

Comparative Study of Collaborative and Independent Blended Learning in Taiwan College

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Abstract—Blended learning is the first reality for teaching and learning learner-centered models. It has emerged as an alternative form of teaching, learning, and supplementing. Dziuban et al. mentioned that cooperative blended learning combined classroom effectiveness and advanced technology for learning environment benefits. Aharon and Rachel believe that any successful collaboration starts with the individual capabilities of motivation and personality.

A non-experimental, quantitative SPSS 17.0 research design was used to explore the relationship of background demographic characteristics, blended learning, learning environment, collaborative learning, independent learning, and student feedback.

The accessible population was 450 participants, resulting in a response rate of 77%. The participants were college students from two colleges in Taiwan. The results for research questions showed that there is no significant for the students' cooperative and independent learning; however, students' cooperative feedback has a greater explanation of the student independent learning. In addition, there are relationship among student background characteristics, blended learning and learning environment with cooperative and independent learning. Therefore, there was the main effect for background demographic characteristics, blended learning, cooperative learning, independent learning, learning environment and student feedback for the study.

One of the limitations of the study was that participants were from two colleges in two cities with small groups. Furthermore, the distribution over those groups was irregular. The case is limited in a small portion of educational research. Although still valid, the results should be overgeneralized. Blended learning transforms the whole education system, which consists of unique characteristics. Future studies of blended learning can transform traditional concepts and curriculum design.

Keywords- blended learning; learning environment; collaborative learning; independent learning; student feedback.

I. INTRODUCTION

The twenty-first century effectuated various challenges for universities. Today, students enter classrooms and learning environments with a background of different skills [1]. Over the last decade, higher education used “blended” courses to

integrate cooperative technology with regular face-to-face meetings for the needs of learners [2][3][4]. Blended learning is the first reality for teaching and learning learner-centered models and has emerged as an alternative form of teaching, learning, and supplementing [5] [2] [6]. Vaughan [7] described that blended learning can increase the effectiveness and convenience for fundamentally redesigned teaching and learning approaches. Dziuban et al. [8] mentioned that cooperatively blended learning combined classroom effectiveness and advanced technology for the learning environment.

Aharon and Rachel [9] believed that any successful collaboration starts with individual capabilities of motivation and personality. Results presented the view of team performance because the students prefer to work in teams if they have the same ability level; however, better students prefer to work alone [10]. Cooperative and independent education are an integrated approach to higher education that merges scholastic learning with workplace knowledge [11]. Academia challenges the framework of blended learning with cooperative and independent learning that seem to be the basic future of learning methodologies [12].

This article examines student feedback on background demographic characteristics of students (age, gender, school, educational status, and year program), blended learning with cooperative and independent learning, learning environments, and student feedback for the study.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

A. Blending Learning

Garrison and Vaughan [13] defined blended learning as “the organic integration of thoughtfully selected and complementary face-to-face and online approaches and technologies” (p. 148). Bart [14] and Naidoo[11] affirmed that blended learning can decrease the costs, relieve the overcrowded classrooms, and provide more convenience to traditional classrooms. In addition, blended courses can increase student engagement. Blended learning is intended to promote the effectiveness of learning. There are two learning methods: the first is regarded as “shallow learning,” and the

other blended learning characterized as “deep learning” [15]. In general, there are three elements for blended learning explicitly present: (a) some personal contact with instructor, (b) some use of electronics to deliver learning objects, and (c) an intentional design to make the first two elements work together toward learning objectives [16] [4] [18].

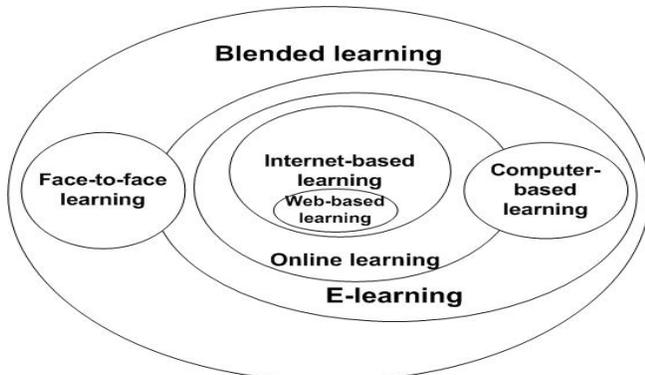


Fig. 1: Components of blended learning

Singh and Reed [19] stated that the blended learning model has five dimensions: (a) online versus offline, (b) self-paced versus live collaborative, (c) structured versus unstructured, (d) custom and off-the-shelf content, and (e) working versus learning. The use of the blended learning model follows the learning cycle through three phases. In summary, blended learning is a combination of e-learning and face-to-face learning [20].

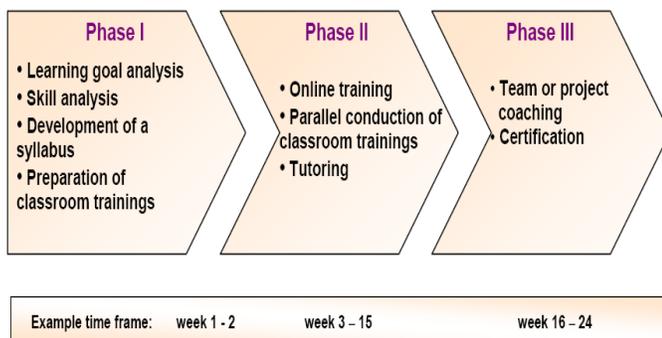


Fig. 2: Blended learning model in three phrases [21].

B. Cooperative Learning

Blended learning may be used for cooperative learning for many college students that may have some experience with inefficient and/or unproductive groups working in face-to-face courses [22]. Johnson and Johnson [23] defined cooperative learning as “the instructional use of small groups so that student’s work together [can] maximize their own and each other’s learning” (p. 9). Jacobs, Power, and Loh [24], conversely, defined cooperative learning as “principles and techniques for helping students work together more effectively” (p. 1).

Research on learning emphasized the important role for cooperative learning within the past few decades [25]. The goal of cooperative learning is to enhance college student

learning and develop student social skills [26]. Kagan [27] discussed cooperative learning as a type of structured peer interaction emphasizing positive human relationships, active learning, collaboration between peers, academic achievements, and equal status for students in the classroom. Kagan [27] considered the essential structural concepts of cooperative learning as positive interdependence, individual accountability, equal participation, and simultaneous interaction.

Jigsaw II is one of the most effective cooperative learning structures [28]. According to Jigsaw II, cooperative learning has five critical characteristics: (a) face-to-face interaction; (b) individual accountability; (c) cooperative social skills; (d) positive interdependence; and (e) group processing [28]. In addition, there are several cooperative learning techniques within the framework of the basic principles; learning together, academic conflicts, learner teams, group research, co-op, Jigsaw I, discovery, Jigsaw II, and ask together - learn together [29]. Cooperative learning allows students to shift from passive to active learning. However, individual learning processes of conscious learning behavior refer to students learning actively and positively [30].

C. Independent Learning

The effect of independent learning has been examined empirically for years [31] [32] [10] [34]. Independent learning is described “in which the learner, in conjunction with relevant others, can make the decisions necessary to meet the learner’s own learning needs” [35]. The key elements of independent learning comprise internal and external factors to learners. The external elements are the development of strong relationships between teachers and students. The internal elements are skills that students have to acquire [36].

Pintrich [37] proposed a theoretical model of independent learning that emphasizes the importance of self-regulated planning, self-controlling, monitoring, and evaluating learning activities. Independent learning, referred to as self-directed learning, can be divided into cognitive skills, metacognitive skills and affective skills. Cognitive skills include attention, memory, and problem-solving. Metacognitive skills are skills associated with learner understanding. Affective skills are skills that are related to emotions and feelings [38] [36]. In addition, learning techniques must be considered lesson objectives in classroom environments. Self-directed learning and lifelong learning are listed as key components and are recognized as important for modern society in twenty-first century skills [39].

D. Learning Environment

The learning environment is part of a blended learning arrangement; for example, blended learning comprises media base in learning environments [40]. Environmental education programs may enhance student collaborative skills [41]. Rieber [42] referred to a learning environment as “a space where the resources, time, and reasons are available to a group of people to nurture, support, and value their learning of a limited set of information and ideas” (p. 3).

According to the 3-C model (content, communication, constructive), learning environments consist of three

components: (a) a *content* component for learners to have material available; (b) a *communication* component that offers learners exchanges between tutors; and (c) a *constructive* component that facilitates and guides individual and cooperative learning activities to achieve learning tasks [43].

E. Student Feedback

In educational contexts, feedback is generally regarded as improving knowledge and skill acquisition [44] [45] [46]. The feedback is multidimensional, learner-controlled, specific, non-evaluative, credible, supportive, contingent, infrequent, and genuine [47] [48]. Morgan [49] discussed that feedback should be effective and useful, depending on three factors: (a) motive: the student needs it, (b) opportunity: the student uses it, and (c) means: the student is able to use the feedback.

III. HYPOTHESIS DEVELOPMENT AND METHODOLOGY

A. Research questionas and hypothesis

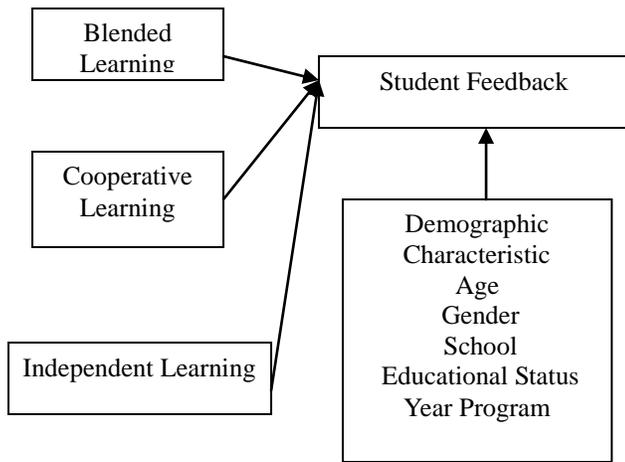


Fig. 3: Hypothesized model of background characteristics, blended learning, cooperative learning, independent learning and student feedback

- H1: Cooperative learning and independent learning have statistical significance for student feedback.
- H2: Student background demographic characteristics, blended learning, and learning environment are significant explanatory variables of student feedback with cooperative learning.
- H3: Student background demographics characteristics, blended learning, and learning environment are significant explanatory variables of student feedback with independent learning.
- H4: Cooperative learning has a greater explanation of the relationship of student feedback than the independent learning of student feedback.
- H5: Background demographics characteristics, blended learning, cooperative learning, independent learning, learning environment, and feedback are significant explanatory variables for Taiwan students.

B. Resign Design

A non-experimental, quantitative SPSS 17.0 research design explored the relationship of background demographic characteristics, blended learning, learning environment, collaborative learning, independent learning, and student feedback.

C. Population and sampling plan

Target population

According to the Taiwan Ministry of Education Department of Statistics, over 100,000 students have taken the national university entrance exam, which is roughly 66.6% study in the University. Since the 1990s, many junior colleges and trade schools have been promoted to universities. Target populations were 177 college students in Taiwan. The sample included students enrolled in the National Taichung University of Education, and Toko University in Taiwan.

D. Sampling plan

The entire accessible population included 347 people who were invited to participate in the study. However, the final data-producing sample was self-selected depending on those who agreed to participate in the study.

E. Instrumentaion

The study survey consisted of six parts: (1) *Background Demographic Characteristics*, developed by the researchers; (2) *Blended Learning Experience*, developed by the Rochester Institute of Technology [50]; (3) *Cooperative Learning Features*, developed by Lara [51]; (4) *Independent Learning*, developed by Morris [52]; (5) *Distance Education Learning Environment (DELES)*, developed by Sahin [53]; and (6) *Course Feedback*, developed by Brennan and Williams[54].

IV. RESULTS

A. Two-way ANOVA analysis: Hypothesis I Research questionas and hypothesis

The value of significance ($p = .900$) in Table 1 indicates no statistical significance. Therefore, Research Hypothesis 1 was not supported.

Table 1: Two-way ANOVA of Cooperative Learning, Independent Learning, and Student Feedback

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	26.657(a)	13	2.051	5.812	.000
Intercept	187.947	1	187.947	532.708	.000
Cooperative Learning	1.456	5	.291	.825	.532
Independent Learning	8.060	4	2.015	5.711	.000

Cooperative Learning Average					
2 * Individual Learning Average	374	4	.093	.265	.900
3					
Error	117.488	333	.353		
Total	4497.000	347			
Corrected Total	144.144	346			

B. Multiple regression analysis: Hypothesis 2, 3, and 5
Research questionas and hypothesis

The value of significance ($p = .000$) in Table 2 indicates statistical significance. Therefore, Research Hypothesis 2 was supported.

Table 2: ANOVA for Multiple Regression Analyses of Background Demographic Characteristics, Blended Learning, Learning Environment, Student Feedback, and Cooperative Learning

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	34.768	8	4.346	12.726	.000(a)
	Residual	115.425	338	.341		
	Total	150.193	346			

The value of significance ($p = .000$) in Table 3 indicates statistical significance. Therefore, Research Hypothesis 3 was supported.

Table 3: ANOVA for Multiple Regression Analyses of Background Demographic Characteristics, Blended Learning, Learning Environment, Student Feedback, and Independent Learning

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	39.979	8	4.997	13.857	.000(a)
	Residual	121.894	338	.361		
	Total	161.873	346			

The value of significance ($p = .000$) in Table 4 indicates statistical significance. Therefore, Research Hypothesis 5 was supported.

Table 4: ANOVA for Multiple Regression Analyses of Background Demographic Characteristics, Blended Learning, Cooperative learning, independent Learning, Learning Environment, and Student Feedback

Model	R	Adjusted R Square	Std. Error of the Estimate	F	Sig.
1	.490(a)	.240	.220	.570	.240
					11.856.000

1	.490(a)	.240	.220	.570	.240	11.856.000
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C. R-Square Analysis

Table 5 shows that the R Square value of the model accounted for 9.1% of the variation in student cooperative learning and 11.49% with student independent learning. Research Hypothesis 4 was not supported.

Table 5: Multiple Regression R Square Analyses of Cooperative Learning, Independent Learning, and Student Feedback

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Cooperative Learning	.301(a)	.091	.088	.616
Independent Learning	.386(a)	.149	.146	.596

D. Reliability analysis

Table 6 indicates that Cronbach’s Alphas for internal consistency on all variables $\alpha = 0.891$ were an acceptable value of reliability. All of them were more than 0.70; therefore, internal consistency was satisfactory.

Table 6: Reliability Statistics for Demographic Characteristics, Blended Learning, Cooperative Learning, Independent Learning, Learning Environment, and Feedback

Cronbach's Alpha	N of Items
.891	36

E. Factor analysis for construct validity

Table 7 shows the results of KMO and Bartlett’s test of sphericity. The value of KMO for blended learning was 0.815, cooperative learning was 0.809, independent learning was 0.772, learning environment was 0.767, and student feedback was 0.857.

Table 7: KMO and Bartlett’s Test Results on Blended Learning, Cooperative Learning, Independent Learning, Learning Environment, and Student Feedback

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	.742
	.827

Bartlett's Sphericity Test	of Approx. Chi-Square	294.596
		161.053
		518.915
	Df	10
		36
		21
	Sig.	.000
		.000
		.000

Table 8 shows that two factor values were larger after varimax rotation was extracted, which accounted for approximately 68% of the total variance.

Table 8: Extraction Sums of Squared Loading on Blended Learning

Component	Extraction Sums of Squared Loadings	% of Variance	Cumulative %
1	3.425	48.931	48.931
2	1.361	19.447	68.378

Table 9 shows that one factor value was larger after varimax rotation was extracted, which accounted for approximately 52% of the total variance.

Table 9: Extraction Sums of Squared Loading on Cooperative Learning

Component	Extraction Sums of Squared Loadings	% of Variance	Cumulative %
1	3.129	52.142	52.142

Table 10 shows that one factor value was larger after varimax rotation was extracted, which accounted for approximately 49% of the total variance.

Table 10: Extraction Sums of Squared Loading on Independent Learning

Component	Extraction Sums of Squared Loadings	% of Variance	Cumulative %
1	2.460	49.196	49.196

Table 11 shows one factor value was larger after varimax rotation was extracted, which accounted for approximately 50% of the total variance.

Table 11: Extraction Sums of Squared Loading on Learning

Environment			
Component	Extraction Sums of Squared Loadings	% of Variance	Cumulative %
1	2.481	49.628	49.628

Table 12 shows that one factor value was larger after varimax rotation was extracted, which accounted for approximately 48% of the total variance.

Table 12: Extraction Sums of Squared Loading on Student Feedback

Component	Extraction Sums of Squared Loadings	% of Variance	Cumulative %
1	3.329	47.551	47.551

V. CONCLUSION

The accessible population was 450 participants, resulting in a response rate of 77%. The participants were college students from two colleges in Taiwan. The results for research questions showed that there is no significant for the students' cooperative and independent learning; however, students' cooperative feedback has a greater explanation of the student independent learning. In addition, there are relationship among student background characteristics, blended learning and learning environment with cooperative and independent learning. Therefore, there was the main effect for background demographic characteristics, blended learning, cooperative learning, independent learning, learning environment and student feedback for the study.

VI. PRACTICAL IMPLICATIONS

Blended learning is closely associated with online and traditional learning from the process and the cooperative and independent learning perspectives. These results show that Taiwanese college students did not prefer using cooperative learning with student feedback than they did student independent learning. Although blended learning is prevalent in Taiwan, there is still no significance for cooperative and independent learning for student feedback.

The findings of the study are important to the Taiwanese government, educational institutes, students, and other researchers that may benefit from the results of blended learning with cooperative and independent learning. The Taiwan government should support educational institutes with other learning techniques so that they can stimulate students to learn through cooperative or independent learning.

VII. LIMITATIONS AND FUTURE STUDY

One of the limitations of the study was that participants were from two colleges in two cities with small groups. Furthermore, the distribution over those groups was irregular. The case is limited in a small portion of educational research. Although still valid, the results should be overgeneralized. Blended learning transforms education with unique characteristics. Future studies on blended learning can transform traditional concepts and curriculum design.

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Chia-Hui Lin works for the Toko University in the south of Taiwan, and Chia-Tsung Lee works for the National Taichung University of Education in Taiwan as well. Both of us do really focus on the research areas and cooperate well in the study. We are looking forward to promoting ourselves and discover new methods in the future study.