Facilitating Students' Learning with Hybrid Instruction: A Comparison among Four Learning Styles

Saovapa Wichadee[1]

[1] Language Institute, Bangkok University, Thailand

Thailand

Correspondence: Saovapa Wichadee. 9/1 Moo 5, Paholyothin Road, Klongluang, Pathumthani, Thailand.
E-mail: saovapa.w@bu.ac.th

Abstract

Introduction. Since a part of the instruction happens online, a hybrid course has usually been used to solve the problems of space and time. This article explores how students' learning styles influence their learning and satisfaction when certain format of a hybrid course is implemented.

Methods. Participants were 122 first-year students at a private university in Thailand participating in 14-week fundamental English classes. Research instruments included English proficiency tests, a learning style questionnaire, and a satisfaction questionnaire. The data were analyzed by dependent t-tests, One-way Analysis of Variance, mean and standard deviation.

Results. Results suggest that hybrid teaching can be an effective way for language development. Interestingly, although students in four learning styles did not differ in their language improvement, their satisfaction was statistically different in two pairs: reflectors and activists; reflectors and pragmatists. In addition, students with reflector style (those who learn best from thinking about what has been learned, listening to and observing others, thinking through before acting on them, and working at their own pace) achieved a higher satisfaction with the course than the other three groups of learning style.

Discussion and Conclusion. Results confirmed the effectiveness of hybrid instruction in language development as well as students' high level of satisfaction on hybrid instruction. Implications for practice were discussed.

Key words: hybrid teaching, language teaching, learning styles, blended learning

Facilitar el Aprendizaje de los Alumnos con la Instrucción Híbrida. Una Comparación de Cuatro Estilos de Aprendizaje.

Resumen

Introducción. Dado que una parte de la instrucción ocurre en línea, los cursos híbridos se han utilizado generalmente para resolver los problemas de espacio y tiempo. Este artículo explora cómo los estilos de aprendizaje de los alumnos influyen en su aprendizaje y satisfacción, cuando un determinado formato de un curso híbrido se implementaba.

Método. Los participantes fueron 122 estudiantes de primer año en una universidad privada en Tailandia participando en 14 semanas de clases de inglés fundamentales. Los instrumentos de investigación incluyeron ensayos de aptitud de inglés, un cuestionario estilo de aprendizaje y un cuestionario de satisfacción. Los datos fueron analizados mediante pruebas t-dependientes, una vía de análisis de varianza, media y desviación estándar.

Resultados. Los resultados sugieren que la enseñanza híbrida puede ser una manera eficaz para el desarrollo del lenguaje. Curiosamente, aunque los estudiantes en cuatro estilos de aprendizaje no difieren en su lenguaje mejora, su satisfacción fue estadísticamente diferente en dos pares: los reflectores y activistas, reflectores y pragmáticos. Además, los estudiantes con estilo reflector (los que aprenden mejor de pensar en lo que se ha aprendido, escuchando y observando a los demás, pensando antes de actuar sobre ellos, y trabajar a su propio ritmo) lograron una mayor satisfacción con el curso que el otro tres grupos de estilo de aprendizaje.

Discusión y Conclusión. Los resultados confirmaron la eficacia de la instrucción híbrida en el desarrollo del lenguaje, así como el nivel de de satisfacción de los estudiantes en la enseñanza híbrida. Se discuten las implicaciones para la práctica.

Palabras clave: enseñanza híbrida, enseñanza de idiomas, estilos de aprendizaje, aprendizaje combinado

Introduction

Nowadays, technology-based learning is a new alternative to create interesting and active learning. As we can see, various on-line tools such as discussion forums, blogs, wikis, and emails are more integrated into instruction to better serve student learning and interaction. New emerging technologies such as mobile phones, tablets, and I-pads are implemented in classes to connect with the Internet in order to search for more information. In Thailand, most educational institutions have been developing online learning courses to provide students with opportunities to study from different places. However, modifying existing face-to-face courses to meet the specific characteristics of online-learning environments is not easy; it requires a great deal of effort and resources (Rodriguez, Ooms, & Montañez, 2008). Institutions are gaining more burdens from the increased financial costs. So, it is rather difficult for all courses to adopt on-line learning. Also, it has been accepted that a single course delivery mode cannot lead to successful learning (Kocoglu, Ozek, & Kesli, 2011). As such, on-line learning components and on-line course management tool is combined with face-to-face instruction. Hybrid instruction is a solution for teachers who would like to to promote active, self-directed learning opportunities with added flexibility (Garnham & Kaleta, 2002).

Hybrid instruction blends the use of technology-based asynchronous teaching methods and traditional teaching methods to give students more control of their own learning and promote greater interaction and cognitive engagement (Allen & Seaman, 2006). Hybrid teaching is first introduced to our university when there were devastating floods in Thailand in October 2011. The natural disaster was difficult to control, and the situation was so terrible because floods destroyed nearly all buildings and facilities in our university. Since most classrooms needed to be repaired, teachers decided to depend on hybrid instruction. Then English courses were transformed to a hybrid format to solve the problem of limited classrooms. In developing an appropriate hybrid format, the previous course syllabus had to be redesigned to cover online and in-class contents. Even though the use of Internet technologies blended with face-to-face class format can produce a wide variety of models, for the Language Institute, teachers in all courses followed the same pattern of two weeks of lecture, three weeks of WebEx Video Conference, two weeks of Learning Management System, and seven tutorial classes due to classroom limitation. In week 8, some of the

classrooms were expected to be ready for tutorial classes where two subjects were taught in the same room.

Previous Research on Hybrid Teaching

The possibility that students would accept blending technology-based asynchronous teaching methods with traditional teaching methods was rather high since there were a number of claims showing students' positive attitudes towards hybrid teaching. For example, Rivera, McAlister, and Rice (2002) surveyed student satisfaction among the three modes of learning (face to face, fully online, and hybrid) and found that student satisfaction was the highest with the hybrid learning model and that test scores were the same for all three methods of delivery. In addition, Young (2002) examined hybrid and fully online teaching at several universities and concluded that among the three modes of instruction (face to face, fully online, and hybrid), hybrid model offers the most significant benefits for teaching and learning. Furthermore, Wu and Hiltz (2004) found that hybrid courses that utilized asynchronous means of communication improved students' perception of learning. According to Rodriguez & Anicete (2011), a majority of students had positive views and experiences with hybrid learning in an undergraduate Ecology course. Similarly, positive opinions were found on the technological applications introduced (Lopez-Perez, Perez-Lopez & Rodriguez-Ariza, 2011).

The research review on hybrid teaching endowed with remarkable results in many studies can guarantee its implementation in class. It was reported that the hybrid group made more progress than the face-to-face group when the pre-test was considered (Woltering, Herrler, Spitzer & Spreckelsen, 2009; Donnely, 2010). In many studies, the "hybrid" course demonstrated the improvements including increased enrollment and students' performance (Lo & Prohaska, 2011; Ladyshewsky, 2004; Motteram, 2006). One study revealed positive influences of blended learning on student participation and motivation (DeGeorge-Walker & Keeffe, 2010).

Hybrid Teaching and Learning Styles

Although the hybrid format in this study was designed to solve the problem of insufficient classrooms after devastating floods, the issue of individual difference such as students' learning styles is deemed important and should be taken into account. Morris, Ross, & Kemp (2004) define learning styles as the characteristics individuals demonstrate when

undertaking learning tasks and processing information. Since learners have different learning styles or a combination of styles, teachers at the Language Institute decided to choose a format that addressed their modes of learning in order to provide significant experiences for each class participant. In designing the effective hybrid courses, individual learning styles play a role in the selection of course delivery modes (online and face to face). To support this belief, Brown (1994) stated that using an appropriate teaching method matching with learners' learning style will help to promote their motivation to learn and enhance their learning potentials, leading to higher learning achievement.

So, in this study, achievement can best be accomplished by utilizing multiple instructional strategies. It is hoped that the hybrid course delivery can improve all students' language proficiency no matter what learning styles they possess. Interestingly, no research was found on hybrid teaching based on students' learning style. Previous research results revealed no influence of learning styles on student performance only in on-line learning. In the first study, Choi, Lee, & Kang (2009) found that the four learning styles (active–reflective, sensing–intuitive, visual–verbal, sequential–global) did not influence students' learning experience and learning outcomes during the implementation of e-learning. Another study showed that the cognitive style neither affected the learning nor the satisfaction of learners (Eyuboglu & Orhan (2011).

Objectives

Since previous research had little investigation on learning style in relation to hybrid instruction, individual differences were still the main concern in this study. As the number of hybrid courses increases rapidly, it is important for teachers and institutions to identify specific characteristics of successful students in this learning environment. It is useful to find out which learning styles can be best improved by hybrid teaching. In addition, the results obtained will clarify students' satisfaction with the hybrid course. The findings will help teachers to understand more about students' learning styles in relation to their preferred learning environments. This research will be guided by three primary questions:

1) To what extend do students in four groups improve their language proficiency after studying through the hybrid course?

2) Do differences exist among four groups with different learning styles in terms of their language proficiency?

3) Do differences exist among four groups with different learning styles in terms of satisfaction with the hybrid course?

Method

Participants

This study was conducted on 122 students (63 male and 59 female) who enrolled in an undergraduate English course in the second semester of the academic year 2011. It was a 3-credit, 14-week compulsory course. The students studied through hybrid teaching once a week for two periods (70 minutes per period). The course was primarily aimed at enhancing students' skills in reading and in writing logical responses to texts. They were also required to practice listening and speaking skills through computerized language learning in a self-study language laboratory for two periods a week.

Instruments

Three research instruments were used to assess the effectiveness of the hybrid teaching course of Fundamental English.

The first instrument was *English proficiency tests* designed in parallel form comprising reading and writing skills, administered as pre-test and post-test. The total score was 30 points. The contents for testing students were written to cover EN 112 contents in terms of vocabulary, grammatical points, summary writing, and paragraph writing. So, there were three main parts: 1) read a story and answer 5 questions, 2) read a story and write a summary in 3-5 sentences, and 3) write a well-organized paragraph in about 100 words. Each part contained 10 points. Time allotted for both tests was 100 minutes. The items of the tests were constructed, verified for content validity by three experts at the English Department at Bangkok University to check and adjust its content. The experts were also asked to rate each item as to see whether it was congruent with the objective stated using the evaluation form constructed by the author. Then, the Item-Objective Congruence (IOC) Index was calculated by assigning scores to three kinds of answers: congruent = 1, questionable = 0, incongruent = -1. Basically, any items with an IOC index lower than 0.5 should be removed or revised. In this study, all items were rated higher than 0.5 of the IOC index, indicating that they were acceptably congruent with the objectives. Its content validity measured by the IOC Index was 0.87. Only 1 item needed a little adjustment in terms of language use. After that, the test was

pilot tested with 40 students who were studying EN 112 during the summer session of 2010 academic year.

The second instrument was *Honey and Mumford's Learning Style questionnaire* which was administered to the students to investigate their preferred learning styles. One of the models dealing with how people take in and possess information is Honey and Mumford's Learning Styles. Honey and Mumford's LSQ has subsequently been applied to a wide range of subjects, including students in higher education (Duff & Duffy, 2002). The LSQ is designed to probe the relative strengths of four different learning styles: activist, reflector, theorist and pragmatist. People with different learning styles can learn best in different situations. Activists are likely to learn best from opportunities to work with other people, or as part of a team, or in flexible situations without the constraint of rules and guidelines. They like to tackle problems as well as welcome new challenges and experiences. For pragmatists, they are likely to learn best from understanding the real world application and trying things out since they usually have a clear structured plan with a definable purpose. Theorists are likely to learn best from information that is presented in a theoretical framework. They like to analyze information, develop a plan, and explore the relationships between things. Reflectors tend to learn best from thinking about what has been learned, listening to and observing others, thinking through before acting on them, and working at their own pace. These behaviors allow them to be thorough and careful (Honey & Mumford, 2000). This questionnaire was Likert format ranging from 1 to 5 as follows: 1 = strongly disagree, 2= disagree, 3 = neither agree nor disagree, 4= agree, and 5 = strongly agree. All of the items were related to how the students perceived their learning styles -- activist, reflector, theorist, and pragmatist. The questionnaire consisted of totally 24 items, 6 denoting each type of learning styles. Even though it had been widely used in many pieces of research, to make sure of its content validity, the items in the questionnaire were rated again by three experts who have keen experience in teaching English for more than 5 years. To determine validity, each item must get a score more than 80 percent, and all of the experts (100%) agreed that the items could be used for measuring a specific learning style pattern of learners. After that, the validated learning style inventory was processed for determining its reliability with 40 non-subject students by the coefficient alpha technique. The result was highly reliable with the Cronbach alpha coefficient of 0.81.

The third instrument was a *questionnaire surveying students' satisfaction* with the hybrid course in order to learn how well the course was accepted by the students. In the first stage, ten items were written with a choice of five rating scale responses for each (5 = strongly agree to 1 = strongly disagree). and examined by three teachers from the Language Institute to assume language accuracy and content validity. To ensure validity, the items containing IOC value from 0.50 to 1.00 were acceptable. As a result, three items with value of 0.33 were removed. Then the questionnaire containing 7 items was piloted on 40 undergraduate students during summer semester of academic year 2009 at Bangkok University and calculated for proper reliability. The value of Cronbach's Alpha Coefficient was .95.

Teaching and Learning Procedure

In this study, the hybrid teaching course was managed based on the pattern of two weeks of team-teaching, three weeks of WebEx Video Conference, two weeks of Learning Management System, and seven tutorial classes due to classroom limitation. On the first week, students were given an orientation on the course and its hybrid format, and hybrid instruction commenced on that day. Teachers carried out a team teaching on summary writing and paragraph writing for two weeks (week 1 and week 2). On week 3, 5, 7, students were to study through the WebEx video conference where they could interact with the teacher on-line. They were invited to speak, share ideas, ask questions, and receive answers. There was also a self-study through Learning Management System on week 4 and 6. After learning the materials provided, students did some exercises for checking their own understanding. After that, they were required to summarize three stories and submit their assignments in Learning Management System. Seven weeks (Week 8-14) were provided for tutorial classes. On week 8, it was expected that some classrooms would be ready for tutorial classes where two subjects were taught at the same room. Students in a group of 10 persons came in the class on a certain period of time based on the schedule distributed to them. In these tutorial classes, students had a good chance to practice writing and get feedbacks from their teacher right after they finished writing.

Data Collection and Analysis

On the first week, all participants were given the Learning Style questionnaire followed by a proficiency test of which the total score was 30. Then a 140-minute lesson (2 periods) was taught with hybrid delivery format for 14 weeks. The intervention was followed

by the post-test and a satisfaction questionnaire on hybrid teaching course. The proficiency scores obtained before and after the intervention were compared using descriptive and dependent samples t-tests in SPSS Program based on students' learning styles. The mean scores of students in four learning styles got from the post-test were compared using an independent samples t-test. P values < .05 were considered statistically significant. Data from the satisfaction questionnaire were analyzed and presented in a form of means and standard deviations. One-way Analysis of Variance was employed to find out the differences of satisfaction with the hybrid course among four learning styles. The Scheffe test was further conducted to find out which pair differed in their satisfaction.

Results

Part I: Results of the English Proficiency Tests

This part contains the proficiency scores of the students who obtained the treatment of hybrid learning. Data from the pre-and post-test scores were quantitatively analyzed by descriptive and inferential statistical procedures, and the findings were examined in light of three research questions.

Research Question 1: To what extend do students in four groups improve their language proficiency after studying through the hybrid course?

This research question investigated whether the language improvement existed in every learning style. The scores of students in the four learning styles -- activist, pragmatist, theorist, and reflector were calculated for mean and standard deviation, and paired samples t-tests were employed to examine the language improvement.

Hypothesis 1: Students in the four learning styles improve their language proficiency significantly.

According to Table 1, the pre-test mean scores can be arranged from most to least as follows: pragmatist, activist, reflector, and theorist (M =14.30, 14.23, 13.68, 13.47). However, after the intervention, the post-test mean scores can be rearranged from most to least as follows: pragmatist, reflector, theorist, activist (M = 21.60, 21.21, 21.05, 21.00). The results showed that the proficiency of students in the four groups of learning style improved significantly after the experiment ($p<.05$). This means that all learning styles can be best improved by the hybrid teaching course. Therefore, hypothesis 1 was accepted.

Table 1. **Comparisons of Pre-and Post-Mean Scores of Students Classified by Learning Styles**

Learning Style	Pre-test		Post-test		
	$\overline{X}$	S.D.	$\overline{X}$	S.D.	t
Activist (n=26)	14.23	(3.12)	21.00	(2.98)	13.37*
Pragmatist (n=43)	14.30	(3.17)	21.60	(3.22)	21.36*
Theorist (n=19)	13.47	(3.52)	21.05	(3.72)	10.15*
Reflector (n=34)	13.68	(3.18)	21.21	(2.89)	18.88*

*p< .05

Research Question 2: Do differences exist among four groups with different learning styles in terms of their language proficiency?

The pre-test scores were used to observe the normal distribution within both groups by the Quantile-Quantile Plot (Q-Q Plot) to ensure that they represented the normal population. Once the distribution of four groups was proven to be normal, the pre-test mean scores of the four groups were compared to ensure that their levels of proficiency were similar before their post-test scores were compared. No significant difference existed in the pre-test scores among four groups. In order to test the hypothesis 2, students' mean scores of the four groups obtained from the post-test were compared using One-way Analysis of Variance to see if there was a statistically significant difference.

*Hypothesis 2***:** *The language proficiency of students in four groups of learning style is not significantly different.*

As Table 2 reveals, the P value for the ANOVA test was not small (P > .05), so there was insufficient evidence to reject the null hypothesis, which donated that the means did not differ. After the intervention, students' language proficiency of the four groups did not differ significantly at a level of .05. That is to say, students in all learning styles could develop their language proficiency well through hybrid instruction.

Table 2. **ANOVA Results for Students' Language Proficiency of the Four Learning Styles**

	SS	df	MS	F	*p*
Between Groups	7.74	3	2.58	.26	.856
Within Groups	1180.79	118	10.01		
Total	1188.53	121			

Part II: Results of the Students' Satisfaction with the Hybrid Course

*Research Question 3***:** Do differences exist among four groups with different learning styles in terms of satisfaction with the hybrid course?

Hypothesis 3: Students' satisfaction with the hybrid course of four groups of learning styles is significantly different.

When students' satisfaction obtained from the questionnaire was calculated, it was found that the mean scores of the four learning groups comprising activists, pragmatists, theorists, and reflectors were 4.20, 4.16, 4.24, and 4.43 respectively. To test Hypothesis 3, data of the four groups were analyzed using One-way Analysis of Variance to see if there was a statistically significant difference.

Table 3. **Mean and Standard Deviation of Students' Satisfaction with the Hybrid Course Shown in Four Learning Styles**

Statement	Learning Styles			
	activist	pragmatist	theorist	reflector
1. the format of hybrid	4.00 (.56)	4.32 (.57)	4.58 (.61)	4.41 (.61)
2. team-teaching	4.23 (.51)	4.06 (.59)	4.10 (.61)	4.41 (.61)
3. tutorial classes	4.04 (.34)	4.16 (.48)	4.00 (.56)	4.47 (.56)
4. WebEx video conference	4.31 (.55)	4.14 (.60)	4.21 (.64)	4.32 (.64)
5. learning management system	4.31 (.47)	4.16 (.69)	4.16 (.70)	4.41 (.70)
6. means of communication such as Facebook, e-mail, blog & forum	4.23 (.65)	4.30 (.60)	4.42 (.65)	4.62 (.65)
7. on-line materials	4.27 (.53)	3.98 (.71)	4.21 (.60)	4.35 (.60)
Total	4.20 (.17)	4.16 (.28)	4.24 (.22)	4.43 (.22)

As Table 4 displays, the P value was small ($p< .001$), so the null hypothesis was rejected. That is, students in four learning styles had different satisfaction with the hybrid instruction.

Table 4. **ANOVA Results for Students' Satisfaction with the Hybrid Course of the Four Learning Styles**

	SS	df	MS	F	$p<$
Between Groups	1.48	3	.49	8.50	.001
Within Groups	6.85	118	.06		
Total	8.32	121			

The Scheffe test was further conducted to find out which groups differed in their satisfaction. Table 5 showed that satisfaction was different in two pairs: reflector and activist; reflector and pragmatist. It is also noted that the mean score of reflector group was higher than those of the other three groups.

Table 5. **A Comparison of Students' Satisfaction Shown in Four Learning Styles**

	Learning Styles			
	Activist	Pragmatist	Theorist	Reflector
	($\bar{x} = 4.20$)	($\bar{x} = 4.16$)	($\bar{x} = 4.24$)	($\bar{x} = 4.43$)
Activist ($\bar{x} = 4.20$)	-	.04	.04	.23*
Pragmatist ($\bar{x} = 4.16$)			.08	.27*
Theorist ($\bar{x} = 4.24$)				.19
Reflector ($\bar{x} = 4.43$)				-

*p< .05

Discussion and Conclusions

The present study was carried out to determine whether hybrid instruction is a better approach to teaching the English language in Thailand. The findings were discussed according to the research questions as follows:

First, there was a change in the participants' language proficiency. This study provided sufficient support for the improvement of the language proficiency of students after using hybrid teaching to facilitate their learning. These effective results were evidenced by the obviously higher mean scores obtained from the pre- to post-tests of the four groups. The reason supporting these results might be because there was a variety in the hybrid course delivery. It can be assumed that blended learning fit in the context. Team teaching and tutorial methods in face-to-face environment could support their learning while the use of technology concerning video conference, and Learning Management System was a new learning experience for them, motivating them to be more responsible. Students also benefitted from receiving fast feedback on-line. That is why students in all learning styles could improve their English proficiency through hybrid teaching which appeared to be not only practical but also efficient.

Second, no statistically significant difference in language proficiency among four groups of students after the experiment could be explained by the well-designed hybrid teaching which incorporated instructional technology in the course, making students learn with convenience. Learning Management System enabled students to review the contents to achieve their learning goal. These reasons are, therefore, used to support that hybrid teaching can improve all learning styles. This finding is similar to Choi, Lee, and Kang (2009); Eyuboglu and Orhan (2011) who found that learning styles did not have an influence on students' outcomes.

Lastly, students' satisfaction demonstrated a high level of satisfaction in all groups (M = 4.20, 4.16, 4.24, 4.43). This can be concluded that students in the four learning styles gained positive attitudes. The result is consistent with the previous research results of Rivera, McAlister, and Rice (2002); Young (2002); Wu and Hiltz (2004). However, when the four learning styles were compared in terms of satisfaction, it was interesting to see that reflectors were satisfied with the hybrid course the most. Their satisfaction was so high (M = 4.43) that statistically significant differences were found in two pairs: reflectors and activists; reflectors and pragmatists. This is probably because reflectors tends to learn best from thinking about what has been learned, listening to and observing others, thinking through before acting on them, and working at their own pace. This personality type allows thorough and careful thinking (Honey & Mumford, 2000). The finding suggested that providing students with preferred learning environment can increase their satisfaction. So, it is necessary for all teachers to understand students' learning styles in order to manage their classes more efficiently.

Implication for Practice

Hybrid instruction blends the use of technology-based asynchronous and traditional teaching methods, so it gives students more control of their own learning. According to the findings, learning styles did not have an influence on students' outcomes in the hybrid course. Students in the four learning styles (activist, pragmatist, theorist, and reflector) can improve their language proficiency through hybrid instruction. In contrast, reflectors are the most acceptable with the idea of hybrid teaching since they like working at their own pace. Since hybrid courses can be more satisfying for some students, so teachers should not leave the others who are less enjoyable.

Limitations of the Research Study

Since this research was conducted in a classroom setting, the sample size was small. Therefore, with limited samples, the generalizability of the findings should be interpreted with caution and may extend only to this immediate population. So, it is recommended that future research should increase the number of students to gain better understanding of the effect of hybrid teaching.

Recommendations for Further Studies

Firstly, the future study may be conducted to see if students with other learning styles such as activists and pragmatists are more satisfied with hybrid teaching if its format has been adjusted. The proportion of online and face-to-face classes might have an effect on their satisfaction. Secondly, it is interesting to achieve transferability by conducting further studies in other contexts, with local resources or with other subjects. Lastly, it is recommended that other kinds of qualitative instruments such as semi-structured interview and learning logs should be included in future studies. These instruments are needed to allow a more in-depth study.

References

Allen, I., & Seaman, J. (2006). Making the grade: Online education in the United States, 2006. The Sloan Consortium. Retrieved 17 November 2011 from http://www.sloan c.org/publications/survey/ pdf/MakingtheGrade.pdf

Brown, H. (1994). *Principles of learning and teaching.* NJ: Prentice Hall Regents.

Choi, I., Sang, J., & Jeongwan, K. (2009). Implementing a case-based e-learning environment in a lecture-oriented anaesthesiology class: Do learning styles matter in complex problem solving over time? *British Journal of Educational Technology*, *40*(5), 933-947.

De George-Walker, L., & Keeffe, M. (2010). Self-determined blended learning: A case study of blended learning design. *Higher Education Research & Development, 29*(1), 1-13. [verified 27 Oct 2011] http://eprints.usq.edu.au/8603/2/De_George-Walker_Keeffe_HERD_v29n1_AV.pdf

Donnelly, R. (2010). Harmonizing technology with interaction in blended problem-based learning. *Computers & Education, 54*(2), 350-359.

Duff, A., & Duffy, T. (2002). Psychometric Properties of Honey 6 Mumford's Learning Style Questionnaire (LSQ). *Personality and Individual Differences, 22,* 147-163.

Eyuboglu, F., & Feza, O. (2011). Paging and scrolling: Cognitive styles in learning from hypermedia. *British Journal of Educational Technology, 42*(1), 50-56.

Garnham, C. & Kaleta, R. (2002). Introduction to hybrid courses. *Teaching with Technology Today, 8*(6). http://www.uwsa.edu/ttt/articles/garnham.htm

Honey, P., & Mumford, A. (2000). *The learning styles helper's guide.* Maidenhead: Peter Honey Publications Ltd.

Ibrahim, A. (2011). The effects of using PBWorks in a hybrid collaborative class environment on students' academic achievement. ProQuest LLC, Ph.D. Dissertation, Indiana State University.

Kocoglu, Z., Ozek, Y., & Kesli, Y. (2011). Blended learning: Investigating its potential in an English language teacher training program. *Australasian Journal of Educational Technology, 27*(7), 1124-1134.http://www.ascilite.org.au/ajet/ajet27/kocoglu.html

Ladyshewsky, R. (2004). E-learning compared with the face to face: Differences in the academic achievement of postgraduate business students. *Australasian Journal of Educational Technology, 20*(3), 316-336.
http://www.ascilite.org.au/ajet/ajet20/ladyshewsky.html

Lee, I. (1998). Supporting greater autonomy in language learning. *ELT Journal, 52*(4), 282-290.

Lo, C., & Prohaska, A. (2011). Creating an Environment Conducive to Active and Collaborative Learning: Redesigning Introduction to Sociology at a Large Research University. *Journal on Excellence in College Teaching, 21*(4), 75-98.

Lopez-Perez, M., Perez-Lopez, M., & Rodriguez-Ariza, L. (2011). Bended learning in higher education: Students' perceptions and their relation to outcomes. *Computers & Education, 56*(3), 818-826.

Morrison, G., Ross, S., & Kemp, J. (2004). *Designing effective instruction.* (4th ed.). Hoboken, NJ: J. Wiley & Sons.

Motteram, G. (2006). Blended education and the transformation of teachers: A long-term case study in postgraduate UK higher education. *British Journal of Educational Technology, 37*(1), 17-30.

Rivera, J., McAlister, M., & Rice, M. (2002). A comparison of student outcomes and satisfaction between traditional and web based course offerings. *Online Journal of Distance Learning Administration, 5*(3), 151-179.

Rodriguez, M., Ooms, A., & Montanez, M. (2008). Students' perceptions of online- learning quality given comfort, motivation, satisfaction, and experience. *Journal of Interactive Online Learning, 7*(2), 105-125.

Woltering, V., Herrler, A., Spitzer, K., & Spreckelsen, C. (2009). Blended learning positively affects students' satisfaction and the role of the tutor in the problem-based learning process: results of a mixed-method evaluation. *Advances in Health Science Education, 14,* 725-738.

Wu, D., & Hiltz, R. (2004). Predicting learning from asynchronous online discussions. *Journal of Asynchronous Learning Networks, 8(*2), 139-152.

  http://www4.uwm.edu/ltc/hybrid/faculty_resources/questions.cfm

Young, J. (2002). Hybrid teaching seeks to end the divide between traditional and online instruction. *Chronicle of Higher Education, 48*(28), A33.

Wichadee, S.

[This page intentionally left blank]