# METACOGNITIVE AWARENESS, REFLECTIVE THINKING, PROBLEM SOLVING, AND COMMUNITY OF INQUIRY AS PREDICTORS OF ACADEMIC SELF-EFFICACY IN BLENDED LEARNING: A CORRELATIONAL STUDY

**Dr. Fatma Gizem KARAOGLAN-YILMAZ**
ORCID: 0000-0003-4963-8083
Faculty of Sciences
Bartin University
Bartin, TURKIYE

**Dr. Ahmet Berk USTUN**
ORCID: 0000-0002-1640-4291
Faculty of Sciences
Bartin University
Bartin, TURKIYE

**Dr. Ke ZHANG**
ORCID: 0000-0002-4690-7586
College of Education
Wayne State University
Detroit, Michigan, USA

**Dr. Ramazan YILMAZ**
ORCID: 0000-0002-2041-1750
Faculty of Sciences
Bartin University
Bartin, TURKIYE

**Received:** 02/09/2021 **Accepted:** 18/04/2022

## ABSTRACT

Blended learning (BL) has been increasingly implemented in higher education. However, limited research is available to understand the role of metacognitive awareness, reflective thinking, problem solving and community of inquiry as related to students' academic self-efficacy in BL. The purpose of this research is to examine the effect of metacognitive awareness, reflective thinking, problem solving and community of inquiry on students' academic self-efficacy in BL. This correlational study collected data from 217 undergraduate students in an introductory computer course, using five well-established instruments. The research found a strong and positive relationship between self-efficacy and metacognitive awareness, reflective thinking and problem solving skills. There was also a moderate positive relationship between students' academic self-efficacy and community of inquiry. In addition, the predictive models revealed that metacognitive awareness, reflective thinking, problem solving skills and community of inquiry were the predictors of academic self-efficacy as well as its subdimensions, such as learners' engagement, social status and cognitive applications. The article then discusses the practical and research implications of the study and suggests future research directions.

**Keywords:** Academic self-efficacy, metacognitive awareness, reflective thinking, problem solving, community of inquiry, blended learning.

## INTRODUCTION

The rapid advancement of technology has altered the ways of teaching and learning in this digital age. Technological advancements empower students to learn anytime and anywhere by connecting to the internet or offline via mobile devices. Instructors can provide collaborative activities, give interactive learning assignments, and use diverse assessment strategies such as peer assessment and self-assessment by means of ICT tools (Ustun & Tracey, 2020). These tools can be used in blended learning (BL) to meet students' learning needs for flexible and personalized instruction (Jonker, März, & Voogt, 2018). BL is seen as an accelerator for technology adoption in higher education in the short term and institutions should be ready for adopting a pervasive, adaptive and effective BL approach to address the various needs of students from different backgrounds as stated in the New Media Consortium Horizon Report (Adams Becker et al., 2017). BL potentially creates a collaborative, interactive and engaging learning environment by offering enhanced accessibility, pedagogical effectiveness and flexibility (Dziuban, Graham, Moskal, Norberg, & Sicilia, 2018). Ustun, Karaoglan-Yilmaz and Yilmaz (2021) reveal that students' engagement and sense of community can be increased when students are willing to utilize ICT tools in BL. Similarly, Jusoff and Khodabandelou (2009) demonstrate that BL alleviates the discomfort of transactional distance and escalates the interaction between instructors and students.

Researchers have found many merits and benefits of BL (e.g., Rasheed, Kamsin, & Abdullah, 2020). For instance, it facilitates knowledge acquisition (Maza, Lozano, Alarcón, Zuluaga, & Fadul, 2016), promotes engagement (Ustun & Tracey, 2021), improves collaborations among students and interactions between instructor and students as well (Geng, Law, & Niu, 2019). It also allows students to learn at their own pace (Ustun & Tracey, 2020). BL inherently has flexibility and accessibility, which increases the quality of students' learning experiences. Besides, learning experiences can be tailored to address students' interests and preferences (Adams Becker et al., 2017). In this way, students are encouraged to participate as active knowledge seekers in a flexible learning environment. Previous research has inconsistent findings. Some indicate that the adoption of BL significantly increases student satisfaction (Li, He, Yuan, Chen, & Sun, 2019; Sadeghi, Sedaghat, & Ahmadi, 2014) and improves academic achievement (Al-Qahtani & Higgins, 2013; Li et al., 2019). While another study finds no significant effect of BL on student satisfaction or academic achievement (Yen, Lo, Lee, & Enriquez, 2018). Researchers also point out varied challenges for students to develop self-efficacy skills and technological competency in BL environments (Rasheed et al., 2020).

One of the key challenges of BL is the design and implementation of an effective BL environment. Instructors find the planning and designing of BL very challenging (Jokinen & Mikkonen, 2013). More specifically, the four design challenges include incorporating flexibility, stimulating interaction, facilitating students' learning processes, and fostering an effective learning climate (Boelens, De Wever, & Voet, 2017). A few studies have provided frameworks and guidelines for the design and implementation of optimal BL environments (Graham, Woodfield, & Harrison, 2013; Porter, Graham, Spring, & Welch, 2014; Ustun & Tracey, 2020, 2021). Successful adoption of BL also requires students to develop self-efficacy, because it is a significant predictor of academic achievement (Robbins et al. (2004). Although a few studies focused on student self-efficacy in the context of BL (e.g., Rafiola, Setyosari, Radjah, & Ramli, 2020; Shea & Bidjerano, 2010), the predictors of self-efficacy have not been studied in BL. Thus, this study was designed to investigate the effect of metacognitive awareness, reflective thinking, problem-solving and community of inquiry (CoI) on students' academic self-efficacy in BL.

## THEORETICAL BACKGROUND AND HYPOTHESES

### Community of Inquiry

Garrison and Akyol (2013) define Community of Inquiry (CoI) as "a group of individuals who collaboratively engage in purposeful critical discourse and reflection to construct personal meaning and confirm mutual understanding" (p.105). The definition confirms that CoI is theoretically grounded in social constructivism indicating that student interactions facilitate and accelerate meaningful knowledge construction (Garrison, Cleveland-Innes, & Fung, 2010). Rovai (2002) points out that in order to create an effective online learning environment, the CoI model aims to build a learning community that enables inquiry-based learning and deep learning. When students' ties to a learning community are getting stronger, their willingness to share ideas and experiences, engagement in interactions among themselves and collaborative knowledge creation increase. Their engagement in interactions with instructors and each other helps construct new understanding and knowledge (Garrison et al., 2010).

The CoI model consists of three types of presence including cognitive presence, social presence and teaching presence (Anderson, Rourke, Garrison, & Archer, 2001). Cognitive presence refers to the individual student's abilities to construct knowledge through continued communication and reflection in a learning community (Garrison, Anderson, & Archer, 2000). In other words, students gain an understanding of the meaning as a result of continuing discussions. Social presence refers to students' ability to build interpersonal relationships with each other in the learning environment by being a social and emotional presence in a CoI (Garrison et al., 2000). It implies the importance of students' communication skills and how their communication skills contribute to constructing a collaborative learning community. Teaching presence refers to the design and implementation of learning processes to realize the learning outcomes and facilitating learning (Anderson et al., 2001). These presences explicitly demonstrate that students' active involvement constructs knowledge in a learning community. In this sense, self-efficacy is essential in order to build interpersonal relationships and construct meaning in a learning community because students have the beliefs to execute a particular behaviour. There might be a positive relationship between CoI and self-efficacy. Accordingly, the following hypotheses were proposed:

- CoI is a significant predictor of academic self-efficacy
- CoI is a significant predictor of social status
- CoI is a significant predictor of cognitive applications
- CoI is a significant predictor of technical skills

## Reflective Thinking

Reflective thinking describes the way of thinking process that bridges the gap between what is already known and what needs to be known in order to control learning (Dewey, 1933). Schon (1987) elucidates reflective thinking as the consideration of action in a careful, systematic and detailed way. Reflective thinking is a high-level thinking skill because it requires problem recognition, reflection on action in solving a problem and analyzing what has been done well or wrong for further improvements (Van der Schaaf, Baartman, Prins, Oosterbaan, & Schaap, 2013). Students who have reflective thinking skills are cognizant of their learning experiences and apply them to different problem situations to deal with these situations (Yilmaz, 2020). They also understand what they need to do in order to accomplish more difficult tasks when they are aware of their learning experiences. However, students without developed reflective skills are likely to fail to critically and carefully evaluate situations due to being unable to identify and prioritize solutions and consequently make a decision to implement the right solution (van Velzen, 2016).

Reflective thinking is one of the necessary skills for students to enhance several skills (Ulucinar Sagir, Aslan, Bertiz & Oner Armagan, 2016). Ersozlu and Arslan (2009) point out that reflective thinking enables students to perform better by comprehending, organizing, transferring and evaluating knowledge rather than just applying memorized knowledge when facing problems and they are also able to identify their strengths and weaknesses while coming up with a solution to these problems due to their reflective thinking skills. Previous research has proved that reflective thinking plays a role in students' task performance (van Velzen, 2016). In this sense, it might play a significant role in self-efficacy because self-efficacy is also students' belief in their abilities and skills to perform a task, accomplish goals and cope with obstacles. However, the relationship between reflective thinking and self-efficacy remains obscure with limited studies (Ulucinar Sagir et al., 2016). This study attempted to address this gap and accordingly the following hypotheses were proposed:

- Reflective thinking is a significant predictor of academic self-efficacy
- Reflective thinking is a significant predictor of social status
- Reflective thinking is a significant predictor of cognitive applications
- Reflective thinking is a significant predictor of technical skills

## Problem Solving

Problem Solving has been considered an essential part of the curriculum because there is a strong need for students to be immersed in learning environments in which they are required to apply their higher-order thinking skills to solve problems on their own. The importance of the concept of problem solving can be understood by its definition. It is defined as high-level cognitive processes to resolve a problem situation that even has no explicit clue to solve a problem (Bahar & Maker, 2015). It is vital for students to be successful in their educational life (Agran, Blanchard, Wehmeyer, & Hughes, 2002) so teaching and learning processes stimulate students to develop their problem-solving skills to meet the high demands of their professional and personal life (Barr & Stephenson 2011). Similarly, Lesh and Zawojewski (2007) state that students who possess problem solving skills can use their high-level intellectual functions and cognitive processes to gain new knowledge and skills when they encounter any real-life problems to adapt to changes in their life. It is obvious that the possession of problem solving is vital for students to comprehend a problem, determine the causes of the problem, plan reasonable possible solutions and carry out the best solution.

Self-efficacy plays an vital role in critical thinking processes in terms of considering putting in a great deal of sustained effort while achieving challenging tasks (Dehghani, Jafari-Sani, Pakmehr, & Malekzadeh, 2011). In this sense, it has possibly a link to problem solving. When previous literature is reviewed, it is seen that the concepts of self-efficacy and problem solving are theoretically related. Empirical studies have shown a positive and significant correlation between self-efficacy and problem solving (Cansoy & Turkoglu, 2017; Kozikoglu, 2019). Also, Dwiyogo (2018) finds that the implementation of BL positively affects problem solving and another study conducted by Shea and Bidjerano (2010) reveals that there is a strong relationship exists between self-efficacy and CoI in BL. Although empirical evidence has proved the strong relationship between self-efficacy and problem solving and there is enough body of research to show the importance of self-efficacy and problem solving in BL, there is a need to investigate the predictive power of problem solving directly on students' academic self-efficacy in BL. One of the aims of this study was to close this existing gap and accordingly the following hypotheses were proposed.

- Problem solving is a significant predictor of academic self-efficacy
- Problem solving is a significant predictor of social status
- Problem solving is a significant predictor of cognitive applications
- Problem solving is a significant predictor of technical skills

## Metacognitive Awareness

Metacognition can be defined as one's awareness of cognitive processes as well as regulation and control of these processes (Flavell, 1979). In other words, it refers to one's ability to plan, manage and assess his own learning processes. Knowledge of Cognition" and "Regulation of Cognition" are two elements of metacognitive awareness (Brown, 1987). Cognitive knowledge refers to knowledge about one's own thinking of how, when and where learning strategies can effectively be utilized for learning and cognitive regulation refers to adjustments of one's own cognition to control and management of learning (Karaoglan-Yilmaz, Yilmaz, Ustun, & Keser, 2019). Metacognitive awareness enables students to understand what they know, what they don't know, and what they need to know to fill the gaps in their knowledge. It also enables students to understand how to control their cognitive processes and what cognitive strategies lead them to learn (Jaleel, 2016). Metacognitive strategies including planning, monitoring and evaluation increase metacognitive awareness that enhances the quality of the learning process (Karaoglan Yilmaz, Olpak, & Yilmaz, 2018). Previous studies reveal that students who have a strong metacognitive awareness increase the probability of achieving learning goals and improving learning performance (Choy, Yim, & Tan, 2020; Ramirez-Arellano, Bory-Reyes, & Hernandez-Simon, 2019). Metacognitive awareness is an important factor in learning environments as indicated in the previous studies, it potentially plays a significant role in student self-efficacy in BL. Accordingly, the following hypotheses were proposed.

- Metacognitive awareness is a significant predictor of academic self-efficacy
- Metacognitive awareness is a significant predictor of social status
- Metacognitive awareness is a significant predictor of cognitive applications
- Metacognitive awareness is a significant predictor of technical skills

## METHOD

This study adopted a correlational research design, which aids in revealing the relationships between independent and dependent variables as well as assessing the independent variables' predictive potential on the dependent variable (Creswell, 2012). The dependent variable of the study was students' academic self-efficacy. The independent variables of the study were metacognitive awareness, reflective thinking, problem solving and community of inquiry. Within the scope of the research, the effect of metacognitive awareness, reflective thinking, problem solving and community of inquiry on students' academic self-efficacy was examined in BL environments based on correlational research.

### Participants and Research Process

The study was conducted in an introductory computer course with 217 university students. The introductory computer course was taught in the BL environment. Purposive sampling method was used in the research. Accordingly, the criterion to select the sample group of participants in the study was that the students take the course delivered according to the BL approach. The participants were the students who are studying at the faculty of education in a public university, Turkiye and who took the introductory computer course delivered according to the BL approach. Students were at the departments of Turkish language education and primary school mathematics education. Participants included 63% female and 37% male undergraduate students.

Within the scope of the research, the introductory computer course was delivered according to the BL approach. Accordingly, the conceptual and theoretical issues of course topics were asynchronously presented to the students through instructional videos, e-books and discussion forums prepared by the instructor before coming to the F2F instruction in the computer laboratory. Students came to the F2F instruction by preparing these course materials. However, the course instructor concisely lectured theoretical topics delivered online if any issue remained unresolved in online learning and students needed further clarification. Afterward, they did practices related to course topics that they had theoretically learned. Each student did practice on their own in the computer laboratory. This is the way how the course was taught each week during an academic term

A web-based survey was applied to the students at the end of the academic term. This survey consisted of three main parts. In the first part, the students were informed about the research. The students who agreed to participate in the study reached the second part of the survey. Students' demographic information, such as age, gender, department, etc., was obtained in this part. In the third part of the survey, there were the scales used in the study. Students were required to fill in all the items of the web-based survey. Therefore, there was no data loss resulting from answering the survey.

### Data Collection Instruments

#### Personal Information Form

A personal information form developed by researchers was used to collect data on participants' demographic information such as gender, age and technological equipment.

#### Academic Self-Efficacy Scale

Owen and Froman (1988) originally developed the self-efficacy scale to ascertain the academic self-efficacy levels of students, and Ekici (2012) adopted the scale into Turkish. The scale had 33 items in 3 dimensions including Cognitive applications (19 items), Social status (10 items) and Technical skills (4 items). It used a five-point Likert scale with 5 being "strongly agree" to 1 being "strongly disagree". The reliability coefficient was recalculated for the scale and found to be .96. The high scores on the scale mean a high level of academic self-efficacy.

### Community of Inquiry Scale

The community of inquiry scale developed by Arbaugh et al. (2008) and adapted into Turkish by Ozturk (2012) was employed to ascertain the level of community of inquiry. The scale had 34 items in 3 dimensions including Social presence (9 items), Teaching presence (13 items), and Cognitive presence (12 items). It used a four-point Likert scale with 4 being “Certainly Agree” to 1 being “Certainly Disagree”. The reliability coefficient was recalculated for the scale and found to be .98. The high scores on the scale mean a high level of community of inquiry.

### Reflective Thinking Scale

The reflective thinking scale developed by Kember et al. (2000) and adapted into Turkish by Cigdem and Kurt (2012) was employed to ascertain the level of reflective thinking skills. The scale had 16 items in 4 dimensions including Understanding (4 items), Critical reflection (4 items), Reflection (4 items) and Habitual action (4 items). It used a five-point Likert scale with 5 being “Certainly Agree” to 1 being “Certainly Disagree”. The reliability coefficient was recalculated for the scale and found to be .89. The high scores on the scale mean a high level of reflective thinking skills.

### Problem Solving Inventory

The problem solving inventory developed by Heppner and Peterson (1982) and adapted into Turkish by Sahin, Sahin and Heppner (1993) was employed to ascertain the level of problem solving skills. The scale had 32 items in 6 dimensions including Avoidant style, Reflective style, Impulsive style, Planfulness, Problem-solving confidence and Monitoring. The scale used a six-point Likert scale from “strongly disagree” to “strongly agree”. The reliability coefficient was recalculated for the scale and found to be .86. The high scores on the scale mean a low level of problem solving skills.

### Metacognitive Awareness Inventory

The metacognitive awareness inventory developed by Schraw and Dennison (1994) and adapted into Turkish by Akin, Abaci and Cetin (2007) was employed to ascertain the level of metacognitive awareness. The scale had 52 items in 8 dimensions including Planning (7 items), Conditional knowledge (5 items), Procedural knowledge (4 items), Declarative knowledge (8 items), Information management (9 items), Debugging (5 items), Evaluation (6 items) and Monitoring (8 items). It used a five-point Likert scale with 5 being “always true” to 1 being “always false”. The reliability coefficient was recalculated for the scale and found to be .99. The high scores on the scale mean a high level of metacognitive awareness.

## Data Analysis

A total of 217 university students were surveyed in the study. Data analysis was carried out to conduct the stepwise multiple linear regression. Before carrying out the analysis, the mandatory statistical assumptions were assessed. The distribution of normality was tested by calculating skewness and kurtosis values. They were in the range of +1 to -1. Determining outliers in multivariate data was done by calculating Mahalanobis distance and the data set was found suitable. Afterward, the normality assumptions of the data were also examined through skewness and kurtosis values (from -1 to +1), and a histogram graph. The data set showed a normal distribution. A multivariate scatter diagram was checked to determine if the multivariate normality assumption was met. It was found to be met. Besides, information about multicollinearity was obtained by this normality test. Bivariate correlation coefficients were performed to determine if a multicollinearity problem existed among the (independent) predictor variables in multiply regression analysis. There wasn’t a problem (.49, .54, .53, .64). Durbin-Watson test was performed to examine the problem of autocorrelation and the suitability of the model was confirmed. Thus, stepwise multiple linear regression and descriptive statistics such as correlation, percentage and frequency were conducted to analyze all of the 217 responses when assumptions were met.

## FINDINGS

### Descriptive Statistics of Participants' Responses

As summarized in Table 1, the participants' average score on the academic self-efficacy scale was 115.85 (3.51 out of 5), while their average score on the community of inquiry scale was 104.02 (3.06 out of 4). Their average score on the problem solving inventory was 125.98 (3.94 out of 6) and it was computed as 56.12 (3.51 out of 5) on the reflective thinking scale while their average score on the metacognitive awareness inventory was 191.96 (3.69 out of 5). Therefore, scores of community of inquiry scale and metacognitive awareness inventory were at a high level, while scores of problem solving inventory, reflective thinking scale and academic self-efficacy scale were at a moderate level.

**Table 1.** Descriptive statistics

| Scales | Number of items | Minimum score | Maximum score | $\overline{X}$ | sd | $\overline{X}$/k |
|---|---|---|---|---|---|---|
| Social status | 10 | 17.00 | 50.00 | 34.29 | 6.29 | 3.43 |
| Cognitive applications | 19 | 35.00 | 95.00 | 67.72 | 11.03 | 3.56 |
| Technical skills | 4 | 5.00 | 20.00 | 13.84 | 2.87 | 3.46 |
| Academic Self-Efficacy Scale | 33 | 57.00 | 165.00 | 115.85 | 18.84 | 3.51 |
| Community of Inquiry Scale | 34 | 71.00 | 136.00 | 104.02 | 13.63 | 3.06 |
| Reflective Thinking Scale | 16 | 40.00 | 73.00 | 56.12 | 7.20 | 3.51 |
| Problem Solving Inventory | 32 | 66.00 | 172.00 | 125.98 | 19.28 | 3.94 |
| Metacognitive Awareness Inventory | 52 | 97.00 | 260.00 | 191.96 | 34.39 | 3.69 |

### Relations between Students' Academic Self-Efficacy, Community of Inquiry, Metacognitive Awareness, Problem Solving, and Reflective Thinking

Pearson correlation coefficients were calculated to examine the relations among student reflective thinking, community of inquiry, academic self-efficacy, problem solving, and metacognitive awareness. The results are summarized in Table 2.

**Table 2.** Correlations between students' academic self-efficacy, community of inquiry, reflective thinking, problem solving, and metacognitive awareness

| | | Social status | Cognitive applications | Technical skills | Academic Self-Efficacy | Community of Inquiry | Reflective Thinking | Problem Solving | Metacognitive Awareness |
|---|---|---|---|---|---|---|---|---|---|
| Social status | r | 1 | | | | | | | |
| Cognitive applications | r | .798** | 1 | | | | | | |
| Technical skills | r | .740** | .754** | 1 | | | | | |
| Academic Self-Efficacy Scale | r | .914** | .967** | .841** | 1 | | | | |
| Community of Inquiry Scale | r | .402** | .488** | .446** | .488** | 1 | | | |
| Reflective Thinking Scale | r | .466** | .531** | .457** | .536** | .482** | 1 | | |
| Problem Solving Inventory | r | .456** | .540** | .412** | .531** | .442** | .378** | 1 | |
| Metacognitive Awareness Inventory | r | .520** | .653** | .528** | .636** | .553** | .559** | .687** | 1 |

**. Correlation is significant at the .01 level (2-tailed).

The correlation coefficients between scores on students' academic self-efficacy and other scales were determined as students' academic self-efficacy - community of inquiry (r=.488, p<.01), academic self-reflective thinking (r=.536, p<.01), academic self-efficacy - problem solving (r=.531, p<.01) and academic self-efficacy - metacognitive awareness (r=.636, p<.01). Pallant (2001) highlights that r = .30 to .49 means a moderate relation and r = .10 to .29 shows a small relation. He also adds that r = .50 to 1.0 shows a strong relation. Thus, the results suggest that there was a positive, strong relationship between students' academic self-efficacy and self-reflective thinking, academic self-efficacy and problem solving, and academic self-efficacy and metacognitive awareness. Besides, there was a positive, moderate relationship between students' academic self-efficacy and community of inquiry.

Concerning the correlation between social status and other variables, it was found as social status - community of inquiry (r=402, p<.01), social status - reflective thinking (r=.466, p<.01), social status - problem solving (r=.456, p<.01) and social status - metacognitive awareness (r=.520, p<.01). The results thus confirm a positive, strong relationship between social status and metacognitive awareness. There was also a positive, moderate relationship between social status and community of inquiry, social status and reflective thinking, as well as social status and problem solving.

Calculating the correlation between cognitive applications and other variables showed cognitive applications - community of inquiry (r=488, p<.01), cognitive applications - reflective thinking (r=.531, p<.01), cognitive applications - problem solving (r=.540, p<.01) and cognitive applications - metacognitive awareness (r=.653, p<.01). Therefore, there was a positive, strong relationship between cognitive applications and reflective thinking, cognitive applications and problem solving, and cognitive applications and metacognitive awareness. A positive, moderate relationship also existed between cognitive applications and community of inquiry.

Calculating the correlation between technical skills and other scale scores demonstrated technical skills - community of inquiry (r=446, p<.01), technical skills - reflective thinking (r=.457, p<.01), technical skills - problem solving (r=.412, p<.01) and technical skills - metacognitive awareness (r=.528, p<.01). The results confirm a positive, strong relation between technical skills - metacognitive awareness. A positive, moderate relationship also existed between technical skills and community of inquiry, technical skills and reflective thinking, and technical skills and problem solving.

## Predictors of Students' Academic Self-Efficacy

Stepwise multiple linear regression was performed to determine the predictors of students' academic self-efficacy. As summarized in Table 3, four models significantly predict students' academic self-efficacy. When model 1 was examined, metacognitive awareness explained 41% of the total variance of students' academic self-efficacy. In model 2, reflective thinking explained 5%, while problem solving skills explained 2% of the total variance in Model 3. In model 4, community of inquiry explained 1% of the total variance of students' academic self-efficacy. A positive relationship existed between each variable and students' academic self-efficacy upon addressing regression coefficients. These four variables explained the 48 percent of the total variance in students' academic self-efficacy. Examining regression coefficients related to the model revealed that metacognitive awareness ($\beta$=.636, p<.05), reflective thinking ($\beta$=.263, p<.05), problem solving skill ($\beta$=.182, p<.05) and community of inquiry ($\beta$=.123, p<.05) contribute to students' academic self-efficacy.

**Table 3.** Stepwise regression analysis for variables predicting students' academic self-efficacy

| Model | Variable | R | $R^2$ | Adjusted $R^2$ | Standard Error | β | t |
|---|---|---|---|---|---|---|---|
| 1 | (Constant) | .636 | .405 | .402 | 14.569 | | 8.706 |
| | Metacognitive Awareness Inventory | | | | | .636 | 12.093 |
| | R= .636, $R^2$=.405, F (1,215) = 146.230, p=.000 | | | | | | |
| 2 | (Constant) | .672 | .452 | .447 | 14.009 | | 3.392 |
| | Metacognitive Awareness Inventory | | | | | .489 | 8.023 |
| | Reflective Thinking Scale | | | | | .263 | 4.305 |
| | R= .672, $R^2$=.452, F (2,214) = 88.344, p=.000 | | | | | | |
| 3 | (Constant) | .685 | .470 | .462 | 13.815 | | 1.977 |
| | Metacognitive Awareness Inventory | | | | | .364 | 4.745 |
| | Reflective Thinking Scale | | | | | .264 | 4.392 |
| | Problem Solving Inventory | | | | | .182 | 2.652 |
| | R= .685, $R^2$=.470, F (3,213) = 62.901, p=.000 | | | | | | |
| 4 | (Constant) | .692 | .479 | .470 | 13.721 | | 1.045 |
| | Metacognitive Awareness Inventory | | | | | .323 | 4.100 |
| | Reflective Thinking Scale | | | | | .233 | 3.778 |
| | Problem Solving Inventory | | | | | .167 | 2.441 |
| | Community of Inquiry Scale | | | | | .123 | 1.986 |
| | R= .692, $R^2$=.479, F (4,212) = 48.815, p=.000 | | | | | | |

## Predictors of Students' Social Status

Stepwise multiple linear regression was performed to determine the predictors of student's social status. As summarized in Table 4, three models significantly predict students' social status. When model 1 was examined, metacognitive awareness explained 27% of the total variance of students' social status whereas reflective thinking explained 5% of the total variance in model 2. In model 3, problem solving skill explained 2% of the total variance of students' social status. A positive relationship existed between three variables and students' social status upon addressing regression coefficients. These three variables explained 33% of the total variance in students' social status. Examining regression coefficients related to the model demonstrated that metacognitive awareness (β=.520, p<.05), reflective thinking (β=.256, p<.05) and problem solving skill (β=.190, p<.05) contribute to students' social status.

**Table 4.** Stepwise regression analysis for variables predicting students' social status

| Model | Variable | R | $R^2$ | Adjusted $R^2$ | Standard Error | β | t |
|---|---|---|---|---|---|---|---|
| 1 | (Constant) | .520 | .270 | .266 | 5.388 | | 7.723 |
| | Metacognitive Awareness Inventory | | | | | .520 | 8.915 |
| | R= .520, $R^2$=.270, F (1,215) = 79.473, p=.000 | | | | | | |
| 2 | (Constant) | .561 | .315 | .308 | 5.231 | | 3.002 |
| | Metacognitive Awareness Inventory | | | | | .377 | 5.519 |
| | Reflective Thinking Scale | | | | | .256 | 3.749 |
| | R= .561, $R^2$=.315, F (2,214) = 49.179, p=.000 | | | | | | |
| 3 | (Constant) | .578 | .334 | .325 | 5.169 | | 1.690 |
| | Metacognitive Awareness Inventory | | | | | .245 | 2.852 |
| | Reflective Thinking Scale | | | | | .258 | 3.819 |
| | Problem Solving Inventory | | | | | .190 | 2.475 |
| | R= .578, $R^2$=.334, F (3,213) = 35.613, p=.000 | | | | | | |

## Predictors of Students' Cognitive Applications

Stepwise multiple linear regression was performed to determine the predictors of students' cognitive applications. As summarized in Table 5, three models significantly predict students' cognitive applications. When model 1 was examined, metacognitive awareness explained 43% of the total variance of students' cognitive applications whereas reflective thinking explained 4% of the total variance in model 2. In model 3, problem solving skill explained 2% of the total variance of students' cognitive applications. A positive relationship existed between three variables and students' cognitive applications upon addressing regression coefficients. These three variables explained 48% of the total variance in students' cognitive applications. Examining regression coefficients related to the model revealed that metacognitive awareness (β=.653, p<.05), reflective thinking (β=.241, p<.05) and problem solving skill (β=.177, p<.05) contribute to students' cognitive applications.

**Table 5.** Stepwise regression analysis for variables predicting students' cognitive applications

| Model | Variable | R | $R^2$ | Adjusted $R^2$ | Standard Error | β | t |
|---|---|---|---|---|---|---|---|
| 1 | (Constant) | .653 | .426 | .423 | 8.381 | | 8.512 |
| | Metacognitive Awareness Inventory | | | | | .653 | 12.628 |
| | R= .653, $R^2$=.426, F (1,215) = 159.454, p=.000 | | | | | | |
| 2 | (Constant) | .683 | .466 | .461 | 8.102 | | 3.426 |
| | Metacognitive Awareness Inventory | | | | | .518 | 8.594 |
| | Reflective Thinking Scale | | | | | .241 | 4.004 |
| | R= .683, $R^2$=.466, F (2,214)= 93.316, p=.000 | | | | | | |
| 3 | (Constant) | .695 | .482 | .475 | 7.994 | | 2.024 |
| | Metacognitive Awareness Inventory | | | | | .395 | 5.220 |
| | Reflective Thinking Scale | | | | | .243 | 4.085 |
| | Problem Solving Inventory | | | | | .177 | 2.613 |
| | R= .695, $R^2$=.482, F (3,213)= 66.181, p=.000 | | | | | | |

### Predictors of Students' Technical Skills

Stepwise multiple linear regression was performed to determine the predictors of student's technical skills. As summarized in Table 6, three models significantly predict students' technical skills. When model 1 was examined, metacognitive awareness explained 28% of the total variance of students' technical skills whereas reflective thinking explained the 4% of the total variance in model 2. In model 3, community of inquiry explained 2% of the total variance of students' technical skills. A positive relationship existed between three variables and students' technical skills upon addressing regression coefficients. These three variables explained 34% of the total variance in students' technical skills. Examining regression coefficients related to the model showed that metacognitive awareness ($\beta$=.528, $p<.05$), reflective thinking ($\beta$=.236, $p<.05$) and community of inquiry ($\beta$=.174, $p<.05$) contribute to students' technical skills.

**Table 6.** Stepwise regression analysis for variables predicting students' technical skills

| Model | Variable | R | $R^2$ | Adjusted R2 | Standard Error | β | t |
|---|---|---|---|---|---|---|---|
| 1 | (Constant) | .528 | .279 | .276 | 2.445 | | 5.685 |
| | Metacognitive Awareness Inventory | | | | | .528 | 9.127 |
| | R= .528, $R^2$=.279, F (1,215) = 83.297, p=.000 | | | | | | |
| 2 | (Constant) | .563 | .317 | .311 | 2.385 | | 1.697 |
| | Metacognitive Awareness Inventory | | | | | .397 | 5.826 |
| | Reflective Thinking Scale | | | | | .236 | 3.460 |
| | R= .563, $R^2$=.317, F (2,214) = 49.760, p=.000 | | | | | | |
| 3 | (Constant) | .581 | .337 | .328 | 2.356 | | .360 |
| | Metacognitive Awareness Inventory | | | | | .325 | 4.447 |
| | Reflective Thinking Scale | | | | | .192 | 2.765 |
| | Community of Inquiry Scale | | | | | .174 | 2.509 |
| | R= .581, $R^2$=.337, F (3,213) = 36.092, p=.000 | | | | | | |

As shown in Table 7, community of inquiry was not a significant predictor of social status or cognitive applications. Besides, problem solving did not significantly predict technical skills. Findings show that all research hypotheses were accepted, except for three of them. As a result, findings provide evidence that community of inquiry , metacognitive awareness, problem solving inventory and reflective thinking are significant and strong predictors of students' academic self-efficacy.

**Table 7.** Summary of all hypotheses tests results

| Hypothesis | Antecedents | Supported? |
|---|---|---|
| H1 | Community of Inquiry → Academic self-efficacy | Yes |
| H1a | Community of Inquiry → Social status | No |
| H1b | Community of Inquiry → Cognitive applications | No |
| H1c | Community of Inquiry → Technical skills | Yes |
| H2 | Reflective thinking → Academic self-efficacy | Yes |
| H2a | Reflective thinking → Social status | Yes |
| H2b | Reflective thinking → Cognitive applications | Yes |
| H2c | Reflective thinking → Technical skills | Yes |
| H3 | Problem solving → Academic self-efficacy | Yes |
| H3a | Problem solving → Social status | Yes |
| H3b | Problem solving → Cognitive applications | Yes |
| H3c | Problem solving → Technical skills | No |
| H3 | Metacognitive awareness → Academic self-efficacy | Yes |
| H3a | Metacognitive awareness → Social status | Yes |
| H3b | Metacognitive awareness → Cognitive applications | Yes |
| H3c | Metacognitive awareness → Technical skills | Yes |

## DISCUSSIONS

This study examined the relationships amongst learners' self-efficacy, reflective thinking, metacognitive awareness, social status and community of inquiry in BL. Regarding self-efficacy, it was confirmed that it had a strong positive relationship with variables like metacognitive awareness, problem solving and reflective thinking. In addition, it had a moderate positive relationship with community of inquiry. Concerning social status, the findings suggested a strong, positive relationship with metacognitive awareness, and a moderate positive relationship with community of inquiry, reflective thinking and problem solving as well. In terms of cognitive applications, it had a strong, positive relationship with metacognitive awareness, problem solving and reflective thinking, and a moderate positive relation with community of inquiry. As to students' technical skills, it had a strong, positive relationship with metacognitive awareness, a positive, moderate relationship with community of inquiry, reflective thinking and problem solving. The findings of the study were consistent with similar studies in flipped classrooms, which found a moderate, positive relationship between community of inquiry and self-efficacy (Karaoglan-Yilmaz, 2017), and a strong, positive relationship between metacognitive awareness and academic self-efficacy in a recent empirical study on flipped classrooms (Karaoglan-Yilmaz, 2020).

## LIMITATIONS

Participants of this study were students in an introductory computer course in Turkiye. Thus, the results might not apply to students from other cultures or subject areas. As typical with self-reporting, possible bias in self-reported data is another limitation, although well-established, reliable data collection instruments were employed in this study.

## IMPLICATIONS

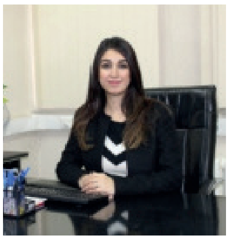
Many studies have revealed a positive correlation between academic performance and self-efficacy (Lai & Hwang, 2016; Roick & Ringeisen, 2017). In addition, a recent study (Namaziandost & Cakmak, 2020) found that students' self-efficacy belief had a positive effect on students' participation in group discussions as well as their overall engagement in active learning. Extending previous research, this study built multiple predictive models to investigate students' self-efficacy through comprehensive statistical analyses. The predictive models indicated that metacognitive awareness, reflective thinking, problem solving skills and community of inquiry contributed to learners' engagement, social status and cognitive applications. Also, metacognitive awareness, reflective thinking, and community of inquiry contributed to students' technical skills. In summary, variables such as community of inquiry, metacognitive awareness, problem solving and reflective thinking were significant and strong predictors of students' academic self-efficacy, as found in this study.

The findings of this study add to the limited body of research on self-efficacy and reflective thinking (Ulucinar Sagir et al., 2016), provide new evidence supporting the positive and significant correlation between problem solving and self-efficacy (Cansoy & Turkoglu, 2017; Kozikoglu, 2019), and between self-efficacy and community of inquiry (Shea & Bidjerano, 2010). They are also consistent with previous research on metacognitive awareness (e.g., Choy, Yim, & Tan, 2020; Ramirez-Arellano, Bory-Reyes, & Hernandez-Simon, 2019).

The findings shed light on an effective design of BL with practical guidance for instructors and instructional designers. For instance, strategies and learning activities in BL should aim to stimulate metacognitive awareness, to promote reflective thinking and problem-solving skills and to facilitate community of inquiry in various ways to enhance learner engagement, social status and improve cognitive applications. Such strategies may address the four vital design challenges in BL that researchers have identified previously (Boelens et al., 2017). Likewise, the learning environments, activities and materials that foster metacognitive awareness, reflective thinking, problem solving skills and community of inquiry in BL may improve learners' engagement, social status and cognitive applications as well as technical skills.

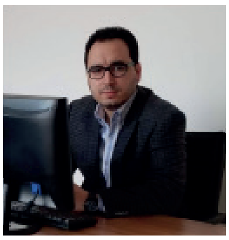
The study may also serve as a first attempt in bridging the gap between research on self-efficacy and reflective thinking (Ulucinar Sagir et al., 2016). To further advance related research on self-efficacy and its relationships with variables like reflective thinking, cognitive applications, metacognitive awareness, social status and community of inquiry, future research may employ various methods, including qualitative, experimental, mixed methods and educational design research, to name a few.

## BIODATA and CONTACT ADDRESSES of AUTHORS



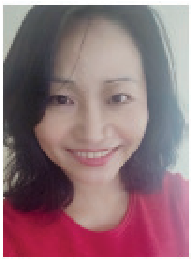
**Dr. Fatma Gizem KARAOGLAN-YILMAZ** is an Associate Professor of Computer Technology and Information Systems at Bartin University. She is interested in distance education, flipped learning, interactive learning environments, human–computer interaction, virtual reality, augmented reality, and eye-tracking. Her articles have been published in various well-known journals. She has presented on a wide range of topics at national and international conferences.

Fatma Gizem KARAOGLAN-YILMAZ
Computer Technology and Information Systems, Faculty of Sciences
Address: Bartin University, 74110, Bartin, TURKIYE
Phone: +90 378 501 10 00
E-mail: gkaraoglanyilmaz@gmail.com



**Dr. Ahmet Berk USTUN** is is an Assistant Professor of Computer Technology and Information Systems in the Faculty of Sciences at Bartin University. Dr. Ustun gained his Ph.D. in Learning Design and Technology from Wayne State University. His academic interest areas are blended learning, online learning, emerging technologies, virtual reality, augmented reality, mixed reality and learning analytics. He has over 30 publications in the research and practice of instructional design including a book chapter and refereed journal articles. He has presented on a wide range of topics at national and international conferences.

Ahmet Berk USTUN
Computer Technology and Information Systems, Faculty of Sciences
Address: Bartin University, 74110, Bartin, TURKIYE
Phone: +90 378 501 10 00, 3422
E-mail: ustun.ab@gmail.com



**Dr. Ke ZHANG** is Professor of Learning Design and Technology at Wayne State University in USA. Her work focuses on e-learning, innovative learning technologies, and new research methods. Her collaborative research is supported by federal government and agencies, like the US Department of Health and Human Services and National Institute of Health, with multi-million-dollar grants. Dr Zhang has also consulted for international organizations, national governments and agencies, corporations, healthcare systems, and educational institutions.

Ke ZHANG
Learning Design and Technology, College of Education
Address: Wayne State University, 48202, Detroit, Michigan, USA
Phone: +1 313-577-1728
E-mail: ke.zhang@wayne.edu

**Dr. Ramazan YILMAZ** is an associate professor of Computer Technology and Information Systems at Bartin University. He is interested in flipped learning, virtual reality, smart learning environments, technology-enhanced learning, human–computer interaction, cyberpsychology, data mining, learning analytics, and eye-tracking. His articles have been published in various well-known journals such as Interactive Learning Environments, Computers & Education, Computers in Human Behavior, Journal of Educational Computing Research, etc.

Ramazan YILMAZ
Computer Technology and Information Systems, Faculty of Sciences
Address: Bartin University, 74110, Bartin, TURKIYE
Phone: +90 378 501 10 00
E-mail: ramazanyilmaz067@gmail.com

## REFERENCES

Adams Becker, S., Cummins, M., Davis, A., Freeman, A., Hall Giesinger, C., & Ananthanarayanan, V. (2017). *NMC Horizon Report: 2017 Higher Education Edition*. Austin, Texas: The New Media Consortium.

Agran, M., Blanchard, C., Wehmeyer, M. & Hughes, C. (2002). Increasing the Problem-Solving Skills of Students with Developmental Disabilities Participating in General Education. *Remedial and Special Education, 23*(5), 279-288.

Akin, A., Abaci, R., & Cetin, B. (2007). The validity and reliability of the Turkish version of the metacognitive awareness inventory. *Kuram ve Uygulamada Egitim Bilimleri, 7*(2), 671-678.

Al-Qahtani, A. A., & Higgins, S. E. (2013). Effects of traditional, blended and e-learning on students' achievement in higher education. *Journal of Computer Assisted Learning, 29*(3), 220–234.

Anderson, T., Rourke, L., Garrison, D. R., & Archer, W. (2001). Assessing teaching presence in a computer conferencing context. *Journal of Asynchronous Learning Networks, 5*(2), 1–17.

Bahar, A., & Maker, C. J. (2015). Cognitive Backgrounds of Problem Solving: A Comparison of Open-ended vs. Closed Mathematics Problems. *Eurasia Journal of Mathematics, Science & Technology Education, 11*(6), 1531–1546.

Barr, V., & Stephenson, C. (2011). Bringing computational thinking to K-12: What is involved and what is the role of the computer science education community? *ACM Inroads, 2*(1), 48–54

Boelens, R., De Wever, B., & Voet, M. (2017). Four key challenges to the design of blended learning: A systematic literature review. *Educational Research Review, 22,* 1–18. https://doi.org/10.1016/j.edurev.2017.06.001.

Bradley, C., Erice, M., Halfer, D., Jordan, K., Lebaugh, D., Opperman, C., & Stephen, J. (2007). The impact of a blended learning approach on instructor and learner satisfaction with preceptor education. *Journal for Nurses in Staff Development, 23,* 164–170.

Brown, A. L. (1987). *Metacognition, executive control, self-regulation, and other more mysterious mechanisms.* In F. E. Weinert, R. H. Kluwe (Eds.), Metacognition, motivation, and understanding (65-116). Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Cansoy, R., & Turkoglu, M. E. (2017). Examining the Relationship between Pre-Service Teachers' Critical Thinking Disposition, Problem Solving Skills and Teacher Self-Efficacy. *International Education Studies, 10*(6), 23-35.

Choy, S. C., Yim, J. S. C., & Tan, P. L. (2020). A Metacognitive Knowledge, Metacognitive Experience, And Its Effects On Learning Outcomes For Stem And Non-Stem Malaysian Students. *International Journal of Advanced Research in Education and Society, 2*(1), 1-14.

Cigdem, H., & Kurt, A. A. (2012). Yansitici dusunme olceginin Turkceye uyarlanmasi. *Uludag Universitesi Egitim Fakultesi Dergisi, 25*(2), 475-493.

Creswell, J. W. (2012). *Educational Research: Planning, Conducting and Evaluating Quantitative and Qualitative Research.* Boston, MA: Pearson.

Dehghani, M., Jafari-Sani, H., Pakmehr, H. & Malekzadeh, A. (2011). Relationship between Students Critical Thinking and Self-Efficacy Beliefs in Ferdowsi University Of Mashhad, Iran. *Procedia Social and Behavioral Sciences, 15*, 2952–2955.

Dewey, J. (1933). *How we think. Chicago:* Henry Regnery.

Dwiyogo, W. D. (2018). Developing a blended learning-based method for problem-solving in capability learning. *Turkish Online Journal of Educational Technology, 17*(1), 51-61.

Dziuban, C., Graham, C. R., Moskal, P. D., Norberg, A., & Sicilia, N. (2018). Blended learning: the new normal and emerging technologies. *International Journal Of Educational Technology in Higher education, 15*(1), 1-16.

Ekici, G. (2012). Akademik oz-yeterlik olcegi: Turkceye uyarlama, gecerlik ve guvenirlik calismasi. *Hacettepe Universitesi Egitim Fakultesi Dergisi, 43*(43), 174-185.

Ersozlu, Z. N., & Arslan, M. (2009). The effect of developing reflective thinking on metacognitional awareness at primary education level in Turkey. *Reflective Practice, 10*(5), 683-695. doi: 10.1080/14623940903290752.

Flavell, J., 1979. Metacognition and cognitive monitoring: A new area of cognitive–developmental inquiry. *American Psychologist, 34*(10), 906-911.

Garrison, D. R., & Akyol, Z. (2013). *The community of inquiry theoretical framework.* In M. G. Moore (Ed.), Handbook of distance education. New York, NY: Routledge.

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment. *The Internet and Higher Education, 2*(2–3), 87–105.

Garrison, D. R., Cleveland-Innes, M., & Fung, T. S. (2010). Exploring causal relationships among teaching, cognitive and social presence: Student perceptions of the community of inquiry framework. *The Internet and Higher Education, 13*, 31–36.

Geng, S., Law, K. M., & Niu, B. (2019). Investigating self-directed learning and technology readiness in blending learning environment. *International Journal of Educational Technology in Higher Education, 16*(1), 17. https://doi.org/10.1007/s10798-018-9462-3

Graham, C. R., Woodfield, W., & Harrison, J. B. (2013). A framework for institutional adoption and implementation of blended learning in higher education. *The Internet and Higher Education, 18,* 4-14.

Jaleel, S. (2016). A Study on the Metacognitive Awareness of Secondary School Students. *Universal Journal of Educational Research, 4*(1), 165-172.

Jokinen, P., & Mikkonen, I. (2013). Teachers' experiences of teaching in a blended learning environment. *Nurse Education in Practice, 13,* 524–528.

Jonker, H., Marz, V., & Voogt, J. (2018). Teacher educators' professional identity under construction: The transition from teaching face-to-face to a blended curriculum. *Teaching and Teacher Education, 71,* 120–133. https://doi.org/10.1016/j.tate.2017. 12.016.

Jusoff, K., & Khodabandelou, R. (2009). Preliminary study on the role of social presence in blended learning environment in higher education. *International Education Studies, 2*(4), 79–83.

Karaoglan Yilmaz, F. G. (2017). Predictors of community of inquiry in a flipped classroom model. *Journal of Educational Technology Systems, 46*(1), 87-102.

Karaoglan Yilmaz, F.G. (2020). Modeling different variables in flipped classrooms supported with learning analytics feedback. *Journal of Information and Communication Technologies, 1*(2), 78-94.

Karaoglan Yilmaz, F. G., Olpak, Y. Z., & Yilmaz, R. (2018). The effect of the metacognitive support via pedagogical agent on self-regulation skills. *Journal of Educational Computing Research, 56*(2), 159-180.

Karaoglan-Yilmaz, F. G., Yilmaz, R., Ustun, A. B, & Keser, H. (2019). Examination of critical thinking standards and academic self-efficacy of teacher candidates as a predictor of metacognitive thinking skills through structural equation modelling. *Journal of Theoretical Educational Science, 12*(4), 1239-1256.

Kozikoglu, I. (2019). Investigating Critical Thinking in Prospective Teachers: Metacognitive Skills, Problem Solving Skills and Academic Self-Efficacy. *Journal of Social Studies Education Research, 10*(2), 111-130.

Lai, C-L., & G-J Hwang (2016). A self-regulated flipped classroom approach to improving students' learning performance in a mathematics course. *Computers & Education, 100,* 126-140. https://doi.org/10.1016/j.compedu.2016.05.006

Lesh, R., & Zawojewski, J. (2007). *Problem-solving and modeling. In F. Lester (Ed.), Second handbook of research on mathematics teaching and learning* (763–804). Reston: NCTM.

Li, C., He, J., Yuan, C., Chen, B., & Sun, Z. (2019). The effects of blended learning on knowledge, skills, and satisfaction in nursing students: A meta-analysis. *Nurse education today, 82,* 51-57.

Maza, E. M. T., Lozano, M. T. G., Alarcón, A. C. C., Zuluaga, L. M., & Fadul, M. G. (2016). Blended learning supported by digital technology and competency-based medical education: a case study of the social medicine course at the Universidad de los Andes, Colombia. *International Journal of Educational Technology in Higher Education, 13*(1), 27.

Namaziandost, E., & Cakmak, F. (2020). An account of EFL learners' self-efficacy and gender in the Flipped Classroom Model. *Education and Information Technology, 25,* 4041–4055.

Ozturk, E. (2009). Adaptation of the classroom community index: the validity and reliability study. *Hacettepe University Journal of Education, 36,* 193-252.

Pallant, J. (2001). *SPSS: Survival manual.* Canberra: McPherson.

Porter, W. W., Graham, C. R., Spring, K. A., & Welch, K. R. (2014). Blended learning in higher education: Institutional adoption and implementation. *Computers & Education, 75,* 185–195.

Rafiola, R., Setyosari, P., Radjah, C., & Ramli, M. (2020). The Effect of Learning Motivation, Self-Efficacy, and Blended Learning on Students' Achievement in The Industrial Revolution 4.0. *International Journal of Emerging Technologies in Learning, 15*(8), 71-82.

Ramirez-Arellano, A., Bory-Reyes, J., & Hernandez-Simon, L. M. (2019). Emotions, motivation, cognitive–metacognitive strategies, and behavior as predictors of learning performance in blended learning. *Journal of Educational Computing Research, 57*(2), 491-512.

Rasheed, R. A., Kamsin, A., & Abdullah, N. A. (2020). Challenges in the online component of blended learning: A systematic review. *Computers & Education, 144,* 103701.

Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. *Psychological bulletin, 130*(2), 261.

Roick, J., & Ringeisen, T. (2017). Self-efficacy, test anxiety, and academic success: A longitudinal validation. *International Journal of Educational Research, 83,* 84-93.

Rovai, A. P. (2002). Sense of community perceived cognitive learning, and persistence in asynchronous learning networks. *The Internet and Higher Education, 5*(4), 319–332.

Sadeghi, R., Sedaghat, M. M., & Ahmadi, F. S. (2014). Comparison of the effect of lecture and blended teaching methods on students' learning and satisfaction. *Journal of advances in medical education & professionalism, 2*(4), 146.

Sahin, N., Sahin, N. H., & Heppner, P. P. (1993). Psychometric properties of the problem solving inventory in a group of Turkish university students. Cognitive *Therapy and Research, 17*(4), 379-396.

Schon, D. (1987). *Educating the reflective practitioner: Toward a new design for teaching and learning in the professions.* San Francisco: Jossey Bass.

Shea, P., & Bidjerano, T. (2010). Learning presence: Towards a theory of self-efficacy, self-regulation, and the development of a communities of inquiry in online and blended learning environments. *Computers & Education, 55*(4), 1721-1731.

Ulucinar Sagir, S., Aslan, O., Bertiz, H., & Oner Armagan, F. (2016). Investigation of the Relationship between Pre-Service Science Teachers' Perceived Self-Efficacy in Science Teaching and Disposition toward Reflective Thinking. *European Journal of Science and Mathematics Education, 4*(3), 331-344.

Ustun, A. B., & Tracey, M. W. (2020). An effective way of designing blended learning: A three phase design-based research approach. *Education and Information Technologies, 25,* 1529–1552.

Ustun, A. B., & Tracey, M. W. (2021). An innovative way of designing blended learning through design-based research in higher education. *Turkish Online Journal of Distance Education, 22*(2), 126-146.

Ustun, A. B., Karaoglan Yilmaz, F. G. K., & Yilmaz, R. (2021). Investigating the role of accepting learning management system on students' engagement and sense of community in blended learning. *Education and Information Technologies, 26,* 4751–4769. https://doi.org/10.1007/s10639-021-10500-8

Van der Schaaf, M., Baartman, L., Prins, F., Oosterbaan, A., & Schaap, H. (2013). Feedback dialogues that stimulate students' reflective thinking. *Scandinavian Journal of Educational Research, 57*(3), 227-245. doi:10.1080/00313831.2011.628693.

van Velzen, J. H. (2016). Measuring senior high school students' self- induced self-reflective thinking. *The Journal of Educational Research, 110*(5), 495-502. doi:10.1080/00220671.2015.1129596

Yen, S. C., Lo, Y., Lee, A., & Enriquez, J. (2018). Learning online, offline, and in-between: Comparing student academic outcomes and course satisfaction in face-to-face, online, and blended teaching modalities. *Education and Information Technologies, 23*(5), 2141–2153.

Yilmaz, R. (2020). Enhancing community of inquiry and reflective thinking skills of undergraduates through using learning analytics-based process feedback. *Journal of Computer Assisted Learning, 36*(6), 909-921.