Effects of Personality Traits and Kolb Learning Styles on Learning Outcomes in a Blended Learning Environment

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Abstract
This study explored the effects of personality traits (Big Five personalities) and Kolb’s learning styles on academic achievements in a blended learning environment. A total of 200 students who enrolled in a blended communication course were administered questionnaires that assessed the Big Five personality traits and Kolb’s learning styles. The learning outcomes (the course grades) were attributable to the two of the Big Five personality traits: extraversion and conscientiousness. Learning styles did not have an effect on learning outcomes in this study. Further, there were relationships between the Big Five personality and learning styles. That is, Divergers and Accommodators tended to be more conscientiousness than Convergers and Assimilators. Assimilators and Divergers were more inclined to be extraverted than Convergers and Accommodators.

Keywords: Blended learning, Personality traits, Learning styles, Academic Achievement

1. Introduction
Due to a development of information technology, educational environments have changed rapidly. As e-Learning is being expanded in higher education with viewpoint of learner-centered learning and the importance of self-driven learning, studies about e-Learning are becoming more important. So far, a host of studies regarding e-Learning and blended learning focused on what e-learning is, how to manage it, teaching contents and activities, instructional methods, technological issues, and so on [1]. More studies are required on how to manage effective class with those learners who are more familiar with the traditional face-to-face way of study. It would be useful for teachers and institutions to identify specific learner characteristics for successful online learning, in order to develop appropriate curricular and course designs.

There were beliefs that learners with different variables (gender, age, experience, preferences) appeared to have different learning outcomes. In this context, cognitive ability (e.g., intelligence) has been considered to be a strong predictor in academic performance [2]. However, some studies show that the strong relation between cognitive abilities such as intelligence and academic performance tends to decline as time goes on [3]. A host of studies on the effects of blended learning on academic achievements showed that academic performance is greatly affected by psychological and cognitive traits of individuals (interest, motivation, self-efficacy, learning style), personality types (introversion or extraversion, feeling vs. thinking type), and demographic characteristics [4][5][6][7][8]. Therefore, it would be valuable to examine individual differences such as personality traits and learning strategies in academic achievement. The present study explores the effects of personality traits (Big Five personalities) and Kolb’s learning styles on academic achievements in a blended learning environment.

2. Literature Review
2-1. Learning Styles and Academic Achievements
Researches on learning styles have found that students’ learning styles affect performance in a learning environment [9]. One of the most popular and widely distributed learning style inventories is the Kolb’s Learning Style Inventory (KLSI) [10]. KLSI is based on Kolb’s experiential learning model [11]. In this model, knowledge is created from grasping and transforming one’s experiences. KLSI was designed to place people on a line between concrete experience (CE) and abstract conceptualization (AC); and active experimentation (AE) and reflective observation (RO). While CE and AC are two modes of grasping experience, AE and RO are two modes of transforming experience. The result brings four learning styles such as Divergers (CE/RO), Assimilators (AC/RO), Convergers (AC/AE), and Accommodators (AE/CE) (See figure 1) [12].
There is evidence that different learning styles affect academic achievements. One study found that Convergers and Assimilators among Information Systems students performed better than the students with other learning styles [13]. In a web-based learning environment, learning styles were significant factors affecting students’ achievement. However, the findings regarding relations between learning styles and outcomes are not consistent. For example, students whose learning styles belonged to Convergers and Assimilators were likely to succeed than students whose learning styles belonged to Divergers and Accommodators [14]. On the other, a study found that learners with a Diverger learning style performed best followed by Assimilator, Accommodator and Converger, respectively [15]. Another research revealed Accommodator learning style was associated to higher learning scores [16]. Furthermore, there are studies that have shown little to no correlations between learning styles and academic performance. For instance, Lu, Jia, Gong and Clark found that there are no differences between learning styles and the enduring time of online learning behaviors, and grades [17]. Similarly, one study showed that Divergers outperformed others but the difference was not statistically significant [18].

2-2. Personality and Academic Achievements

The Big Five personality traits have emerged to produce a model for understanding the relationship between personality and various academic behaviors [19]. The Big Five personality is usually administered as an overall personality test that measures the traits of neuroticism, extraversion, openness, agreeableness, and conscientiousness [20]. A study about the effect of personality traits on academic performance found that personality played a significant role in influencing academic achievement. In a regression analysis, the Big Five personality traits explained 14% of the variance in GPA [6]. Specifically, openness, agreeableness, and conscientiousness were positively related to academic performance [21]. A study pointed out neuroticism had higher grades in language and practical topics and lower grades in sports [22]. Also, extraversion, openness, agreeableness, and conscientiousness are positively related to academic achievements and the level of neuroticism is inversely related to academic outcomes [6][23]. Similarly, a study found that extraversion was positively associated with speech performances [5].

2-3. Relationships between Personality and Learning Styles

Some studies have examined a relationship between personality and learning styles. For example, compared to shallow processors, deep processors are more likely to be conscientiousness, intellectually curious, and extraverted [24][25]. Also, students who prefer a structured learning environment and
intuitive processing are prone to anxiety and worry [25]. Landers and Lounsbury found that extraversion and conscientiousness among the Big Five personality traits were predictors of Internet usage [7]. DiTiberio argued that extroverted learners prefer collaborative learning compared to introverted learners; introverted learners are more likely to be comfortable with computer-assisted instruction [4].

Similar to those studies, Komarraju, Karau, Schmeck, and Avdic examined the relationship between personality traits and four different learning styles (i.e., synthesis analysis, methodical study, fact retention, and elaborative processing). As a result, conscientiousness and agreeableness were positively correlated with the four learning styles, whereas neuroticism was negatively correlated with all four learning styles [6]. In addition, extraversion and openness were positively related with elaborative processing and speech performances [5].

3. Research Questions

The previous studies generate empirical evidence that personality traits and learning styles affect academic performance, but also show inconsistent evidence that fail to demonstrate the stable relationship between student learning style, personality traits and learning outcomes. Therefore, the present study aims to answer the following research questions:

RQ1. Do different learning styles significantly influence learning outcome (with respect to course grades) in a blended learning environment?

RQ2. Is there a difference in the blended course grades of students based upon their personality traits?

RQ3. Are there relationships between students’ learning styles and their personality types?

4. Methods

4-1. Participants and Data Collection

The participants for this study are full-time undergraduate students who enrolled in a blended communication course in a university in Korea. The course combines face-to-face lectures with online lessons. Blended learning is a type of e-Learning and refers to an integrated environment that combines the advantages of e-Learning and traditional classroom teaching [26]. The course was designed and taught by individual faculty members based on the Blackboard learning management system (LMS) and facilitated by assistant instructors under the supervision of a professor. Accompanying traditional classroom lessons, these online sessions require learners to perform the following tasks mostly via Blackboard: browse the Internet, view online lectures or streaming media content, read various course materials, participate in asynchronous online discussions, take real-time online quizzes and tests, engage in group problem-solving and collaborative tasks, share content and perform peer evaluations, submit written assignments and receive feedback on those assignments.

A total of 200 students were administered questionnaires that assessed the Big Five personality types and Kolb’s learning styles. Of the participants 109 (54.5%) were males, 91(45.5%) were females; 83 (41.5%) were freshmen, 50 (25%) were sophomores, 43 (21.5%) juniors, and 24 (12%) were seniors. The mean age was 21.33 (SD = 1.45). Data collection spanning both fall and spring semesters had been conducted in 2012 and in 2013.

4-2. Scales

Learning style: Kolb’s learning style inventory 3.1 was adopted to measure students’ learning styles [27]. The inventory consists of 12 items. With Kolb’s learning style instrument, respondents were categorized as Convergers, Divergers, Assimilators or Accommodators.

Personality type: The Big Five Inventory as a measure of the five broad personality factors of neuroticism, extraversion, openness, agreeableness, and conscientiousness was used in this study. The inventory of the Big Five personality is a 44-item, untimed, self-report inventory established by previous researchers [28]. At the Big Five personality test homepage, students provided answers to the Big Five inventory survey, and reported the results to a researcher. Means for the Big Five test result were 28.43 (openness, SD = 22.54), 47.41 (conscientiousness, SD = 23.14), 44.67 (extraversion, SD =
26.25), 47.10 (agreeableness, SD = 22.03), and 39.98 (neuroticism, SD = 23.19) respectively.

_Learning outcome:_ academic achievements were evaluated using the actual course grades that students received in the blended communication course. The course grade was based on assignments, individual class and group activities, a term paper, quizzes, speeches and a final test. The mean for course grades was 78.44 (SD=8.49).

5. Results

5-1. Correlation Analyses

Pearson correlation analyses were calculated to check significant relationships among the research variables (see Table 1). Correlation analysis revealed two significant relationships between course grades and personality traits. Specifically, extraversion (r = .264, p < .001) and conscientiousness (r = -.219, p < .01) were positively related with a course grade. Among demographics variables, a school year was also positively related with the course grade (r = .166, p < .05).

| Table 1. Correlations between the Big Five personality traits, School years, and Grades |
|---------------------------------|-----------------|----------------|----------------|----------------|----------------|
| Variables                        | Openness | Conscientiousness | Extraversion | Agreeableness | Neuroticism | School years |
| Course grade                      | .09      | .219***           | .264***      | .037          | .117         | .166*        |
| N = 200, * p < .05, ** p < .01, *** p < .001 |

5-2. Regression Analyses

In order to identify predictors of learning outcomes (the course grade), regression analyses were conducted using SPSS (version 15). It was found that those personality traits (extraversion, conscientiousness, and neuroticism) and students’ school year were predictors of the course grade. The regression models were statistically significant and the statistics for these models are reported in Table 2. The personality traits such as extraversion, conscientiousness, and neuroticism explained 15.8% of the variance in learning outcomes (F = 12.282, p < .001).

| Table 2. Hierarchical regression analyses with variables regressed on the course grade |
|---------------------------------|-----------------|----------------|----------------|----------------|----------------|
| Dependent Var.                  | Predictor       | Beta | R² | Adjusted R² | F              |
| Course Grade                    | Step 1           | Extraversion | .264 | .07 | .065 | 14.839 (p < .001) |
|                                 | Extraversion     | .240 | .105 | .096 | 11.512 (p < .001) |
|                                 | Conscientiousness| .188 |     |      |     |                |
|                                 | Step 3           | Extraversion | .283 | .158 | .145 | 12.282 (p < .001) |
|                                 | Extraversion     | .287 | .181 | .164 | 10.755 (p < .001) |
|                                 | Conscientiousness| .240 | .235 | .250 |                |
|                                 | Neuroticism      | .245 | .240 | .245 |                |
|                                 | School year      | .151 |     |      |     |                |

5-3. Learning Styles, Personality Traits and Outcomes: ANOVA Test

Utilizing Kolb’s learning style inventory, the participants of the present study were categorized as Convergers, Divergers, Assimilators or Accommodators. 91 (45.5%) of the participants were Divergers, 36 (18%) were Assimilators, 14 (7%) were Convergers, and 59 (29.5%) were Accommodators. The most common learning styles of students are diverging and accommodating in this study which are said to be suited to careers in social science and business (Both of convergers and Assimilators are said to be suited to careers in science and technology) [11]. The distribution of learning styles between males and females was similar.

Analysis of Variance tests (ANOVA) were used to explore whether there were any differences in academic achievements among students’ learning styles. After comparing academic achievements
(based on assignment, test, quiz, writing scores, etc.) of the four learning styles, there were no significant differences between Kolb’s learning styles and learning outcomes.

In addition, ANOVA test was administered to examine relationships between learning styles and personality traits. The mean data of each personality trait (openness, conscientiousness, extraversion, agreeableness, and neuroticism) among the four learning styles showed two significant mean differences (see Table 3). Divergers and Accommodators showed higher conscientiousness scores ($F = 4.857, p < .01$) than Convergers and Assimilators. Assimilators and Divergers were revealed higher extraversion scores ($F = 5.097, p < .01$) than Convergers and Accommodators. However, the differences among the average openness, agreeableness, and neuroticism scores among the four groups were not statistically significant.

Table 3. Means (SD) of personality traits among the learning styles

<table>
<thead>
<tr>
<th>Big Five Personality</th>
<th>Divergers (N = 91)</th>
<th>Assimilators (N = 36)</th>
<th>Convergers (N = 14)</th>
<th>Accommodators (N = 59)</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Openness</td>
<td>30.04 (21.68)</td>
<td>27.86 (23.81)</td>
<td>31.07 (32.28)</td>
<td>25.64 (20.58)</td>
<td>NSD</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>52.27 (21.95)</td>
<td>40.19 (20.41)</td>
<td>32.00 (21.09)</td>
<td>47.98 (24.70)</td>
<td>$4.857^{**}$</td>
</tr>
<tr>
<td>Extraversion</td>
<td>46.19 (27.39)</td>
<td>56.72 (25.27)</td>
<td>36.21 (25.09)</td>
<td>36.98 (22.42)</td>
<td>$5.097^{**}$</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>47.71 (22.34)</td>
<td>49.58 (21.53)</td>
<td>37.71 (26.66)</td>
<td>46.85 (22.03)</td>
<td>NSD</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>37.47 (21.66)</td>
<td>41.53 (24.04)</td>
<td>51.36 (23.71)</td>
<td>40.20 (24.51)</td>
<td>NSD</td>
</tr>
</tbody>
</table>

* $p < .05$, ** $p < .01$

6. Conclusion and Discussion

The present study examined the impact of the Big Five personality and Kolb’s learning styles on academic achievements in a blended environment. The study was designed to explore individual differences on learning outcomes with a different context in Korea while most studies were examined in a western society. The results revealed that the course grade was attributable to extraversion and conscientiousness of the learners. Those who were extraverted and conscientious tended to have higher learning outcomes. Also, those who have higher school years tended to achieve higher course grades. As noted earlier, extraversion and conscientiousness were shown as effective predictors of course grades in regression analyses. This supports previous research that has shown that the more conscientious and extraverted individuals are the more likely that they are to be successful academically [20]. The findings for conscientiousness and extraversion were as expected. However, learning styles did not have an effect on learning outcomes in this study. The findings are not consistent with previous studies arguing of effects of learning styles on learning outcomes [12][15][16]. It is noticed that the courses of previous studies were related to information technology; such as computer programming language learning while the present study focused on learners in the social sciences. Therefore, the conflicting results could be due to the course characteristics or grade assessment.

Meanwhile, there were relationships between the Big Five personality and learning styles. Divergers and Accommodators tended to be more conscientiousness than Convergers and Assimilators. Assimilators and Divergers were more inclined to be extraverted than Convergers and Accommodators. The present study was conducted in a university which is specializes in science and technology. Interestingly, the most common learning styles of the Korean student were Divergers and Accommodators who are said to be suited to careers in social science and business fields. This is in conflict with the Kolb’s view as well as it is not consistent with previous western studies [30][31]. Possible causes would be cultural difference. Regarding to cultural differences, once Joy and Kolb have pointed out that learning styles are related to culture [29]. Further studies could examine the cultural differences in learning styles.

In conclusion, the results provide a support for the role of personality traits in explaining academic achievement, and add to the emerging body of research that highlights individual differences in academic outcomes and student behavior. However, some confusing and inconsistent findings regarding learning styles were also found in this study. The reason why might be produced by various
factors, such as the topic of the course, how grades are given, and cultural differences. Therefore, future researchers have to take these factors into consideration for the following study.

The limitation of present study was that learning outcomes did not contain various course grades. It is more recommended to assess various course grades for learning outcomes. However, the study suggests some implications to teachers and institutions for blended learning courses and curriculum design. Firstly, instructors should consider the diversity of personality when designing and developing e-Learning modules for different students. Second, they should provide various electronic documents for different students. These could be effective methods to improve the quality of online courses.

7. References


