Singapore Students' and Teachers' Perceptions of Computer-Supported Project Work Classroom Learning Environments

Angela F. L. Wong, Choon-Lang Quek, Shanti Divaharan, Woon-Chia Liu, Jarina Peer, and Michael D. Williams
National Institute of Education, Nanyang Technological University, Singapore

Abstract

The computer-supported Project Work classroom learning environment discussed in this paper represents a paradigm shift from teacher-centered to student-centered teaching and learning in Singapore schools. Besides the face-to-face weekly lessons in existing Project Work classrooms, the students engaged in computer-supported online forum discussions. Two hundred and sixty students and 26 teachers from seven high schools participated in this study. Their perceptions of this new learning environment were assessed using a modified version of the Web-based Learning Environment Instrument (WEBLEI). In addition, the instrument was also validated. The WEBLEI exhibited satisfactory internal consistency reliability and discriminant validity. Comparing the actual and preferred perceptions of the students and teachers revealed that there were differences between the actual and preferred perceptions for both students and teachers. With these in mind, the implications for using technology to support the face-to-face teaching and learning in Project Work classrooms are discussed in this paper. (Keywords: computer-supported classrooms; learning environment; classroom environment; project work; project-based learning.)

INTRODUCTION

The field of learning environments has undergone remarkable growth in the last 30 years. Past research (Fraser, 1986, 1994, 1998a, 1998b; Fraser & Walberg, 1991; Goh & Khine, 2002; Khine & Fisher, 2003; Trinidad, Macnish, Aldridge, Fraser, & Wood, 2001) shows that learning environment information has proven valuable for a variety of research purposes in many countries. Qualitative and quantitative research methods have been successfully combined in the assessment and investigation of learning environments (Tobin & Fraser, 1998). The strongest tradition in past classroom environment research has involved investigation of associations between students' cognitive and affective learning outcomes and their perceptions of psychosocial characteristics of their classrooms. Approximately 40 studies tabulated by Fraser (1994) showed that associations between outcome measures and classroom environment perceptions have been replicated for a variety of cognitive and affective outcome measures, a variety of classroom environment instruments, and a variety of samples across grade levels and countries. In the mid-1990s, the learning environment studies have moved to include investigations of computer and online classroom learning environments (Chang & Fisher, 2003; Maor & Fraser, 1996, 2000; Teh & Fraser, 1994, 1995, 1997; Trinidad, Macnish, Aldridge, Fraser, & Wood, 2001;

Trinidad, 2005). In these learning environment studies, computers were perceived as learning technologies that played critical roles in promoting interactions, enjoyment, collaboration, and individualized learning among the learners who came from secondary schools and tertiary institutions.

Project-based learning (PBL) draws on the latest research on effective teaching pedagogies and learning approaches in the 21st century. It is a model for classroom activity that shifts away from the classroom practices of short, isolated, teacher-centered lessons. Instead it focuses on learning activities that are long term, interdisciplinary, student-centered, and integrated with real world issues and practices. It is a total approach to education—both a curriculum and a process (Southern Regional Education Board (SREB), 2000; Houghton Mifflin Company, 2004; ISTE Research Projects, 2004). There is a growing body of literature that supports the use of project-based learning for both the students and teachers (Adamson, 1999; Berns & Bottoms, 1999; Erikson, 2001; Fredell, 1998; Glef, 2004; Johnson, McDonald, & MacAllum, 2002; Quek et al., 2005; Ramey, 1997; Schneider & Krajcik, 2001; Vinson, 2002). It is a pedagogical approach that emphasizes learning through student-directed inquiry and interactions that lead to the creation and representation of knowledge. Although the teachers facilitate students' project-based learning, often they also become their peers, visit various project groups, and assume roles as devils' advocates instead of just being managers in these classrooms.

Benefits from PBL include learning core skills in knowledge application, cooperation, communication, teamwork, and information sourcing. Schools where project-based learning was adopted found a decline in absenteeism, an increase in cooperative learning skills and motivation, a change of attitude, and improvement in social skills and student test scores (Baron & McKay, 2001; Wong, 2001; Yip, Quek, Seet, & Wong, 2003). With the introduction of PBL, teachers interacted and collaborated frequently, reflected on knowledge, cultivated organization skills, and shared knowledge for professional development (Johnson, McDonald, & MacAllum, 2002; Nani, 2003; Penuel & Means, 1999, 2002; Santamaria, 2003). Research has also shown that benefits are enhanced when technology is used in a meaningful way in the projects (Glef, 2004; Thomas, 2000; Yip, Quek, Seet, & Wong, 2003). These learning benefits include students' confidence in both written and spoken communication and ICT skills as well as project skills such as thinking and information literacy skills. They also learned how to build, manage, and share their Web-based resources within and across the project groups.

In the Singapore context, project-based learning is commonly referred to as Project Work (PW). It was introduced in the Singapore school curriculum in 2000 and aimed at promoting student-centered learning and collaborative and communication skills as well as critical and creative thinking (MOE, 1999). Students were given opportunities to experience PW learning between primary 3 and 5 (grades 3 and 5), secondary 1 and 3 (grades 7 and 9) and junior college 1 (grade 11). In the typical Project Work classroom learning environment, the teachers function as facilitators, while the students are engaged in working on collaborative projects in groups of 4–5 members, to brainstorm, select project

ideas and make decisions about their project tasks, and finally make a presentation of their project to their peers. The learning process and products are equally emphasized in the PW classrooms (Quek & Wong, 2002).

THEORETICAL BACKGROUND

In 2000, Project Work (PW) was introduced by the Ministry of Education to Singapore schools as a major educational initiative. PW represented a major paradigm shift in the teaching and learning arena, from being teacher-centred to student-centred. It involved getting students to connect their knowledge from different disciplines to work on real world issues. It provided the learning path for students to initiate work and present their ideas. Hence, teachers became less of a "sage on the stage" and more of a "guide by the side."

In a typical Project Work classroom, the students are assigned to groups of 4–5 members to work on a project task. The group members meet face-to-face during dedicated PW class time and outside curriculum time to discuss how they will go about carrying out the task and completing it. At the end of the school term, each group will be required to make a presentation of their project to their peers in a "show-and-tell" session. The teacher's role in such a classroom is to facilitate the students' discussions and gathering of information.

However, with the introduction of the Masterplan for Information Technology in Education 2 (MP2) (Ministry of Education, 2002), it was timely that PW move beyond the boundaries of the classroom and the school. It was with this purpose in mind that the present study was conceptualized. In the present study, technology was used to support the PW classroom by providing more learning opportunities for students to collaborate, and engage in asynchronous scaffolded online discussions from the comfort of their own homes and schools while their teacher-facilitators worked online. For this purpose, 4 to 5 students from 2 or 3 secondary schools were placed in collaborative PW groups to complete inter-school collaborative projects. As this is an innovative practice, it was important to investigate if the teachers and students perceived their new PW environment positively. To this end, the research in the field of learning environment was explored.

The field of learning environment research has made available a variety of research instruments in the last 30 years. The original instruments were the Learning Environment Inventory (LEI) and the Classroom Environment Scale (CES) (Fraser, 1998b).

Over the years, these instruments were gradually refined to suit specific environments, which allowed researchers to select instruments most suitable for their chosen fields of study. The Science Laboratory Environment Inventory (SLEI) (Fraser, Giddings, & McRobbie, 1995), for instance, was designed for studying science laboratories at senior high schools and universities. For the evaluation of IT-based geography classrooms, Teh and Fraser (1995) developed a four-scale instrument to assess Gender Equity, Investigation, Innovation and Resource Adequacy. Teh (2001) later used the Internet-Based Classroom Environment Inventory (ICEI) to assess postgraduate diploma-in-education students' perceptions of a synchronous Internet-based learning environment.

The synchronous Internet-based learning system used was online, in real-time mode, and took the form of online mediated conferencing and telecomputing approaches.

The Computer Classroom Environment (CCEI) (Maor & Fraser, 1996) was another example of an e-learning environment research instrument. It comprised five scales based on, among other things, the ICEI. The CCEI was validated with a sample of 120 Grade 11 students in Australia. This instrument was unique in that it evaluated the extent of inquiry with the use of technology and how technology could support the inquiry approach in the teaching of secondary school science.

Maor and Fraser (2000) developed and validated the Constructivist Multimedia Learning Environments (CMLES) for use among 221 high school students (grades 10 and 11) in 11 Australian classrooms. All the scales of CMLES demonstrated a high degree of internal consistency reliability and displayed satisfactory factorial validity and discriminant validity. Recently, Macnish et al. (2003) and Trinidad et al. (2001, 2005) developed and validated an online learning survey that was used to investigate the association between students' perceptions of their e-learning environment and their enjoyment of e-learning. The findings provided valuable feedback to educators working in e-learning environments, for example, to help teachers to evaluate the effectiveness of the environment and to make adjustments and improvements to the online learning environment.

The use of the Internet has created opportunities to expand learning experience beyond the traditional classroom. Chang and Fisher (2003) developed a new instrument called the Web-based Learning Environment Instrument (WEBLEI) to assess students' perceptions of online learning. This instrument incorporated students' usage pattern (e.g., students' access, convenience of materials), students' learning attitudes (e.g., students' participation and enjoyment), students' learning process (e.g., level of activity and interactivity among students and between student and lecturer), and academic factors (e.g., scope, layout, presentation, and links of the Web-based learning materials).

As it was the purpose of this study to investigate how students and teachers perceived their computer-supported PW classroom learning environment, a modified version of the WEBLEI was selected for use.

OBJECTIVES

The objectives of the study were:

1. To validate the actual and preferred versions of the Web-based Learning Environment Instrument (WEBLEI) for use among secondary school students in Singapore in terms of internal consistency reliability and discriminant validity,
2. To examine the differences in actual and preferred perceptions among students and teachers and between teachers and students,
3. To suggest strategies to address the student perceptual differences that exist in the e-learning classroom.

METHODOLOGY

Sample

The sample consisted of 260 secondary 2 (i.e., grade 8) students from seven co-educational secondary schools in Singapore who took part in a larger study on "Student-centered learning in the context of Project Work." Each school was asked to select one secondary 2 (grade 8) class of above-average ability students to participate in this study. Hence the selection was done by the schools themselves. All seven schools are typical "neighborhood" secondary schools, meaning that the majority of the student population is from the housing areas around the school.

The student sample came from seven intact classes, one from each school. Each class had an average of 40 students, with a fairly even mix of 14-year-old girls and boys. In general, the students were of above-average ability. At the secondary 2 level, all students undergo a common curriculum. The subjects studied are English language, English literature, mathematics, general science, geography, history, home economics, design and technology, physical education and mother tongue (Mandarin, Malay, or Tamil). With the exception of mother tongue, the medium of instruction in Singapore schools is English.

The teacher data comprised responses from 26 teachers who were the PW facilitators for these students. The teachers were nominated by their school principals to participate in the study. Each school contributed 3–4 teachers from different subject areas, e.g., math, science, humanities, language arts. At least one of the teachers selected in each school had to be the PW teacher of the class participating in the study. The other teachers served as resource teachers whom the students could approach for help with their project tasks. These teachers taught a whole array of subjects, ranging from geography to mathematics to science.

The Computer-Supported PW Classroom and the Processes

At the beginning of the school year, each student was required to select one of the eight project tasks that the PW teachers from the seven schools had jointly crafted previously. Once this was achieved, the researchers assigned the students to various inter-school PW groups based on the project task that they had chosen. This exercise resulted in a total of 67 project groups. Each PW group comprises four to six students from either two or three schools. These students were used to working with each other in cooperative learning groups within the same class; however, they had not worked with peers from another school on PW projects before participating in this study.

After assigning students to their PW groups, the researchers conducted a just-in-time training session for the students. Each student training session was carried out in the respective schools. The focus of the training was to familiarize them with the Knowledge Community (KC) e-learning platform, teach them how to collaborate online using the asynchronous online discussion forum, describe the importance of polite communication, and introduce the protocols to follow when involved in an online collaborative effort. In addition to the training session, students were given handouts to serve as a guide to assist their participation in the online collaboration.

Two periods (1½ hours) were allocated per week for PW. All PW lessons were conducted in the school's computer laboratory, with one student per terminal. During the PW lessons, the students in each intact class went online to discuss how to go about starting their project, streamlining their project objectives, and the process of completing their project tasks with their counterparts from the other schools. The teachers also conducted just-in-time classroom activities that enabled students to acquire the skills that they needed to make progress with their project tasks, such as research and report writing. During the online discussions, the teachers contributed timely facilitation to help students get started and sustain their discussions.

The total duration of the PW online discussions was 10 weeks. Within the 10-week period, the students also had two official face-to-face meetings. The first one was to finalize their project proposal and the other was to finalize the details of their presentations and products. Both meetings were facilitated by their PW teachers and the researchers.

In addition to the in-class online discussions and the official face-to-face meetings, students also met online outside PW curriculum time at other times, for example after school hours, to continue their online discussions.

Instrument

At the end of 10 weeks, the students and their PW teachers completed two questionnaires—the actual and preferred versions of the modified version of the Web-based Learning Environment Instrument (WEBLEI) (Chang & Fisher, 2003). (See Appendix A, page 466.) The researchers went to the schools to personally administer the survey to the students at a 45-minute time slot provided by the school. At the end of that period, the researchers collected back all the surveys. One hundred percent of the students completed the survey, although there was no penalty for non-completion. The researchers sent the teachers' questionnaires to a Head of Department (HOD) to pass them to the teachers to complete. The HOD then mailed back the completed questionnaires to the researchers. We received a 96% response rate. The purpose of the questionnaire was to assess their perceptions of their computer-supported PW classroom learning environment. The WEBLEI was slightly modified from its original form by minor re-wording of a few of the items to make them more appropriate for the Singapore context.

In addition, the modified version used in this study consisted of 31 items instead of 32 because one item from the Access scale was removed. The item that read "I can use time saved in travelling and on campus class attendance for study and other commitments" was not relevant because participants in this study were provided a dedicated curriculum time slot and access to the online environment in their schools. Hence the modified WEBLEI had seven items in the first scale (Access) and eight items in each of the remaining three scales (Interaction, Response, and Results). A five-point response scale, with alternatives of "always," "often," "sometimes," "seldom," and "never," was used.

The first scale, Access, is to ascertain the convenience of accessing the learning activities, the efficiency in terms of accessing the learning materials at a location

suitable to the student, and the autonomy of accessing the learning materials at a time convenient to the student. The second scale, Interaction, assesses if students are able to work in a collaborative and cooperative manner with other students to achieve the learning outcomes. Response, the third scale, measures how students feel in using this type of learning environment by getting them to indicate their perceptions of this learning environment. Finally, the fourth scale, Results, assesses whether the students have gained from this learning environment.

RESULTS

The WEBLEI, in its modified form, was cross-validated as part of the present study using the sample of 260 secondary 2 students in seven intact classes, from seven schools. Internal consistency (alpha reliability) and discriminant validity (mean correlation of a scale with the other three scales) were obtained for the sample in this study as indices of scale reliability and discriminant validity. A summary of these values obtained separately for the actual and preferred versions of the modified WEBLEI used in this study is provided in Table 1.

The internal consistency reliability statistics generated for the sample of the present study were acceptable and higher than those obtained previously with the original validation sample. For the actual version of the modified WEBLEI, the Cronbach alpha coefficient ranged from 0.78 to 0.91 in this study, as compared to 0.68 to 0.87 in the original study by Chang and Fisher (2003). The Cronbach alpha coefficient also ranged from 0.81 to 0.90 for the preferred version of the WEBLEI in this study.

As for the discriminant validity, it ranged from 0.56 to 0.58 in this study, as compared to 0.37 to 0.49 in the original study. On the whole, the values were still acceptable, although they were not as low as those in the original validation.

The actual and preferred perceptions of the computer-supported classroom environment of students and teachers were measured using the WEBLEI. The

Table 1: Internal Consistency Reliability (Cronbach Alpha Coefficient) and Discriminant Validity (Mean Correlation with Other Scales) For the Modified WEBLEI

Scale	No. of items	Form	Alpha reliability	Mean correlations with other scales
Access	7	Actual	0.85	0.58
		Preferred	0.90	0.58
Interaction	8	Actual	0.78	0.56
		Preferred	0.81	0.57
Response	8	Actual	0.83	0.58
		Preferred	0.82	0.58
Results	8	Actual	0.91	0.58
		Preferred	0.89	0.58

N = 260

questionnaire data for the seven classes were used to generate four sets of environment perceptions scores on each of the four WEBLEI scales for each class: the class mean of students' actual scores; the class mean of students' preferred scores; the mean of the teacher's actual score; and the mean of the teacher's preferred score. The means of each set of these perception scores calculated across the seven classes for each of the four WEBLEI scales and their respective standard deviations are tabulated in Table 2.

The item means (as shown in Table 2) ranged from 2.88 to 3.28 and 3.15 to 3.69 for the students' actual and preferred perception scores, respectively. As for the teachers, the item means ranged from 2.90 to 3.48 and 3.25 to 4.19 for the actual and preferred perception scores, respectively. These item means for each scale in the actual and preferred versions of the WEBLEI for both students and teachers were then plotted in Figure 1 to illustrate significant differences between the different forms. The first step in the construction of these classroom environment profiles in Figure 1 involved the performance of a one-way multivariate analysis of variance (MANOVA) with repeated measures. For these analyses, the "form" of the instrument (e.g., student/actual, teacher/preferred) constituted a four-level repeated measures factor, while the set of four WEBLEI scales taken as a whole constituted the dependent variable. Because Wilks' lambda criterion was statistically significant ($p < 0.01$), the univariate one-way analysis of variance (ANOVA) for repeated measures was examined for each of the four scales individually. Finally, in cases for which the ANOVA yielded statistically significant results, pair-wise comparisons between different forms of the same scale (e.g., student/actual versus student/preferred, teacher/actual versus teacher/preferred) were performed using *t*-tests for dependent samples. This three-step approach for the analysis was taken to reduce the Type I error rate associated with the performance of multiple *t*-tests.

Table 2: Scale Means and Standard Deviations for Actual And Preferred Versions of the WEBLEI for Students and Teachers

Scale	No. of Items	Form	Scale Mean		Scale Standard Deviation		Item Mean	
			Student	Teacher	Student	Teacher	Student	Teacher
Access	7	Actual	22.13	24.01	0.72	0.57	3.16	3.43
		Preferred	25.81	28.37	0.81	0.72	3.69	4.01
Interaction	8	Actual	26.27	27.80	0.64	0.51	3.28	3.48
		Preferred	27.07	30.20	0.69	0.47	3.38	3.78
Response	8	Actual	23.02	23.20	0.74	0.75	2.88	2.90
		Preferred	25.23	26.00	0.75	0.78	3.15	3.25
Results	8	Actual	25.58	27.44	0.74	0.65	3.20	3.43
		Preferred	28.91	33.52	0.77	0.64	3.61	4.19

The student sample consisted of 260 secondary 2 students in seven classes. The teacher sample comprised 26 sets of teacher responses.
The Item Mean was calculated by dividing the scale means by the number of items in that scale.

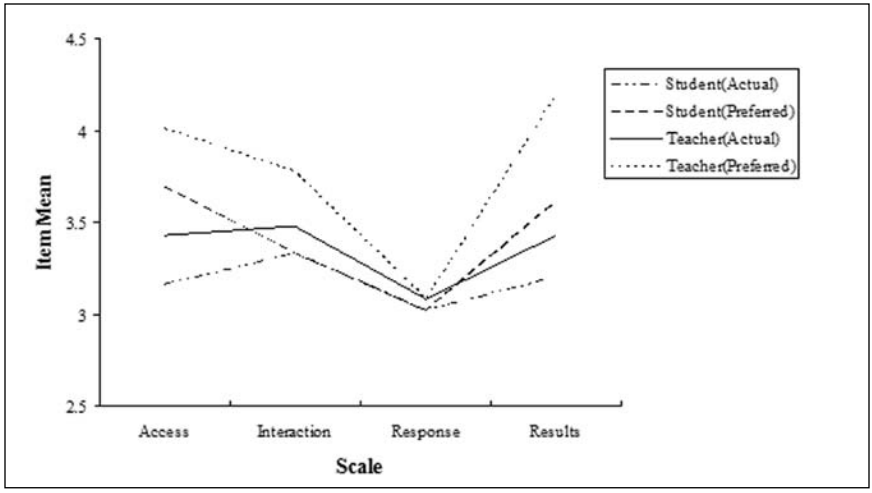

Figure 1. Simplified Plot of Significant Differences between Student (Actual), Student (Preferred), Teacher (Actual), Teacher (Preferred) Perception Scores

In an attempt to provide a more parsimonious picture of the differences between scores on pairs of forms of each WEBLEI scale, it was decided to include only statistically significant differences ($p < 0.05$) found after applying the various tests described above when plotting the profiles shown in Figure 1. Hence only the item means that were significantly different were plotted. Any nonsignificant difference between a pair of forms for a particular scale was represented as a zero difference by averaging the relevant pair of item mean scores. The response alternatives of the WEBLEI instrument corresponding to the value intervals on the item mean axis in Figure 1 are as follows: 1 = "Never," 2 = "Seldom," 3 = "Sometimes," 4 = "Often," and 5 = "Always."

On comparing the actual and preferred perceptions of the classroom environment of students and teachers in Figure 1, it was found that teachers perceived higher levels of Access, Interaction, Response, and Results than their students did in their existing classes. This implied that teachers had more favorable perceptions than their students of the online learning environment as a convenient and efficient way for students to access learning activities (Access). Teachers also perceived a higher level of interaction and collaboration among students and between teachers and students (Interaction). These interactions among students were seen in their participation during the online forums, in the way they asked questions, clarified ideas, and shared resources. Teachers also seemed to have responded to the new environment better than their students (Response) and seemed more satisfied than their students with what they have gained from the online environment (Results).

With regards to their preferred perceptions, students would prefer an environment in which they could access the online materials more conveniently (Access) and benefit more from it (Results). Besides these two areas, teachers would also prefer higher levels of collaboration (Interaction) in their ideal classrooms.

In general, teachers' perceptions were generally similar to, if not more positive than, those of their students' on most of the WEBLEI dimensions. This finding replicated previous classroom environment research using other classroom environment instruments (Fraser, 1982; Moos, 1979).

CONCLUSION

This study set out to validate the actual and preferred versions of the Web-based Learning Environment Instrument (WEBLEI) for use among secondary school students in Singapore. The results showed that each WEBLEI scale displayed satisfactory internal consistency and discriminant validity.

A second objective of the study was to compare the classroom environment perceptions of teachers and students. The findings showed that teachers' perceptions were generally similar to or more positive than their students' on most of the WEBLEI dimensions. Also, preferred perceptions of both teachers and students were more favorable than their actual perceptions. These findings were consistent with those reported for other classroom environment instruments in past research (Fraser, 1982; Moos, 1979).

The third objective was to suggest strategies to address the students' perceptual differences that existed between the actual and preferred computer-supported PW classrooms. The results indicated that the students would prefer to have more convenient and efficient access to learning materials/activities in the online environment (Access scale), so that they can feel a greater sense of gain from studying in such an environment (Results scale). To ensure that students enjoy more convenient and efficient access, teachers should not assume that everyone knows how to use the online environment to access activities (e.g., online forums) and materials (e.g., shared resources). Teachers could spend more time teaching the students how to use the features in the online environment and provide them sufficient practice in using it. For example, they may need to keep the computer laboratories open after school hours for students to use, and to provide more than one preliminary session for students to practice participating in online forums. For this study, there was only one preliminary practice forum.

To help the students feel a greater sense of gain in studying in a computer-supported learning environment, teachers may need to provide more support to the students by facilitating their online sessions more frequently, and probing, encouraging, and extending their thinking rather than just answering their queries. Without this support, students may feel lost and therefore perceive that they have not benefited much from learning in such an environment.

Overall, from the validation results, the WEBLEI has been found to be a reliable instrument for assessing the teachers' and students' perceptions of their computer-supported PW classroom learning environment. From the findings obtained, it would seem that teachers and students perceived such classrooms rather favorably. Although there are areas of perceptual gaps in the Access and Results dimensions, strategies can be developed by the teachers to address them. Therefore, technology can play a part in supporting the face-to-face teaching and learning in Project Work classrooms.

Contributors

Dr. Angela F. L. Wong is an associate professor with the Learning Sciences and Technologies Academic Group, National Institute of Education, Nanyang Technological University, Singapore. She is also the Associate Dean for Practicum and School Matters in the Foundation Programmes Office. She currently lectures in instructional technology and classroom management modules. Her areas of research interests include learning environments, instructional technology, and practicum-related issues in teacher education. (Address: Dr. Angela F. L. Wong, National Institute of Education, Nanyang Technological University, 1 Nanyang Walk, Singapore 637616; flawong@nie.edu.sg.)

Dr. Choon-Lang Quek is an assistant professor with the Learning Sciences and Technologies Academic Group, National Institute of Education, Nanyang Technological University, Singapore. Her research areas include psychosocial classroom learning environments, interdisciplinary curriculum development and implementation, computer-supported project-based teaching and learning in K–12 schools, and gifted education. (clgquek@nie.edu.sg)

Mrs. Shanti Divaharan is a lecturer with the Learning Sciences and Technologies Academic Group, National Institute of Education, Nanyang Technological University, Singapore. Her main research interests include the socio-cultural factors that affect the integration of Information Technology in the classroom, and classroom management and discipline. (sdivah@nie.edu.sg)

Dr. Woon-Chia Liu is an assistant professor with the Psychological Studies Academic Group, National Institute of Education, Nanyang Technological University, Singapore. Her research interests include motivation, self-concept, and ability grouping (streaming). (wcliu@nie.edu.sg)

Mrs. Jarina Peer is a teaching fellow with the Learning Sciences and Technologies Academic Group, National Institute of Education, Nanyang Technological University, Singapore. Her research interests include science education, scientific epistemology, community of learners, information technology in education and classroom management and discipline. (jpeer@nie.edu.sg)

Dr. Michael D. Williams is an associate professor with the Learning Sciences and Technologies Academic Group, National Institute of Education, Nanyang Technological University, Singapore. His areas of specialization include classroom integration models for ICT, teacher competencies, instructional design, and most recently, models for e-learning systems in school and workplace learning environments. (mdwilli@nie.edu.sg)

References

Adamson, R. R. (1999). *An investigation of a project-based partnership approach to science education through a teacher's personal narrative inquiry*. Unpublished master's thesis (A2225), The University of Manitoba, Canada. Available: http://bison.umanitoba.ca/web2/tramp2.exe/see_record/A0bqp2gc.001?server=1home&item=5&item_source=1home.

Baron, J., & McKay, M. (2001). Designing and delivering an online course for K–12 educators. *T.H.E. Journal, 28*(9), 68–75.

Berns, R. S., & Erickson, P. M. (2001). *Contextual teaching and learning: Preparing students of the new economy. The Highlight Zone: Research Work No. 5*. Washington, DC: Office of Vocational and Adult Education. ERIC Document No. ED. 452376

Bottoms, G. (1999). *Outstanding practices, 1998: Raising student achievement by focusing on the 10 key questions: High school that work*. Atlanta, GA: Southern Regional Education Board.

Chang, V., & Fisher, D. (2003). The validation and application of a new learning environment instrument for online learning in higher education. In M. S. Khine & D. Fisher (Eds.), *Technology-rich learning environments: A future perspective,* (pp. 1–18). Singapore: World Scientific.

Fraser, B. J. (1982). Differences between student and teacher perceptions of actual and preferred classroom learning environment*, Educational Evaluation and Policy Analysis*, *4,* 511–519.

Fraser, B. J. (1986). *Classroom environment*. London: Croom Helm.

Fraser, B. J. (1994). Research on classroom and school climate. In D. Gabel (Ed.), *Handbook of research on science teaching and learning*, (pp. 493–541). New York: Macmillan.

Fraser, B. J. (1998a). Science learning environments: Assessments, effects, and determinants. In B. J. Fraser & K. G. Tobin (Eds.), *International handbook of science education* (pp. 1–61). London: Kluwer.

Fraser, B. J. (1998b). Classroom environment instruments: Developments, validity and applications. *Learning Environment Research: An International Journal*, *1*, 7–33.

Fraser, B. J., Giddings, G. J., & McRobbie, C. R. (1995), Evolution and validation of a personal form of an instrument for assessing science laboratory classroom environments. *Journal of Research in Science Teaching, 32,* 399–422.

Fraser, B. J., & Walberg, H. J. (Eds.) (1991). *Education environments: Evaluation, antecedents and consequences.* Oxford, England: Pergamon Press.

Fredell, M. L. (1998). *Improving high school students' performance in chemistry with a hands-on approach*. Unpublished master's thesis, Michigan State University. Available: http://magic.msu.edu:80/record=b3509195a.

Glef, S. (2004). Project-based learning research. *Edutopia online.* The George Lucas Educational Foundation. Retrieved October 4, 2005, from http://www.glef.org/pbl/research.

Goh S. C., & Khine M. S. (Eds.). (2002). *Studies in educational learning environments: An international perspective*. Singapore: New World Scientific.

Houghton Mifflin Company. (2004). *Houghton Mifflin's project-based learning space: Background knowledge and theory*. Retrieved October 4, 2005, from http://college.hmco.com/education/pbl/background.html.

ISTE Research Projects. (2004). *Foundations for the road ahead: Project-based learning and information technologies.* Retrieved October 4, 2005, from http://www.iste.org/research/roadahead/pbl.cfm.

Johnson, A., McDonald, D., & MacAllum, K. (2002). *LAMP Whys? LAMP Wise! A practical guide to the Lansing area manufacturing partnership*. Washing-

ton, DC: Academy for Educational Development, National Institute for Work and Learning.

Khine, M. S., & Fisher, D. (Eds.) (2003). *Technology-rich learning environments: A future perspective*. Singapore: World Scientific.

Maor, D., & Fraser, B. J. (1996). Use of classroom environment perceptions in evaluating inquiry-based computer assisted learning. *International Journal of Science Education*, *18*, 401–421.

Maor, D., & Fraser, B. (2000). *A learning environment instrument for evaluating students' and teachers' perceptions of constructivist multimedia learning environments.* Paper presented at the annual meeting of the National Association for Research in Science Teaching (NARST), New Orleans, LA.

Macnish, J., Trinidad, S., Fisher, D., & Aldridge, J. (2003). *The online learning environment of a technology-rich secondary college.* Paper presented at the annual meeting of the American Educational Research Association, April, Chicago, IL.

Ministry of Education Singapore. (1999). *Project work guidelines*. Singapore: Curriculum Planning & Development Division (CPDD) and Testing & Assessment Branch (TAB).

Ministry of Education Singapore. (2002). *MasterPlan II.* Retrieved July 10, 2005, from http://www.moe.gov.sg/edumall/mp2/mp2.htm.

Moos, R. H. (1979). *Evaluating educational environments: Procedures, measures, findings and policy implications*. San Francisco: Jossey-Bass.

Nani, R. R. (2003). *Using interdisciplinary project work as a learning strategy for student development.* Unpublished master's thesis, National Institute of Education, Nanyang Technological University. Available: http://www.acis.nie.edu.sg/nie-acis/libris/resources/eresources/research/master_thesis_details.do?selectedIndex=n&callNo=LB1027%20Nan&author=Nani%20Rahayu%20Bte%20Mohamed%20Razali.

Penuel, W. R., & Means, B. (1999). *Observing classroom processes in project-based learning using multimedia: A tool for evaluators.* Paper presented at the Secretary of Education's National Conference on Educational Technology, Washington DC. Available: http://www.ed.gov/rschstat/eval/tech/techconf99/whitepapers/paper3.html.

Quek, C. L., & Wong, A. F. L. (2002). Is my project work classroom environment conducive for student collaboration? *Teaching and Learning (Singapore), 23*(2), 107–118.

Quek, C. L, Peer, J., Divaharan, S., Liu, W. C., Williams, M. D., Wong, A. F. L., et al. (2005). Computer mediated communication as a collaborative tool for facilitating student-centred learning in project-based classrooms. *Educational Technology, 45*(4), 48–51.

Ramey, C. L. (1997). *The effect of project-based learning on the achievement and attitudes of Calculus 1 students: A case study*. Unpublished doctoral dissertation, University of Missouri-Kansas City. Available: http://laurel.lso.missouri.edu/search/aRamey&l=&SORT=D&cmdSubmit=Search/aramey/1%2C16%2C116%2CB/frameset&FF=aramey+cynthia+l+1949&1%2C%2C2.

Santamaria, M. D. (2003). *Analysis of an inquiry-oriented in-service program in affecting science teaching practices*. Unpublished doctoral thesis, Boston University. Available: http://wwwlib.umi.com/dissertations/fullcit/3084509.

Schneider, R. M., & Krajcik, J. (2001). Performance of students in project-based science classrooms on a national measure of science achievement. *Journal of Research in Science Teaching*, *39*(5), 410–422.

Southern Regional Education Board (SREB). (2000). *Using real world projects to help students meet high standards in education and the workplace.* Site Development Guide #11. High Schools that Work. Georgia. ERIC Document No. ED 451420.

Teh, G. P. L., (2001, November/December). *Assessing students' perceptions of synchronous Internet-based learning environments.* Proceedings of the annual conference of the Australian Association for Research in Education, Fremantle, Australia. Available: http://www.aare.edu.au/01pap/teh01064.htm.

Teh, G. P. L., & Fraser, B. J. (1994). An evaluation of computer assisted learning in geography in Singapore. *Australian Journal of Educational Technology, 10*(1), 55–68.

Teh, G. P. L., & Fraser, B. J. (1995). Development and validation of an instrument for assessing the psychosocial environment of computer-assisted learning classrooms. *Journal of Educational Computing Research, 12*, 177–193.

Teh, G. P. L., & Fraser, B. J. (1997, January). *Cross validation of an environment inventory for GIS classrooms*. Paper presented at the International Conference on Science, Mathematics and Technology Education, Hanoi, Vietnam.

Thomas, J. W. (2000). *A review of research on project-based learning*. Retrieved October 4, 2005, from http://www.autodesk.com/foundation.

Tobin, K. G., & Fraser, B. J. (1998). Qualitative and quantitative landscapes of classroom learning environments. In B. J. Fraser & K. G. Tobin (Eds.), *International handbook of science education* (pp. 623–640). Dordrecht, The Netherlands: Kluwer Academic Publishers.

Trinidad, S. (2005, November/December). *Constructive solutions: Improving teaching and learning in e-learning environments.* Proceedings of the annual conference of the Australian Association for Research in Education, Sydney, Australia. Available: http://www.aare.edu.au/05pap/tri05058.pdf.

Trinidad, S., Macnish, J., Aldridge, J., Fraser, B., & Wood, D. (2001, November/December). *Integrating ICT into the learning environment at Sevenoaks Senior College: How teachers and students use educational technology in teaching and learning.* Proceedings of the annual conference of the Australian Association for Research in Education, Perth, Australia. Available: http://www.aare.edu.au/01pap/ald01027.htm.

Trinidad, S., Aldridge, J., & Fraser, B. (2005) Development, validation and use of the online learning environment survey. *Australasian Journal of Educational Technology*, *21*(1), 60–81.

Vinson, S. (2002). *The El Paso Overland Stage Project: Computer-mediated communication and web-based instruction for problem-based learning*. Unpublished doctoral dissertation, New Mexico State University. Available: http://libcat.nmsu.edu/cgi-bin/Pwebrecon.cgi?v1=1&ti=1,1&SEQ=20060301000609&

Search_Arg=vinson&SL=none&Search_Code=NAME%2B&CNT=20&Search=Search&Search=Search&PID=8388&HC=2&SID=1.

Wong, H. M. (2001). *Project work in primary school: Effects on learning and teaching*. Unpublished master's thesis, National Institute of Education, Nanyang Technological University. Available: http://www.acis.nie.edu.sg/nie-acis/libris/resources/eresources/research/master_thesis_details.do?selectedIndex=w&callNo=LB1027%20Won&author=Wong,%20Hwei%20Ming.

Yip, M. F., Quek, C. L., Seet, Y. L. B., & Wong, A. F. L. (2003). How do Singaporean and German students collaborate using online discussions in classroom project work? *Teaching and Learning Singapore*, *24*(2), 169–179.

APPENDIX

WEB-BASED LEARNING ENVIRONMENT INSTRUMENT

Student Preferred Form

Directions for Respondents

This questionnaire asks you to describe the Project Work learning experience in a web-based learning environment that you **would prefer to have.**

There are no 'right' or 'wrong' answers. Your opinion is what is wanted.

Think about how well each statement describes what the Project Work teaching and learning environment is like for you.

Draw a circle around

1	if the practice takes place	**Never**
2	if the practice takes place	**Seldom**
3	if the practice takes place	**Sometimes**
4	if the practice takes place	**Often**
5	if the practice takes place	**Always**

Be sure to give an answer for all questions. If you change your mind about an answer, just cross it out and circle another.

Some statements in this questionnaire are fairly similar to other statements. Don't worry about this. Simply give your opinion about all statements.

WEB-BASED LEARNING ENVIRONMENT

For each statement, please **circle** the number which best represents your answer.

	ACCESS	Always	Often	Sometimes	Seldom	Never
1.	I prefer to access the learning environment at times convenient to me.	5	4	3	2	1
2.	I prefer that the on-line resources be available at locations suitable for me.	5	4	3	2	1
3.	I prefer to be allowed to work at my own pace to achieve learning objectives of Project Work.	5	4	3	2	1
4.	I prefer to decide how much I want to discuss in a given period.	5	4	3	2	1
5.	I prefer to decide when I want to discuss.	5	4	3	2	1
6.	I prefer to be allowed flexibility to meet my learning goals.	5	4	3	2	1
7.	I prefer to be allowed flexibility to explore online resources which I am interested in.	5	4	3	2	1

	INTERACTION	Always	Often	Sometimes	Seldom	Never
8.	I prefer to communicate with other students in this subject electronically (online discussions).	5	4	3	2	1
9.	In this learning environment, I prefer to be self-disciplined.	5	4	3	2	1
10.	I prefer to have the autonomy to ask the teachers what I do not understand.	5	4	3	2	1
11.	I prefer to have the autonomy to ask other students what I do not understand.	5	4	3	2	1
12.	I prefer that other students respond promptly to my queries.	5	4	3	2	1
13.	I prefer to regularly reflect on what I have said in the online discussions.	5	4	3	2	1
14.	I prefer to regularly reflect on what my group members have said in the online discussions.	5	4	3	2	1

15.	I prefer to be supported by positive attitude from my group members	5	4	3	2	1

	RESPONSE	**Always**	**Often**	**Sometimes**	**Seldom**	**Never**
16.	I prefer that this mode of learning enable me to interact with other students and teachers asynchronously (in an online environment but not at the same time)	5	4	3	2	1
17.	I prefer to feel a sense of satisfaction and achievement about this learning environment.	5	4	3	2	1
18.	I prefer to enjoy discussing in this online environment.	5	4	3	2	1
19.	I prefer to discuss more in this online environment.	5	4	3	2	1
20.	I prefer that it be easy to organize a group for an online discussion.	5	4	3	2	1
21.	I prefer that it be easy to work collaboratively with other students involved in a group discussion.	5	4	3	2	1
22.	I prefer that the web-based learning environment hold my interest throughout PW lessons.	5	4	3	2	1
23.	I prefer to feel a sense of boredom towards the end of PW lessons.	5	4	3	2	1

	RESULTS	**Always**	**Often**	**Sometimes**	**Seldom**	**Never**
24.	I prefer that the scope or learning objectives be clearly stated.	5	4	3	2	1
25.	I prefer that the organization of each online discussion forum be easy to follow.	5	4	3	2	1
26.	I prefer that the structure keep me focused on what is to be discussed.	5	4	3	2	1

27.	I prefer that the expectations of tasks and roles are clearly stated in the online environment.	5	4	3	2	1
28.	I prefer that activities be planned carefully.	5	4	3	2	1
29.	I prefer that the Project Work resources and Just-in-Time lessons be appropriate for delivery on the Web.	5	4	3	2	1
30.	I prefer that the presentation of the forum topic be clear.	5	4	3	2	1
31.	I prefer that the discussions and reflection log enhance my learning process.	5	4	3	2	1

WEB-BASED LEARNING ENVIRONMENT QUESTIONNAIRE

Student Actual Form

Directions for Respondents

This questionnaire asks you to describe your own Project Work learning experience using Knowledge Community (KC) as a web-based learning environment.

There are no 'right' or 'wrong' answers. Your opinion is what is wanted.

Think about how well each statement describes what the Project Work learning environment class is like for you.

Draw a circle around

1	if the practice takes place	**Never**
2	if the practice takes place	**Seldom**
3	if the practice takes place	**Sometimes**
4	if the practice takes place	**Often**
5	if the practice takes place	**Always**

Be sure to give an answer for all questions. If you change your mind about an answer, just cross it out and circle another.

Some statements in this questionnaire are fairly similar to other statements. Don't worry about this. Simply give your opinion about all statements.

WEB-BASED LEARNING ENVIRONMENT

For each statement, please **circle** the number which best represents your answer.

	ACCESS	Always	Often	Sometimes	Seldom	Never
1.	I can access KC at times convenient to me.	5	4	3	2	1
2.	The on-line KC resource is available at locations suitable for me.	5	4	3	2	1
3.	I am allowed to work at my own pace to achieve learning objectives of Project Work.	5	4	3	2	1
4.	I decide how much I want to discuss in a given period.	5	4	3	2	1
5.	I decide when I want to discuss.	5	4	3	2	1
6.	I am allowed flexibility to meet my learning goals.	5	4	3	2	1
7.	I am allowed flexibility to explore online resources which I am interested in.	5	4	3	2	1

	INTERACTION	Always	Often	Sometimes	Seldom	Never
8.	I communicate with other students in this project electronically (online discussions).	5	4	3	2	1
9.	In this learning environment, I have to be self-disciplined.	5	4	3	2	1
10.	I have the autonomy to ask the teachers what I do not understand.	5	4	3	2	1
11.	I have the autonomy to ask other students what I do not understand.	5	4	3	2	1
12.	Other students respond promptly to my queries.	5	4	3	2	1
13.	I regularly reflect on what I have said in the online discussions.	5	4	3	2	1
14.	I regularly reflect on what my group members have said in the online discussions.	5	4	3	2	1

15.	I was supported by positive attitude from my group members.	5	4	3	2	1

	RESPONSE	**Always**	**Often**	**Sometimes**	**Seldom**	**Never**
16.	This mode of learning enables me to interact with other students teachers asynchronously (in an online environment but not at the same time)	5	4	3	2	1
17.	I felt a sense of satisfaction and achievement about this learning environment.	5	4	3	2	1
18.	I enjoy discussing in this online environment.	5	4	3	2	1
19.	I could discuss more in this online environment.	5	4	3	2	1
20.	It is easy to organize a group for an online discussion.	5	4	3	2	1
21.	It is easy to work collaboratively with other students involved in a group discussion.	5	4	3	2	1
22.	The web-based learning environment held my interest throughout PW lessons.	5	4	3	2	1
23.	I felt a sense of boredom towards the end of PW lessons.	5	4	3	2	1

	RESULTS	**Always**	**Often**	**Sometimes**	**Seldom**	**Never**
24.	The scope or learning objectives are clearly stated.	5	4	3	2	1
25.	The organization of each online discussion forum is easy to follow.	5	4	3	2	1
26.	The structure keeps me focused on what is to be discussed.	5	4	3	2	1
27.	Expectations of tasks and roles are clearly stated in the online environment.	5	4	3	2	1
28.	Activities are planned carefully.	5	4	3	2	1

29.	The Project Work resources and Just-in-Time lessons are appropriate for delivery on the Web.	5	4	3	2	1
30.	The presentation of the forum topic is clear.	5	4	3	2	1
31.	The discussions and reflection log enhanced my own learning.	5	4	3	2	1

WEB-BASED LEARNING ENVIRONMENT INSTRUMENT

Preferred Form (Teacher)

Directions for Respondents

This questionnaire asks you to describe the Project Work teaching and learning experience in a web-based learning environment that you **would prefer to have.**

There are no 'right' or 'wrong' answers. Your opinion is what is wanted.

Think about how well each statement describes what the Project Work teaching and learning environment is like for you.

Draw a circle around

1	if the practice takes place	**Never**
2	if the practice takes place	**Seldom**
3	if the practice takes place	**Sometimes**
4	if the practice takes place	**Often**
5	if the practice takes place	**Always**

Be sure to give an answer for all questions. If you change your mind about an answer, just cross it out and circle another.

Some statements in this questionnaire are fairly similar to other statements. Don't worry about this. Simply give your opinion about all statements.

WEB-BASED LEARNING ENVIRONMENT

For each statement, please **circle** the number which best represents your answer.

	ACCESS	Always	Often	Sometimes	Seldom	Never
1.	I prefer to access the learning environment at times convenient to me.	5	4	3	2	1
2.	I prefer that the on-line resources be available at locations suitable for me.	5	4	3	2	1
3.	I prefer to be allowed to work at my own pace to achieve learning objectives of Project Work.	5	4	3	2	1
4.	I prefer to decide how much I want to discuss in a given period.	5	4	3	2	1
5.	I prefer to decide when I want to discuss.	5	4	3	2	1
6.	I prefer to be allowed flexibility to meet my learning goals.	5	4	3	2	1
7.	I prefer to be allowed flexibility to explore online resources which I am interested in.	5	4	3	2	1

	INTERACTION	Always	Often	Sometimes	Seldom	Never
8.	I prefer to communicate with other teachers in this subject electronically (online discussions).	5	4	3	2	1
9.	In this learning environment, I prefer to be self-disciplined.	5	4	3	2	1
10.	I prefer to have the autonomy to ask the researchers what I do not understand.	5	4	3	2	1
11.	I prefer to have the autonomy to ask other teachers what I do not understand.	5	4	3	2	1
12.	I prefer that other teachers respond promptly to my queries.	5	4	3	2	1
13.	I prefer to regularly reflect on what I have said in the online discussions.	5	4	3	2	1
14.	I prefer to regularly reflect on what my colleagues have said in the online discussions.	5	4	3	2	1

15.	I prefer to be supported by positive attitude from my colleagues.	5	4	3	2	1

	RESPONSE	**Always**	**Often**	**Sometimes**	**Seldom**	**Never**
16.	I prefer that this mode of learning enable me to interact with other teachers and researchers asynchronously	5	4	3	2	1
17.	I prefer to feel a sense of satisfaction and achievement about this learning environment.	5	4	3	2	1
18.	I prefer to enjoy discussing in this online environment.	5	4	3	2	1
19.	I prefer to discuss more in this online environment.	5	4	3	2	1
20.	I prefer that it be easy to organize a group for an online discussion.	5	4	3	2	1
21.	I prefer that it be easy to work collaboratively with other teachers involved in a group discussion.	5	4	3	2	1
22.	I prefer that the web-based learning environment hold my interest throughout PW lessons.	5	4	3	2	1
23.	I prefer to feel a sense of boredom towards the end of PW lessons.	5	4	3	2	1

	RESULTS	**Always**	**Often**	**Sometimes**	**Seldom**	**Never**
24.	I prefer that the scope or learning objectives be clearly stated.	5	4	3	2	1
25.	I prefer that the organization of each online discussion forum be easy to follow.	5	4	3	2	1
26.	I prefer that the structure keep me focused on what is to be discussed.	5	4	3	2	1
27.	I prefer that the expectations of tasks and roles are clearly stated in the online environment.	5	4	3	2	1
28.	I prefer that activities be planned carefully.	5	4	3	2	1

29.	I prefer that the Project Work resources and Just-in-Time lessons be appropriate for delivery on the Web.	5	4	3	2	1
30.	I prefer that the presentation of the forum topic be clear.	5	4	3	2	1
31.	I prefer that the discussions and reflection log enhance my learning process.	5	4	3	2	1

WEB-BASED LEARNING ENVIRONMENT QUESTIONNAIRE

Actual Form (Teacher)

Directions for Respondents

This questionnaire asks you to describe your own Project Work teaching experience using Knowledge Community (KC) as a web-based learning environment. Thus far, you have experienced crafting project tasks and facilitating for your students' PW. We want to find out how you have perceived this mode of learning in PW classroom

There are no 'right' or 'wrong' answers. Your opinion is what is wanted.

Think about how well each statement describes what the Project Work teaching and learning environment is like for you.

Draw a circle around

1	if the practice takes place	**Never**
2	if the practice takes place	**Seldom**
3	if the practice takes place	**Sometimes**
4	if the practice takes place	**Often**
5	if the practice takes place	**Always**

Be sure to give an answer for all questions. If you change your mind about an answer, just cross it out and circle another.

Some statements in this questionnaire are fairly similar to other statements. Don't worry about this. Simply give your opinion about all statements.

WEB-BASED LEARNING ENVIRONMENT

For each statement, please **circle** the number which best represents your answer.

	ACCESS	Always	Often	Sometimes	Seldom	Never
1.	I can access KC at times convenient to me.	5	4	3	2	1
2.	The on-line KC resource is available at locations suitable for me.	5	4	3	2	1
3.	I am allowed to work at my own pace to achieve learning objectives of Project Work.	5	4	3	2	1
4.	I decide how much I want to discuss in a given period.	5	4	3	2	1
5.	I decide when I want to discuss.	5	4	3	2	1
6.	I am allowed flexibility to meet my learning goals.	5	4	3	2	1
7.	I am allowed flexibility to explore online resources which I am interested in.	5	4	3	2	1

	INTERACTION	Always	Often	Sometimes	Seldom	Never
8.	I communicate with other teachers in this project electronically (online discussions).	5	4	3	2	1
9.	In this learning environment, I have to be self-disciplined.	5	4	3	2	1
10.	I have the autonomy to ask researchers what I do not understand.	5	4	3	2	1
11.	I have the autonomy to ask other teachers what I do not understand.	5	4	3	2	1
12.	Other teachers respond promptly to my queries.	5	4	3	2	1
13.	I regularly reflect on what I have said in the online discussions.	5	4	3	2	1
14.	I regularly reflect on what my colleagues have said in the online discussions.	5	4	3	2	1

15.	I was supported by positive attitude from my colleagues.	5	4	3	2	1

	RESPONSE	**Always**	**Often**	**Sometimes**	**Seldom**	**Never**
16.	This mode of learning enables me to interact with other teachers and researchers asynchronously.	5	4	3	2	1
17.	I felt a sense of satisfaction and achievement about this learning environment.	5	4	3	2	1
18.	I enjoy discussing in this online environment.	5	4	3	2	1
19.	I could discuss more in this online environment.	5	4	3	2	1
20.	It is easy to organize a group for an online discussion.	5	4	3	2	1
21.	It is easy to work collaboratively with other teachers involved in a group discussion.	5	4	3	2	1
22.	The web-based learning environment held my interest throughout PW lessons.	5	4	3	2	1
23.	I felt a sense of boredom towards the end of PW lessons.	5	4	3	2	1

	RESULTS	**Always**	**Often**	**Sometimes**	**Seldom**	**Never**
24.	The scope or learning objectives are clearly stated.	5	4	3	2	1
25.	The organization of each online discussion forum is easy to follow.	5	4	3	2	1
26.	The structure keeps me focused on what is to be discussed.	5	4	3	2	1
27.	Expectations of tasks and roles are clearly stated in the online environment.	5	4	3	2	1
28.	Activities are planned carefully.	5	4	3	2	1

29.	The Project Work resources and Just-in-Time lessons are appropriate for delivery on the Web.	5	4	3	2	1
30.	The presentation of the forum topic is clear.	5	4	3	2	1
31.	The discussions and reflection log enhanced my own learning.	5	4	3	2	1