (2010). Preservice teachers' conceptions and enactments of project-based instruction. *Journal of Science Education Technology*, 19, 370–386.

McMillan, J., & Schumacher, S. (2010). *Research in education: Evidence-based inquiry* (6th ed.). Boston: Pearson Education.

Meece, J. L., Anderman, E. M., & Anderman, L. H. (2006). Classroom goal structure, student motivation, and academic achievement. *Annual Review of Psychology, 57*, 487–503.

Meijer, J. (2001). Learning potential and anxious tendency: Test anxiety as a bias factor in educational testing. *Anxiety, Stress, and Coping, 14*(3), 337–362.

Mills, J. E., & Treagust, D. F. (2003). Engineering education—Is problem-based or project-based learning the answer. *Australasian Journal of Engineering Education*, *3*(2), 2–16.

Nicol, D. J., & Macfarlane-Dick, D. (2006). Formative assessment and self-regulated learning: A model and seven principles of good feedback practice. *Studies in Higher Education, 31*(2), 199–218.

Nihalani, P. K., Mayrath, M., & Robinson, D. H. (2011). When feedback harms and collaboration helps in computer simulation environments: An expertise reversal effect. *Journal of Educational Psychology*, *103*(4), 776–785.

Osman, K., & Lee, T. T. (2012). Interactive multimedia module with pedagogical agent in electrochemistry. In I. Deliyannis (Ed.), *Interactive Multimedia*, (pp. 29–48). London, UK: Intech Open.

Pajares, F. (2003). Self-efficacy beliefs, motivation, and achievement in writing: A review of the literature. *Reading &Writing Quarterly*, *19*(2), 139–158.

Panitz, T. (1997). *Why more teachers do not use collaborative learning techniques*. Retrieved on May, 13, 2016 from http://schoolofeducators.com/2009/07/why-more-teachers-do-not-use-collaborative-learning-techniques/

Parr, J. M., & Timperley, H. S. (2010). Feedback to writing, assessment for teaching and learning and student progress. *Assessing Writing*, *15*(2), 68–85.

Peterson, S. E., & Myer, R. A. (1995). The use of collaborative project-based learning in counselor education. *Counselor Education and Supervision*, *35*(2), 150–158.

Petty, G. (1993). *Teaching today: A practical guide* (1st ed.). Cheltenham, UK: Stanley Thornes.

Pilten, P., Pilten, G., & Sahinkaya, N. (2017). The effect of ICT assisted project based learning approach on prospective ICT integration skills of teacher candidates. *Journal of Education and Training Studies*, *5*(3), 135–147.

Pintrich, P. R. (1999). The role of motivation in promoting and sustaining self-regulated learning. *International Journal of Educational Research, 31*(6), 459–470.

Pintrich, P. R., Smith, D. A., García, T., & McKeachie, W. J. (1993). Reliability and predictive validity of the Motivated Strategies for Learning Questionnaire (MSLQ). *Educational and Psychological Measurement, 53*(3), 801–813.

Prat-Sala, M., & Redford, P. (2010). The interplay between motivation, self-efficacy, and approaches to studying. *British Journal of Educational Psychology*, *80*(2), 283–305.

Price, M., Handley, K., Millar, J., & O'Donovan, B. (2010). Feedback: All that effort, but what is the effect? *Assessment & Evaluation in Higher Education*, *35*(3), 277–289.

Prince, M. J., & Felder, R. M. (2006). Inductive teaching and learning methods: Definitions, comparisons, and research bases. *Journal of Engineering Education*, *95*(2), 123–138.

Richardson, A. T. (2001). Effectiveness of cognitive behavioral group intervention for elemantary aged students. *The California School Psychologist*, *6*, 39–45.

Richey, D. K., Mathern, J., O'Shea, C. S., & Pierce, S. J. (1997). Community college/high school feedback and collaboration: Preventive measures. *New directions for community colleges*, *1997*(100), 63–72.

Schreiber, J. B., Nora, A., Stage, F. K., Barlow, E. A., & King, J. (2006). Reporting structural equation modeling and confirmatory factor analysis results: A review. *The Journal of Educational Research*, *99*(6), 323–338.

Schunk, D. H., Meece, J. R., & Pintrich, P. R. (2012). *Motivation in education: Theory, research, and applications*. Upper Saddle River, N.J.: Pearson Higher Ed.

Selçuk, Z. (1999). *Gelişim ve öğrenme* [*Development and learning*] (6th ed.). Ankara, Turkey: Nobel Yayınları.

Shastri, A., Wang, J. T., & Gandhi, S. (2015) Motivation and learning strategies of college students in the United States and India, *International Journal of Multidisciplinary Consortium*, *2*(1), 214–223.

Shim, S., & Ryan, A. (2005). Changes in self-efficacy, challenge avoidance, and intrinsic value in response to grades: The role of achievement goals. *The Journal of Experimental Education*, *73*(4), 333–349.

Shute, V. J. (2008). Focus on formative feedback. *Review of Educational Research*, *78*(1), 153–189.

Slavin, R. E. (1995). *Cooperative learning: Theory, research and practice* (2nd ed.). Boston, MA: Allyn and Bacon

Stahl, G., Koschmann, T., & Suthers, D. (2006). Computer-supported collaborative learning: An historical perspective. In R. K. Sawyer (Ed.), *Cambridge handbook of the learning sciences* (pp. 409–426). Cambridge, UK: Cambridge University Press.

Stipek, D. (1998). *Motivation to learn, from theory to practice* (3rd ed.). Boston, MA: Allyn and Bacon.

Sungur, S. (2007). Modeling the relationships among students' motivational beliefs, metacognitive strategy use, and effort regulation. *Scandinavian Journal of Educational Research*, *51*(3), 315–326.

Thomas, J. W. (2000). A review of the research on project-based learning. San Rafael, CA: The Autodesk Foundation.

Wigglesworth, G., & Storch, N. (2012). What role for collaboration in writing and writing feedback. *Journal of Second Language Writing*, *21*(4), 364–374.

Wilson, J., & Czik, A. (2016). Automated essay evaluation software in English language arts classrooms: Effects on teacher feedback, student motivation, and writing quality. *Computers & Education*, *100*, 94–109.

Wolters, C. A., Shirley, L. Y., & Pintrich, P. R. (1996). The relation between goal orientation and students' motivational beliefs and self-regulated learning. *Learning and Individual Differences*, *8*(3), 211–238.

Yukselturk, E., & Bulut, S. (2007). Predictors for student success in an online course. *Educational Technology & Society, 10*(2), 71–83.

Zimmerman, B. J., & Schunk, D. H. (2008). Motivation: An essential dimension of self-regulated learning. In D. H. Schunk & B. J. Zimmerman (Eds.), *Motivation and self-regulated learning: Theory, research, and applications* (pp. 1–30). Mahwah, NJ: Lawrence Erlbaum Associates.

Zumbach, J., Reimann, P., & Koch, S. C. (2006). Monitoring students' collaboration in computer-mediated collaborative problem-solving: Applied feedback approaches. *Journal of Educational Computing Research*, *35*(4), 399–424.

Zumbrunn, S., Marrs, S., & Mewborn, C. (2016). Toward a better understanding of student perceptions of writing feedback: a mixed methods study. *Reading and Writing, 29*(2), 349–370.