

The Relationship between Students' Interpersonal Intelligence and their Attitudes toward Cooperative Learning in a Web-based Environment

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The purpose of this study was to investigate the relationship between students' interpersonal intelligence and their attitudes toward cooperative learning in a web-based environment. To this end, a survey questionnaire was administered to 1,100 elementary school students. To measure students' attitudes toward cooperative learning, an instrument that assesses attitudes toward interdependence among students and attitudes toward participation in online group activities was developed by the researchers. The relationships between the variables were analyzed using structural equation modeling (SEM), and the results indicated that students with higher interpersonal intelligence have a more positive attitude toward interdependence among students. Moreover, students with a more positive attitude toward interdependence among students showed a more positive attitude toward participation in online group activities. The findings of this study suggest that instructors should consider students' level of interpersonal intelligence when implementing group activities and facilitating cooperative learning in a web-based environment.

Key words : Interpersonal intelligence, cooperative learning, attitude, interdependence, web-based environment.

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I . Introduction

Since the advent of information society, creating knowledge through sharing and exchanging information has gained more importance than merely accumulating and memorizing knowledge. The learning process is considered as a process of creating and reorganizing meanings rather than imposing specific information on students.

Especially, the development of information technology has provided opportunities to facilitate interaction among students during the learning process. Online discussions or online team projects offer various means to promote students' participation in group activities (Garrison, 1997; McLoughlin & Luca, 2001). Instructional technology that provides channels for synchronous communications, such as online conferences and online messengers, and asynchronous or delayed communications, such as online bulletin boards or e-mail, may facilitate students' interactions (McLoughlin & Luca, 2001; McWhaw, Schnackenberg, Sclater, & Abrami, 2003).

However, technology itself cannot guarantee that students will actively participate and cooperate in group activities (Cole & Smith, 1993). Whether they will regard interactions among students as a meaningful process depends on what attitudes they have toward

interdependence among learners, goal sharing, and individual accountability (Gunawardena, Lowe, & Anderson, 1997; Jensen, Johnson, & Johnson, 2002; McCafferty, Jacobs, & Iddings, 2006). In addition, the role of the instructor in making the exchange more meaningful to the learners has significance.

Johnson and Johnson (1994) have suggested four steps of instruction for effective cooperative learning: 1) specifying the instructional objectives, 2) making pre-instructional decisions, 3) structuring the learning task and positive interdependence, and 4) monitoring and intervening.

Though these steps are necessary for meaningful cooperative learning, they may not be sufficient. Besides structuring the learning tasks and organizing discussion groups, consideration of learners' characteristics is important to induce active and productive social interaction among the group members (Johnson, Skon, & Johnson, 1980). Learners' characteristics largely include cognitive aspects such as intelligence, learning styles, and cognitive styles, and affective aspects such as attitudes, values, and motivation. Attitudes toward learning processes can be also determined by personality traits and personal preferences.

As a theory related to personal characteristics, Gardner's (1993, 1999a) multiple intelligences has implications for students' attitudes toward specific types of learning activities. Especially, the

concept of interpersonal intelligence, which is a sub-category of multiple intelligences, appears to have connections with students' attitudes toward cooperative learning activities.

Interpersonal intelligence is defined as the ability of understanding others' emotions, belief and thought (Checkley & Gardner, 1997; Gardner, 1983, 1999b). Whether one has the ability of understanding others or not can affect personal preferences about learning within groups with other students.

For instance, individual students may have different opinions on whether channels of communication and group activities actually contribute to their learning process. Students' attitudes toward cooperative learning may be positive or negative according to their perceptions of self-efficacy in sharing knowledge with other learners and in making interactions meaningful to accomplish their learning objectives. That is, students' level of interpersonal intelligence may determine their preference to cooperative learning.

Despite the implications interpersonal intelligence has for students' attitudes toward learning activities (Campbell & Campbell, 1999; Gardner & Hatch, 1989, McMahon, Rose, & Parks, 2004; Shearer, 1994, 2004), there are few empirical studies that have actually made connections between these two constructs. A large number of scholars have focused on how

cognitive styles, such as information perception and processing processes, affect the learning process in online settings.

To gain a more comprehensive understanding on the effects of learners' characteristics on attitudes toward specific learning activities, this research attempts to investigate the relationship between students' level of interpersonal intelligence and their attitudes toward cooperative learning.

There are some studies that imply that interpersonal intelligence may have an effect on processes of cooperative learning. For example, Kagan (1994) mentioned that cooperative learning provides learners with opportunities to utilize specific skills of interpersonal intelligence such as the ability to understand other's motivations, values, and perspectives.

Also, Armstrong (1994, 2000) introduced learning styles based on the theory of multiple intelligences asserting the necessity of particular teaching strategies for each learning style. For instructional strategies appropriate to students with high interpersonal intelligence, he suggested peer teaching, social gathering, and cooperative learning.

Johnson and Johnson (1994) suggested that the components of cooperative learning include positive interdependence, promotive interaction, individual accountability, and group processing. Specifically, positive interdependence refers to the

condition in which group members are cooperatively connected with each other and have the awareness that they should help each other to accomplish common educational goals (Jensen et al., 2002; Johnson & Johnson, 1994).

Promotive interactions, such as mutual help and trust, are generated when positive interdependence is facilitated in group activities (Johnson & Johnson, 2007), and a positive relationship between positive interdependence and individual accountability was found during cooperative learning activities (Johnson, Johnson, & Holubec, 1994). As a result, positive interdependence is reckoned as the most important element among the components of cooperative learning.

In addition, group processing is promoted when cooperative learning includes self evaluation or peer evaluation about how close the learning activities of group members have reached their common goals (Johnson & Johnson, 1994).

Interpersonal intelligence includes some characteristics that are related to the components of cooperative learning because interpersonal intelligence encompasses the understanding ability of reciprocity and the ability to approach personal problems and matters in the viewpoints of others (Gardner, 1983). Therefore, it should be investigated how interpersonal intelligence affects students' attitudes toward the components of cooperative learning.

The research questions of this study are as follows:

1. What is the relationship between students' interpersonal intelligence and their attitudes toward cooperative learning in a web-based environment?
2. How can students' attitudes toward cooperative learning in a web-based environment be measured?

II. Research Method

Participants

The participants in this study were 1,100 students (4~6th grade) from two elementary schools in Daegu, Korea. Specifically, there were 324 (29.5%) 4th graders, 337 5th graders (30.6%), and 439 6th graders (39.9%). 620 (56.4%) students were male, and 480 (43.6%) students were female. The students participated in diverse web-based cooperative learning activities such as collaborative writing through online discussions via websites operated by their schools.

Measurements

To measure students' level of interpersonal intelligence, this study adapted 10 items from

the Multiple Intelligence Test developed by Moon, Ryu, Kim, and Kim. (2001). The items measure interpersonal abilities such as social interaction, teamwork skills, and understanding other's moods, belief, and thought. The Cronbach's alpha coefficient for the measurement was .77.

A survey developed by the researcher was administered to measure student's attitudes toward cooperative learning in a web-based environment. The items of this survey were

developed based on review of the research conducted by Brewer and Klein (2006) and Johnson and Johnson (1994, 2007). A five-point Likert-type response scale ranging from "1=strongly disagree" and "5=strongly agree" was used for the instrument.

The items were inspected and revised by one professor and three doctoral students. In addition, the researcher had meetings with two in-service elementary teachers to discuss whether the items in the survey were appropriate.

Table 1. Results of the exploratory factor analysis

Item	Factor	
	1	2
1. During group activities, I am satisfied if all group members including me get the same grade.	.46	.14
3. During group activities, I usually do my best for the common assignment.	.68	-.02
5. If I get a prize or additional score from my teacher for good achievement in group activities, I will participate in them positively.	.70	.08
6. It will help us to achieve our group's goal if the role of each member is specifically assigned during group activities.	.75	.03
8. During group activities, I think it will be helpful for every member of my group to discuss a topic with different materials.	.60	.12
9. After our group finishes our task, it is necessary to help other groups implement their activities effectively.	.45	.30
2. It is interesting to implement group activities through the internet.	.22	.71
4. During group activities, it is useful and convenient for me to implement assignments through e-mail.	.19	.74
7. During group activities, it is helpful for me to collect learning materials through the internet.	.29	.40
10. During group activities, I like to use e-mail or online messengers.	-.17	.66
Eigenvalue	2.96	1.40

Exploratory factor analysis with the principal component extraction method was implemented to validate the instrument, and four items that lowered the item-total correlation and did not significantly load on any factors or highly cross-loaded on multiple factors were removed. Factor analysis was conducted again using data collected from another sample. Two factors were extracted, and each item significantly loaded on each factor.

As presented in Table 1, six items loaded on the first factor that was named “attitudes toward positive interdependence”, and four items loaded on the second factor that was named “attitudes toward participation in online group activities.” The two factors explained 43.6% of the total variance.

Confirmatory factor analysis was conducted with the data in this study to validate the factor structure of the instrument. The model fit estimates indicated that the measurement has factorial validity (CFI=.90; GFI=.96; RMR=.06; RMSEA=.07).

The Cronbach's alpha coefficient for each factor was .71 (attitudes toward positive interdependence) and .68 (attitudes toward participation in online group activities).

Procedure

With cooperation from principals and teachers

of the elementary schools, the researchers administered the survey questionnaire to the students and collected their responses. Descriptive statistics, correlation analysis, and structural equation modeling (SEM) were used to analyze the data. The researchers used SPSS Statistics 17.0 and Amos 17.0 for the data analysis.

III. Results

Descriptive statistics (means and standard deviations) of the variables in this study are presented in Table 2.

Table 2. Descriptive statistics of the variables ($n=1,100$)

Variable	Mean	SD
Interpersonal intelligence	3.16	.61
Attitudes toward positive interdependence	3.56	.62
Attitudes toward participation in online learning activities	3.33	.64

The correlation between students' interpersonal intelligence and their attitudes toward positive interdependence was .49 ($p<.01$), the correlation between students' interpersonal intelligence and their attitudes toward participation in online learning activities was .51 ($p<.01$), and the correlation between students' attitudes toward

positive interdependence and their attitudes toward participation in online learning activities was .63 ($p < .01$).

Structural equation modeling (SEM) was used to test whether the relationships between the variables were significant. Anderson and Gerbing's (1988) two-step approach was used by examining the measurement model before the structural model.

The Goodness of Fit Index (GFI), Comparative Fit Index (CFI), Root-Mean-Square Residual (RMR), and the Root-Mean-Square Error of Approximation (RMSEA) were used to evaluate the adequacy of the measurement and the structural model (Kline, 2005; Tabachnick & Fidell, 2007).

First, the model fit estimates indicated that the measurement model adequately fit the data (GFI=.93; CFI=.85; RMR=.06; RMSEA=.06).

The structural model of this study is presented in Figure 1. Students' interpersonal intelligence was hypothesized to have a positive relationship with their attitudes toward positive interdependence among students and their attitudes toward participation in online learning activities. Also, because positive interdependence refers to the condition in which group members are cooperatively connected with each other, students' attitudes toward positive interdependence was hypothesized to have a positive relationship with their attitudes toward

participation in online learning activities.

The model fit estimates indicated that the structural model adequately fit the data (GFI=.92; CFI=.85; RMR=.06; RMSEA=.06).

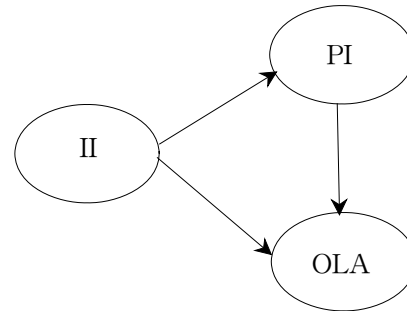


Figure 1. Structural model of the study. II =interpersonal intelligence; PI=attitudes toward positive interdependence; OLA= attitudes toward participation in online learning activities.

The path coefficients of the structural model are presented in Table 3. As can be seen in Table 3, it was found that students' interpersonal intelligence had a positive relationship with their attitudes toward positive interdependence ($t=9.20$, $p < .01$), but students' interpersonal intelligence did not have a significant relationship with their attitudes toward participation in online learning activities ($t=1.16$, $p > .05$).

However, students' attitudes toward positive interdependence had a positive relationship with their attitudes toward participation in online learning activities ($t=8.52$, $p < .01$). That is, students' attitudes toward positive

Table 3. Path coefficients of the structural model

Path	Path Coefficient	Standard Error	<i>t</i>	<i>p</i>
Interpersonal intelligence → Attitudes toward positive interdependence	.51	.06	9.20	.00
Interpersonal intelligence → Attitudes toward participation in online learning activities	.08	.07	1.16	.25
Attitudes toward positive interdependence → Attitudes toward participation in online learning activities	1.39	.16	8.52	.00

interdependence mediated the relationship between interpersonal intelligence and their attitudes toward participation in online learning activities.

IV. Discussion and Conclusions

This study investigated the relationship between students' interpersonal intelligence and their attitudes toward cooperative learning in a web-based environment. It was discovered that students with higher interpersonal intelligence showed a more positive attitude toward interdependence among students in a web-based learning environment. Also, students with a more positive attitude toward interdependence among students had a more positive attitude toward participation in online group activities.

This finding suggests that teachers should consider the level of students' interpersonal intelligence when they implement cooperative

learning activities.

First, teachers should expect that students with higher interpersonal intelligence may participate more actively and show higher achievements when introducing cooperative learning strategies. From this perspective, it would be better to examine students' interpersonal intelligence beforehand and implement cooperative online learning activities when the students show an appropriate level of interpersonal intelligence.

However, from a different perspective, the findings of this study imply that students with higher interpersonal intelligence may lead other students to actively participate in cooperative learning processes.

Nelson (1999) proposed that there are seven stages in collaborative problem solving (CPS). They are 1) preparation of CPS activities, 2) composition of groups, 3) definition of preliminary problems, 4) definition and assignment of roles, 5) execution of CPS

processes, 6) finalization of the solution, and 7) synthesis and reflection. It can be seen that students' level of interpersonal intelligence can be considered especially in the second and the fourth step of CPS.

Nelson (1999) suggested that creating heterogeneous groups consisting of students with different genders, races, knowledge, and skills increases the possibility of collecting diverse types of resources that are necessary for group activities. In addition to collection of diverse materials, students with higher levels of interpersonal intelligence can encourage and facilitate participation and interaction of other students during CPS activities (Cooper, Johnson, Johnson, & Wilderson, 1980).

Also, different roles can be assigned to students within groups based on their level of interpersonal intelligence. The roles Johnson and Johnson (1984) specified in their research on cooperative learning are reader, recorder, checker of understanding, encourager of participation, and elaborator of knowledge. Because students with higher interpersonal intelligence are more likely to perceive others' thinking and emotions effectively, the roles that are especially appropriate for them are checker of understanding and encourager of participation. When these roles are assigned to students with higher interpersonal intelligence, the roles will be performed more effectively and the whole

processes of learning will be enhanced.

Students with a more positive attitude toward interdependence among students also showed a more positive attitude toward participation in online learning activities using communication channels such as e-mail and internet messengers. This result implies that individual differences of students may influence the quality and quantity of students' interactions during online group activities.

Therefore, when teachers attempt to increase interaction between students in a web-based learning environment, they should not only put efforts into designing communication channels using information technology but also pay attention to the effects of students' attitudes and motivation (Jung, Choi, Lim, & Leem, 2002).

Especially, for students with lower levels of interpersonal intelligence, instructors are recommended to promote students' participation in online cooperative learning activities by using instructional strategies that facilitate positive interdependence and group processing (Brewer & Klein, 2006; Nam, 2009; Park & Kim, 2005; Wang, 2003).

For example, the positive effects of active interaction and participation in group activities should be introduced and articulated by the instructor. Teachers should encourage students with lower interpersonal intelligence to participate in group processes and provide

positive feedback when they have attempted to interact with other students.

There are some limitations in this study. First, this study explored only one dimension of multiple intelligences and its effects on online cooperative learning. Therefore, in further research, it would be necessary to investigate the relationships between other types of multiple intelligences and students' attitudes toward specific learning activities. Especially, the effects of intrapersonal intelligence should be considered in future studies.

Second, this study did not investigate the effects of students' interpersonal intelligence on other components of collaborative learning, such as promotive interaction and individual accountability (Johnson & Johnson, 1994). Though positive interdependence is regarded as the most important component of collaborative learning, a more comprehensive understanding on the relationship between interpersonal intelligence and collaborative learning can be gained by including other components in further research.

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웹기반 환경에서 학습자의 대인지능과 협동학습에 대한 태도 사이의 관계

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본 연구의 목적은 웹기반 환경에서 학습자의 대인지능과 협동학습에 대한 태도 사이의 관계를 분석하는 데에 있다. 이를 위해 본 연구에서는 1,100명의 초등학생을 대상으로 대인지능 검사를 실시하고, 협동학습에 대한 그들의 태도를 조사하였다. 협동학습에 대한 학습자의 태도를 측정하기 위하여 학습자 간 상호의존성과 온라인 그룹 활동에의 참여에 대한 태도를 측정하는 도구를 개발하였다. 학습자의 대인지능 수준과 협동학습에 대한 태도가 유의미한 관계가 있는지 검증하기 위하여 구조방정식모형(SEM)을 사용한 결과, 대인지능이 높은 학습자일수록 학습자 간 상호의존성에 대하여 더 긍정적인 태도를 나타내는 것으로 드러났다. 또한 학습자 간 상호의존성에 더 긍정적인 태도를 보이는 학습자일수록 온라인 그룹 활동에의 참여에 대해서도 더 긍정적인 태도를 보이는 것으로 나타났다. 본 연구 결과는 웹기반 환경에서 교수자가 그룹 활동을 실행하거나 협동학습을 촉진하려고 할 때, 학습자의 대인지능의 수준 차이를 고려하여 교수전략을 수립할 필요가 있다는 것을 함의하고 있다.

주요어 : 대인지능, 협동학습, 태도, 상호의존성, 웹기반 환경