

# Effects of a Moodle-based E-learning Management System on E-collaborative Learning, Perceived Satisfaction, and Study Achievement among Nursing Students: A Cross-sectional Study

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## Research Article

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## Abstract

## Aims

To determine whether the use of a Moodle-based learning management system (LMS) for educational purposes can significantly improve e-collaborative learning, perceived satisfaction, and study achievement among nursing students in a pediatric nursing course.

## Background

Studies suggest that in nursing education, electronic Moodle-based LMSs may be more effective than traditional face-to-face teaching, as they lead to learning outcomes that equal or exceed those of face-to-face teaching. Therefore, nursing education methods and pedagogy should be modified accordingly.

## Design:

Nonrandomized pretest–posttest quasiexperimental design.

## Methods

Third-year nursing students in a medical college in northern Taiwan were recruited and nonrandomly assigned to non-Moodle and Moodle groups. Students in the former received traditional classroom teaching without the use of Moodle, while those in the latter completed the course through both Moodle and classroom lectures.

## Results

Eighty-four students (52 in the non-Moodle group and 32 in the Moodle group) completed both the pretest and posttest. For perceived satisfaction, e-collaborative learning, and study achievement, the overall test results indicated a significant difference in the posttest between the two groups ( $F(1,82) = 10.62, P = 0.002$ ), ( $F(1,82) = 9.48, P = 0.003$ ), ( $F(1,82) = 59.30, P < 0.001$ , respectively). The explanatory power  $\eta^2$  reached 11.5%, 10.4%, and 42.0%, respectively.

## Conclusion

The students who used Moodle showed significantly higher levels of perceived satisfaction, e-collaborative learning, and study achievement in the pediatric nursing course. Moodle-based LMSs for educational purposes can serve as effective complementary learning tools for pediatric nursing courses.

## Introduction

Moodle-based learning management systems (LMSs) open the door for new teaching methods (Hmelo-Silver and Chinn, 2015). Most studies have shown that for perceived motivation and the development of problem-solving abilities, the satisfaction reported by students who underwent e-collaborative learning is equal to or higher than that reported by those who received only traditional teaching; this finding echoes the theory of social constructivism (Hmelo-Silver and Chinn, 2015). McMullan et al. (2011) also found that web-based distance-learning group members had higher satisfaction scores than learners who received only traditional teaching. Alemán et al. (2011) reported that compared with traditional teaching, students prefer computer-assisted learning at home. Furthermore, in a study conducted by Chiu et al. (2009), e-learning group members scored higher than members of a traditional teaching group on 12 out of 16 items on a satisfaction scale; however, the difference was statistically significant for only one item. In summary, empirical teaching designs for e-collaborative learning have become increasingly practical. In particular, when students conduct collaborative and cognitive learning through peer interaction on a discussion platform, teachers play the roles of designer, instructor, consultant, supporter, and promoter based on the theory of social constructivism (Hmelo-Silver and Chinn, 2015). They can help students achieve learning objectives by monitoring and understanding students' knowledge acquisition and nursing skills development (Männistö et al., 2020). In addition, student satisfaction is one of the most important indicators for evaluating the quality of a learning environment (Jung, 2014). Student satisfaction with respect to meeting expectations is one of the most critical factors for evaluating the success of e-technology-based interventions (Rahman et al., 2015) and an important factor affecting learning performance (Jung, 2014).

In nursing education, most studies have indicated that in terms of developing professional knowledge and skills, electronic Moodle-based LMSs may be more effective than traditional face-to-face teaching, as they lead to study achievements better than or equal to those of face-to-face teaching and are more effective in developing student abilities (Hmelo-Silver and Chinn, 2015). McCall et al. (2018) found that the effectiveness of electronic education interventions is at least equal to that of traditional methods. Traditional classroom teaching based on textbooks and guidance requires students to memorize facts and figures for knowledge acquisition; however, this memorization is generally short term (Paul, 2015). The combined use of electronic Moodle-based LMSs with traditional teaching based on social constructivism theory can promote learning by improving knowledge construction (Jeong et al., 2014), team reasoning and interaction (Baker, 2015), knowledge sharing to build a consensus, and cooperation and coordination with peers based on

individual knowledge levels, all of which are conducive to learning (Männistö et al., 2020). In educational institutions, because of time efficiency requirements and flexibility, the use of Moodle-based LMSs allows students to have a more flexible and self-scheduled learning process, which promotes student independence and increases their self-teaching efficiency and study achievements (Chan et al., 2016; Mackintosh-Franklin, 2018; Mlotshwa et al., 2020). In addition, Moodle-based LMSs provide students with various learning materials and tools, such as videos, multimedia, and e-text, that arouse their interest and help them understand complex information (Lakens, 2013). Furthermore, interactive tools such as email, posts, and virtual meeting rooms and chat rooms enhance communication between students and teachers (Smeekens et al., 2011). Finally, e-learning platforms can provide students with more information through web links and create a safe environment where students can discuss, share information, transfer new knowledge, and express their opinions in an open atmosphere (Peterson and Roseth, 2016). Moodle-based LMSs based on social constructivism are new learning environments that can effectively promote students' active interaction and facilitate individual contributions for the benefit of the group (Männistö et al., 2020).

Considering the abovementioned advantages of incorporating electronic Moodle-based LMS technology into teaching, changes should be made accordingly in nursing education methods and pedagogical structure. New technologies will inevitably change teaching and learning methodologies; therefore, it is necessary to explore the impact of Moodle-based LMSs on student learning. We hope that the combination of traditional classroom lectures and Moodle-based LMSs will create a new teaching model with considerable potential. The purpose of this study is to evaluate whether the use of a Moodle-based LMS intervention for educational purposes significantly improves collaborative learning, perceived satisfaction, and study achievement among nursing students in a pediatric nursing course.

## Materials And Methods

### Design

A nonrandomized pretest–posttest quasiexperimental research design was used, and students were nonrandomly assigned to an experimental group (Moodle) and a nonexperimental group (non-Moodle) based on free will. The Moodle group was exposed to learning methods involving a Moodle e-learning environment, textbooks, an iPad, and the Internet, among other resources. Nursing students in the Moodle group could choose any learning method at any time, but use of the Moodle e-learning environment was required. Those in the non-Moodle group could use textbooks, an iPad, and the Internet, among other resources, without using the Moodle e-learning environment to complete the course. Once the study was completed, the students in the non-Moodle group were free to use the Moodle e-learning environment. The study framework used in this study is shown in Fig. 1.

### Participants

Heppner and Heppner (2004) suggested that college student recruitment should be approved by the director, dean, and experts of the institution and that participation should be voluntary. G\*Power software (latest ver. 3.1.9.7) with one-way ANOVA ( $F = 0.5$ ;  $\alpha = 0.05$ ; groups = 2) indicated that the sample size should be at least 54. In this study, 105 third-year nursing students enrolled in a pediatric nursing course in a medical college in northern Taiwan were recruited. Eighty-nine nursing students were nonrandomly divided into two groups (Fig. 2). The Moodle group used Moodle e-learning environment technology, while the non-Moodle group completed the course in the traditional classroom environment and did not use Moodle e-learning environment technology until the completion of the study. Students completed the course following their own study plan based on their time schedule. Participating students chose to join the Moodle group or the non-Moodle group on their own. Because this course was part of nursing students' compulsory curriculum, random grouping and blind testing were impossible, which was the reason for the unequal sample groups. Hence, only volunteers could join the Moodle group and complete the course through the e-collaborative learning environment created by Moodle e-learning technology. To control the differences, the two groups were matched based on major (nursing students), grade (third-year students), and learning subject (pediatric nursing course), and all students took a pretest.

### Data collection

### Instruments

Data were collected using an electronic Webropol® questionnaire (Fig. 3), which could be accessed through a link in Moodle. There were 25 questions in the questionnaire, among which four gathered basic information and 21 were related to two survey scales. The following basic information was collected: age, gender, educational background, and field of study. The student satisfaction scale (eight questions in total) measured student satisfaction with the course and its impact on learning. A collaborative learning scale (13 questions in total) was used to measure students' e-collaborative learning in three aspects, i.e., promoting learning, the role of the teacher, and the role of the student. A five-point Likert scale (5 = completely agree, 4 = partially agree, 3 = neither agree nor disagree, 2 = partially disagree, and 1 = completely disagree) was used to measure student perception.

The student satisfaction scale included two subdimensions: (1) learning satisfaction (five questions) and (2) e-learning environment satisfaction (three questions). Questions related to learning satisfaction in an e-learning environment were developed and used based on previous literature (Virtanen et al., 2017). The content validity of all questions was assessed by the same expert teacher group. All questions were pretested by eight nursing students to ensure that the questions could be properly understood and interpreted. After the content validity assessment and pretest, no changes were made to the questions (Ritter and Sue, 2007). Because the student satisfaction scale combined questions for two different dimensions, the construct validity was verified (Table 1) (Männistö et al., 2019).

Exploratory factor analysis (EFA) indicated a two-factor model for the scale. The eigenvalue of the first factor (learning satisfaction) was 4.38, and the total explained variance in questions was 54.8%. The eigenvalue of the second factor (e-learning environment satisfaction) was 1.06, and the total explained variance in questions was 13.3%. These results indicated that this scale has good construct validity. Cronbach's alpha for the first and second factors was 0.84 and 0.83, respectively. The internal reliability of the instrument was evaluated using Cronbach's alpha for both factors separately and for the whole instrument. The alpha for the whole instrument was 0.944. This result indicated that this scale has good internal consistency.

In this study, the collaborative learning scale developed by Vuopala (2016) was used to evaluate collaborative learning in an e-learning environment. This scale includes three subdimensions: (1) promoting collaborative group work (six questions); (2) the teacher's role in the collaborative learning environment (four questions); and (3) students' role in collaborative learning (three questions). The content validity of all questions was assessed by the same expert teacher group. All questions were pretested by eight nursing students to ensure proper understanding and interpretation. After the content validity assessment and pretest, no changes were made to the questions (Ritter and Sue, 2007). EFA revealed a three-factor model. The first factor (promoting group collaboration) had an eigenvalue of 5.58, and the total explained variance in questions was 43.0%. The second factor (teacher's role in the collaborative learning environment) had an eigenvalue of 2.70, and the total explained variance in questions was 20.8%. The third factor (the role of students in the collaborative learning environment) had an eigenvalue of 1.03, and the total explained variance in questions was 7.9%. Therefore, this scale has good construct validity. In addition, Cronbach's alpha for the first, second, and third factors was 0.92, 0.83, and 0.76, respectively (Männistö et al., 2019). These results indicated that the scale has good internal consistency (Table 2).

Finally, students' study achievements were assessed. At the beginning of the course, the assessment criteria for study achievements were explained to students in both groups. At the end of the 18-week course, students in both groups were assessed on the knowledge, content, methods, challenges, and learning performance in the pediatric nursing course. Study achievement was divided into six levels from 0 (failed) to 5 (excellent). Students were asked to answer the questions in a question-and-answer format. The Moodle group answered the questions online, while the non-Moodle group answered the questions in the classroom.

In this study, collaborative learning took place in a Moodle e-learning environment. To explain how students utilized the collaborative learning modules, the figures below show the e-learning environment (Moodle) interfaces. The students could answer or ask questions related to the class, and data related to testing in the collaborative learning environment were collected for analysis.

Participants had access to the e-learning environment (Moodle) in the time period after the pretest and before the posttest. The operation interface was preset as a platform with different operation menus (e.g., main menu and discussion topics). After choosing the course from "My courses," students could enter the virtual classroom (Figs. 4 and 5).

## Environment setup

This study was conducted with a teaching environment setup that was the same as that for a general college class. The students met in the classroom on the first day of the study and received course information before beginning the study. Subsequently, all the students took the pretest in the classroom. The posttest was also held in the same classroom. Students were familiar with the environment because they often attended classes in the classroom. After the pretest, students were nonrandomly assigned to the Moodle group and the non-Moodle group based on their own choice. Students in both groups received guidance in the classroom on how to use the Moodle e-learning environment for this study.

The differences between the educational intervention measure, i.e., an e-learning environment, and traditional classroom-based face-to-face teaching were compared for the pediatric nursing course. The course content and study objectives were the same for the Moodle and non-Moodle groups, and students in each group took the course during the same 18-week period. The objective of the course was to learn multidisciplinary concepts related to all aspects of pediatric nursing. Both groups were taught by the same teachers and used the same textbooks. Educational interventions were developed based on a systematic literature review (Männistö et al., 2020) and evidence from the learning theory of social constructivism (Chan and van Aalst, 2018). Study achievements were assessed via written examinations before and at the end of the course. Students in both groups were given a pretest and a posttest. The college lecturer and his teaching assistants supervised the exams and collected and graded the pretest and posttest exams.

## Experimental procedures

This study was conducted with students enrolled in a pediatric nursing course in a medical college. The person responsible for the research plan gave students a PowerPoint course syllabus and explained to the students the goals of the e-learning environment (Moodle) and e-collaborative learning in the pediatric nursing course. After answering any related questions from students, the researchers recruited student volunteers to participate in the study, and the students who volunteered to participate were required to sign a consent form. Subsequently, the participating students took a pretest. They were given a paper exam and sufficient time to complete the questions.

At the beginning of the first class, the course objectives, content, and teaching methods, along with group learning activities and tasks, were introduced to the students. The Moodle group was divided into five small groups, the members of which remained unchanged throughout the online course. Students were allowed to form groups on their own. After the first class, students opened their Moodle account and completed their weekly assignments, online discussions, comments, self and peer reviews, material searches, reports, and various exams with others in the same group on the Moodle platform. One week before each class, five case scenarios under the study subject on the course schedule were assigned to each group. Each group used the Moodle e-

learning environment to study the case scenarios assigned. Through online discussion, comments, self and peer reviews, and material searches, each group completed a report after e-collaborative learning and uploaded and published it in the Moodle discussion room before the deadline for sharing and discussion. In addition, each group was asked to provide comments on and suggestions for other groups' reports. Taking the study subject of asthma as an example, the teacher assigned five asthma case scenarios to the five groups and posted the assignment on Moodle one week before the class. All groups were required to publish their report, which was created after e-collaborative learning, in the Moodle discussion room two days before the class (Supplemental data 1).

In the course, students constructed new knowledge via research, sharing with others, and studying the given subjects. By studying in groups, students benefited from continuous social interactions, facilitating the development of problem-solving and decision-making skills. Through sharing coconstructed knowledge and continuous social interactions, students were guided to learn together. The students in the non-Moodle group received traditional face-to-face instruction that consisted of 33 hours of subject-centered teaching. Face-to-face teaching occurred in the form of lectures (PowerPoint). The Moodle group was also given additional teaching materials, while the non-Moodle group used the Moodle platform only for course material storage rather than for e-collaborative learning. During the course, students were asked to conduct group discussions related to different subjects presented by the teacher without recording student responses and how they responded. The primary purpose of the discussions was to prompt students to think independently and broaden their understanding of the subject. All students in the non-Moodle and Moodle groups had 18 weeks to learn and complete the pediatric nursing course before the posttest. The posttest was given in the same manner as the pretest after 18 weeks of study, and all test results were e-mailed to the researchers by the teacher (Supplemental data 2).

## Ethical considerations

The reliability and validity of the research were considered for every step in this study. This study was approved by the Institutional Review Board (IRB) of XX Hospital. Consent forms were voluntarily signed by all participants. All data were stored in a laptop protected by a password set by the investigator. Printed copies of the data collected were stored in a locked file cabinet that could be opened only by the investigator with a key.

## Data analysis

Inferential statistical analysis of quantitative data collected from the pretest and posttest was performed using the social science statistical software SPSS. First, the data were converted to frequencies, percentages, means, and standard deviations. Second, paired *t* tests were performed to compare the mean study achievement scores for each group for the pretest and posttest and to test whether there was a significant difference in the pretest score between the Moodle and non-Moodle groups. Finally, one-way analysis of variance (ANOVA) was used to test the study hypothesis and compare the mean study achievement scores on the posttest after adjustment between the two groups. The following question was answered: Did the posttest score for the Moodle group increase more than that for the non-Moodle group? To identify any skewed datasets, the data were examined for the presence of interactive relationships between variables (i.e., internal consistency). Statistical analysis results may be biased when greater than 10% of data are missing (Bennett, 2001). Therefore, questionnaires with missing data that exceeded 10% of the total were discarded. Multiple imputation methods were used to handle missing data.

## Validity and reliability/rigor

All teaching methods followed the basic pedagogical principle of collaboration and were continuously supported by teachers (Miyake and Kirschner, 2014). The collaborative tools used in the course were multimedia, videos, pictures, textbooks, writing materials, and quizzes related to theoretical knowledge (Kollar et al., 2018).

## Results

### Flow of participants and sample characteristics

This study followed the flow diagram of the modified Consolidated Standards for Reporting of Trials (CONSORT) for controlled trials of nonpharmacological treatments (Boutron et al., 2008) (Fig. 2). Two participants in the non-Moodle group and three in the Moodle group withdrew due to physical discomfort during the study period. Overall, 84 third-year nursing students (52 in the non-Moodle group and 32 in the Moodle group) completed the pretest and posttest. The participating students were mostly female. Their GPA (academic performance) ranged from 1.6-4.0. The most common birth order was the oldest child in the family, and they mostly lived in residential areas in northern Taiwan. There were no statistically significant differences in the demographic characteristics (Table 3) between the two groups. Fig. 6 shows the frequency with which nursing students used the Moodle platform in this study. During the first month, the students frequently logged into Moodle. During the four-month study period, the average frequency was highest on Mondays and Fridays, and the average monthly frequency was 97.91 engagements.

### Pretest and posttest of perceived satisfaction, e-collaborative learning, and study achievement

In the non-Moodle group, the mean perceived satisfaction, e-collaborative learning, and study achievement scores were 32.54, 51.31, and 27.79 on the pretest and 33.04, 3.31, and 71.81 on the posttest, with high correlations of 35, 42, and 28, respectively, between the pretest and posttest based on the paired *t* test analysis. The paired-sample tests for perceived satisfaction, e-collaborative learning, and study achievement yielded 95% confidence intervals of 31.98 – 34.10, 51.29 – 55.33, and 70.30 – 73.32, respectively, with *t*(51) values of -0.84, -1.81, and -54.02 and *P* values of 0.405, 0.077, and < 0.001, respectively. The differences in perceived satisfaction and e-collaborative learning did not reach a significant level; however, the difference in study achievement was significant. For the nursing students who did not use the Moodle-based LMS, the results indicated no significant differences between the pretest and posttest in perceived satisfaction and e-collaborative learning but a significant difference between the pretest and posttest in study achievement.

In the Moodle group, the mean perceived satisfaction, e-collaborative learning, and study achievement scores were 33.34, 53.84, and 27.22 on the pretest and 35.84, 58.38, and 81.28 on the posttest, with correlations of 0.358, 0.205 and 0.307, respectively, between the pretest and posttest. The paired-sample tests for perceived satisfaction, e-collaborative learning, and study achievement yielded 95% confidence intervals of 34.50 – 37.19, 55.80 – 60.95, and 79.36 – 83.21, respectively, with *t*(31) values of -4.11, -3.96, and -63.73 and *P* values of < 0.001, < 0.001, and < 0.001, respectively. The differences in all three aspects were significant, indicating that the nursing students who used the Moodle-based LMS had significantly different levels of perceived satisfaction, e-collaborative learning, and study achievement between the pretest and posttest (Table 4). After the completion of the course using the Moodle-based LMS, the nursing students had higher levels of perceived satisfaction, e-collaborative learning, and study achievement than before taking the course, showing certain progress in all three aspects.

## Learning effects of perceived satisfaction, e-collaborative learning, and study achievement within and between groups

One-way ANOVA indicated that the average perceived satisfaction, e-collaborative learning, and study achievement scores on the posttest were 33.04, 53.31, and 71.81 in the non-Moodle group and 35.84, 58.38, and 81.28 in the Moodle group, respectively. The results of Levene's test of equal variances for perceived satisfaction (Levene = 0.68, *P* = 0.412 > 0.05), e-collaborative learning (Levene = 0.31, *P* = 0.578 > 0.05), and study achievement (Levene = 3.34, *P* = 0.071 > 0.05) were not significant, indicating that there was no significant difference in variation between the two groups. For perceived satisfaction, the overall test results indicated a significant difference in the posttest between the two groups (*F*(1,82) = 10.62, *P* = 0.002), suggesting that perceived satisfaction could vary depending on whether classroom teaching was combined with a Moodle-based LMS. For e-collaborative learning, the overall test results indicated a significant difference in the posttest between the two groups (*F*(1,82) = 9.48, *P* = 0.003), suggesting that the incorporation of a Moodle-based LMS into classroom teaching could affect the level of e-collaborative learning. Similarly, the overall posttest result for study achievement was significantly different between the two groups (*F*(1,82) = 59.30, *P* < 0.001), suggesting that the use of a Moodle-based LMS could result in differences in study achievement. In the analysis using Moodle-based LMS learning as an independent variable and perceived satisfaction, e-collaborative learning, and study achievement as dependent variables, the explanatory power  $\eta^2$  reached 11.5%, 10.4%, and 42.0%, respectively, indicating that small and moderate effects of the variance in the dependent variables were explained by the independent variable. The observed power was also high, 0.896, indicating that the data studied had a high reference value (Table 5).

## Discussion

The aim of this study was to determine the effectiveness of combining a Moodle-based LMS with classroom teaching. This method created a new learning module wherein teaching and learning activities were not limited to a face-to-face teaching environment. Compared with those in the non-Moodle group, the students in the Moodle group had a higher level of perceived satisfaction with the pediatric nursing course. This result echoes the ideology of constructivism and was consistent with the findings reported by Chiu et al. (2009) and Hmelo-Silver and Chinn (2015). The results confirmed that in terms of perceived motivation and problem-solving skill development, nursing students were more satisfied with the Moodle platform, a collaborative e-learning system, than traditional face-to-face teaching. By comparing their performance and expectations, the students in the Moodle group reported that the pediatric nursing course had met their expectations and believed that the Moodle-based LMS combined with face-to-face teaching was effective; as a result, the students had a relatively higher level of satisfaction with the course (Petruzzellis et al., 2006). In other words, the students in the Moodle group were satisfied with their experience in the course. Although satisfaction is a psychological process that can be affected by various factors in different environments (Weerasinghe and Fernando, 2017) and has different standards, there is no doubt that student satisfaction is one of the most important indicators for evaluating teaching effectiveness and learning environment quality (Jung, 2014). Hence, student satisfaction regarding meeting expectations is one of the most critical factors in evaluating teaching success (Rahman et al., 2015) and a pivotal factor affecting learning performance (Jung, 2014).

The level of e-collaborative learning significantly improved in the Moodle group compared to the non-Moodle group through the use of the Moodle-based LMS. Consistent with the findings reported by Männistö et al. (2019), e-collaborative learning through Moodle-based LMSs enhances student development and leads to meaningful learning effects. These effects might be attributed to the new e-collaborative learning environment created by the Moodle platform. Submerging themselves in this environment, which has been proven to have a positive impact on learning (Salvetti and Bertagni, 2014), nursing students began to collaborate with each other to accomplish the learning tasks assigned by the teacher and successfully developed problem-solving plans. They discussed the study topics in groups and enjoyed equal opportunities to provide and receive assistance from group members, prompting e-collaborative learning (Miller and Hadwin, 2015). The Moodle platform can provide students with more opportunities to interact and enhance their e-collaborative learning. These opportunities eventually improve students' social and collaborative skills, learning motivation, problem-solving abilities, critical thinking, and cognitive abilities (Reiter-Palmon et al., 2017; Rummel, 2018) and their negotiation and conflict-resolution skills. Another possible

reason for improvements might be the extensive use of interactive tools such as email, posts, online meetings, and online chats. Students can discuss, share information, spread new knowledge, and express opinions in an open atmosphere using these tools, all of which promote communication among peers and facilitate new knowledge construction via social interaction (Peterson and Roseth, 2016; Smeekens et al., 2011). This environment is in line with the views of socioconstructivists who emphasize the important role of social interaction in individual learning and knowledge construction (Scardamalia and Bereiter, 2014). In this study, the nursing students in the Moodle group recorded a monthly average of 97.91 engagements in the learning activities on the Moodle platform during the entire course. Despite a decrease in the third month, the access frequency increased in the last month, potentially because the students were preparing for the upcoming final exam through e-collaborative learning with peers on the Moodle platform. By watching videos and participating in real-time chats on the platform, the students could revise their activities to complete their learning tasks through team collaboration. The Moodle-based LMS provided the students with a more enjoyable and meaningful learning experience, prompting them to share their novel experience with others. The positive response of the students in the Moodle group indicated that the Moodle platform combined with traditional classroom face-to-face teaching improved the effectiveness of teaching knowledge, skills, and abilities related to pediatric nursing and increased student learning.

The F value for study achievement, which was derived from the posttest after the Moodle group completed interactions on the Moodle platform, was 59.30, below the threshold value of 75.32. This result suggested that compared with the non-Moodle group, the Moodle group had a higher level of professional knowledge but that the two groups had similar prior knowledge in the domain of pediatric nursing. This finding indicates that the nursing students gained significant benefits from the Moodle-based LMS. The combined use of traditional face-to-face teaching and the Moodle-based LMS enabled the students to make remarkable progress, based on their study achievements, in professional knowledge after completing the pediatric nursing course. In addition to the content obtained via classroom instruction, the course constructed using the Moodle-based LMS had a significant positive impact on students with respect to obtaining pediatric nursing knowledge. This finding is inconsistent with a previous opinion from some educators that new electronic technologies are not effective learning tools and that their use in teaching does not have positive effects on students' study achievement (Ghuloum, 2010). However, our results support the opinion by Kotzer and Elran (2012) that the proper integration of novel Moodle-based E-learning environments into pedagogical frameworks is conducive to teaching and learning. They also support the findings of Mlotshwa et al. (2020), i.e., that Moodle-embedded teaching activities prompt students to construct knowledge under the theoretical framework of social constructivism. The positive effect of Moodle-based LMS combined with face-to-face teaching on the study achievements of students in the pediatric nursing course is generated in part because the Moodle-based LMS can help nursing students use various study materials and tools after class, for example, videos, multimedia, and email, as well as learning tasks and activity revisions. This method provides students with more diverse information and piques their interest, thus improving their understanding of the complicated topics taught in class (Lakens, 2013). In addition, this new teaching method prompts students to actively construct knowledge based on immediate feedback. As expected, the nursing students in the non-Moodle group also significantly improved their learning in the pediatric nursing course after four months even though they received only face-to-face teaching without the Moodle-based LMS intervention. This finding implies that Moodle-based LMSs are not replacements for traditional face-to-face teaching but instead an effective complementary tool for teaching, discussing, and learning in a classroom environment (Mlotshwa et al., 2020).

A number of studies have evaluated the use of Moodle-based LMSs for educational purposes in higher education and their effects on student learning performance (Männistö et al., 2019; Novo-Corti et al., 2013). Overall, the majority of these studies derived consistent results. Most previous studies on the use of Moodle-based LMSs indicated that this system is more satisfactory, motivating, and effective than face-to-face teaching. In this study, students were satisfied with the online LMS experience, and their expectations regarding learning pediatric nursing were met. Furthermore, e-collaborative learning via LMSs eases student interactions (Weinberger et al., 2010), promotes knowledge construction (Buder and Bodemer, 2008), and creates learning activities with new social communication and cognition functions (Phielix et al., 2011). Consequently, students are more motivated to continue their studies and thus more likely to overcome challenges and master the knowledge necessary for a course, as evidenced by the improved average study achievement score on the written exam in the present study. As explained throughout the discussion section above, most nursing students acknowledged the effectiveness of the Moodle-based LMS as a learning tool. The encouraging findings of this study provide solid empirical evidence supporting the introduction of Moodle-based LMSs into teaching.

## Limitations

Despite our considerable efforts, there are still problems related to the research design of this study. First, our results indicate that Moodle-based LMSs generate a certain level of positive satisfaction. However, the satisfaction level derived from empirical evidence analysis might not always remain the same. Because no follow-up data were collected in the present study, the question of whether satisfaction remains the same over time has yet to be answered. Second, no consensus has been reached related to the methods used for evaluating technological satisfaction with Moodle-based LMSs (García-Murillo et al., 2020). The existing studies used different indicators and standards for evaluation, leading to discrepancies in the effectiveness assessment results and thus limiting the generalization of the research findings. To solve this still-open issue, we suggest that future research focus on developing new assessment tools that can provide effective alternatives.

This study clearly demonstrated the effectiveness of a Moodle-based LMS as a complementary tool in teaching and learning. The findings from this study can further promote the use and positive contribution of this system in the field of teaching plan design and teaching techniques. In addition to providing insight into future research, our findings promote the use of Moodle-based LMSs as important elements of pedagogy in higher medical education and thus bring valuable insights to nursing education.

## Conclusions

The main finding of this study is that the use of a Moodle-based LMS can significantly improve nursing students' perceived satisfaction, e-collaborative learning, and study achievement in a pediatric nursing course. The students reported that the setup and use of the Moodle-based LMS on campus was very effective. Our study not only provides teachers with empirical evidence to help them make effective teaching decisions but also promotes a positive and optimistic attitude toward the use of online LMSs. Based on the findings from this study, Moodle-based LMSs can be adjusted for different types of nursing students in college and can affect the self-learning and learning performance of students. More importantly, during the COVID-19 pandemic, the use of Moodle-based LMSs can reduce the risk of infection and therefore can be an important component of appropriate and safe complementary teaching modules.

## Declarations

### Acknowledgements

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**Conflicts of interest:** none

### Ethical considerations

This study was approved by the Institutional Review Board (IRB) of Mackay Memorial Hospital (IRB Number: 20MMHIS111e).

### Author contributions

*YCC and CJC designed the study and performed the experiments; YCC and MYL performed the experiments, analyzed the data, and wrote the manuscript.*

## References

1. Aleman JLF, de Gea JMC, Mondéjar JJR. Effects of competitive computer-assisted learning versus conventional teaching methods on the acquisition and retention of knowledge in medical surgical nursing students. *Nurse Educ Today*. 2011;31(8):866–71.
2. Baker MJ. Collaboration in collaborative learning. *Interact Stud*. 2015;16(3):451–73.
3. Bennett DA. How can I deal with missing data in my study? *Aust N Z J Public Health*. 2001;25(5):464–9.
4. Boutron I, Moher D, Altman DG, Schulz KF, Ravaud P. Extending the CONSORT statement to randomized trials of nonpharmacologic treatment: explanation and elaboration. *Ann Intern Med*. 2008;148(4):295–309.
5. Buder J, Bodemer D. Supporting controversial CSCL discussions with augmented group awareness tools. *Int J Computer-Supported Collaborative Learn*. 2008;3(2):123–39.
6. Chan AWK, Sit JWH, Wong EML, Lee DTF, Fung OWM. Case-based web learning versus face-to-face learning: A mixed-method study on University nursing students. *J Nurs Res*. 2016;24(1):31–40.
7. Chan CK, van Aalst J. Knowledge building: Theory, design, and analysis. In: Fischer F, Hmelo-Silver CE, Goldma SR, Reimann P, editors. *International Handbook of the Learning Sciences*. New York: Routledge; 2018. pp. 295–307.
8. Chen CJ, Sung HC, Lee MS, Chang CY. The effects of Chinese five-element music therapy on nursing students with depressed mood. *Int J Nurs Pract*. 2015;21(2):192–9.
9. Chiu SC, Cheng KY, Sun TK, Chang KC, Tan TY, Lin TK, ... Yeh SH. The effectiveness of interactive computer assisted instruction compared to videotaped instruction for teaching nurses to assess neurological function of stroke patients: a randomized controlled trial. *Int J Nurs Stud*. 2009;46(12):1548–56.
10. García-Murillo G, Novoa-Hernández P, Rodríguez RS. Technological Satisfaction About Moodle in Higher Education—A Meta-Analysis. *IEEE Revista Iberoamericana de Tecnologías del Aprendizaje*. 2020;15(4):281–90.
11. Ghuloum H. 2010. *3D hologram technology in learning environment, Proceedings of Informing Science & IT Education Conference*. ISIT, pp. 694–704. Retrieved January 6, 2021, from <https://proceedings.informingscience.org/InSITE2010/InSITE10p693-704Ghuloum751.pdf>.
12. Heppner PP, Heppner MJ. (2004). *Writing and publishing your thesis, dissertation, and research: A guide for students in the helping professions*. Thomson/Brooks/Cole.
13. Hmelo-Silver CE, Chinn CA. Collaborative learning. In: Corno L, Anderman EM, editors. *Handbook of Educational Psychology*. New York: Routledge; 2015. pp. 349–63.
14. Järvelä S, Järvenoja H, Malmberg J, Hadwin AF. Exploring socially shared regulation in the context of collaboration. *J Cogn Educ Psychol*. 2013;12(3):267–86.
15. Järvelä S, Kirschner PA, Hadwin A, Järvenoja H, Malmberg J, Miller M, Laru J. Socially shared regulation of learning in CSCL: Understanding and prompting individual-and group-level shared regulatory activities. *Int J Computer-Supported Collaborative Learn*. 2016;11(3):263–80.
16. Jeong H, Hmelo-Silver CE, Yu Y. An examination of CSCL methodological practices and the influence of theoretical frameworks 2005–2009. *Int J Computer-Supported Collaborative Learn*. 2014;9(3):305–34.

17. Jung HJ. Ubiquitous learning: Determinants impacting learners' satisfaction and performance with smartphones. *Lang Learn Technol.* 2014;18(3):97–119.
18. Kollar I, Wecker C, Fischer F. 2018. In scaffolding and scripting (computer-supported) collaborative learning. In F. Fischer, C. Hmelo-Silver, S. Goldman, & P. Reimann, editors, *International Handbook of the Learning Sciences* (pp. 340– 350). New York: Routledge.
19. Kotzer S, Elran Y. (2012). *Learning and teaching with Moodle-based E-learning environments, combining learning skills and content in the fields of Math and Science & Technology*, 1st Moodle Research Conference, Heraklion, pp. 122– 131. Retrieved January 6, 2021, from <https://research.moodle.org/55/1/16%20-%20Kotzer%20-%20Learning%20and%20teaching%20with%20Moodle-based%20E-learning.pdf>.
20. Lakens D. Calculating and reporting effect sizes to facilitate cumulative science: a practical primer for t-tests and ANOVAs. *Front Psychol.* 2013;4:863.
21. Mackintosh-Franklin C. An evaluation into the impact of undergraduate nursing students classroom attendance and engagement with online tasks on overall academic achievement. *Nurse Educ Today.* 2018;61:89–93.
22. Männistö M, Mikkonen K, Kuivila HM, Virtanen M, Kyngäs H, Kääriäinen M. Digital collaborative learning in nursing education: A systematic review. *Scand J Caring Sci.* 2020;34(2):280–92.
23. Männistö M, Mikkonen K, Vuopala E, Kuivila HM, Virtanen M, Kyngäs H, Kääriäinen M. Effects of a digital educational intervention on collaborative learning in nursing education: A quasi-experimental study. *Nordic J Nurs Res.* 2019;39(4):191–200.
24. McCall M, Spencer E, Owen H, Roberts N, Heneghan C. Characteristics and efficacy of digital health education: an overview of systematic reviews. *Health Educ J.* 2018;77(5):497–514.
25. McMullan M, Jones R, Lea S. The effect of an interactive e-drug calculations package on nursing students' drug calculation ability and self-efficacy. *Int J Med Informatics.* 2011;80(6):421–30.
26. Miller M, Hadwin A. Scripting and awareness tools for regulating collaborative learning: Changing the landscape of support in CSCL. *Comput Hum Behav.* 2015;52:573–88.
27. Miyake N, Kirschner PA. The social and interactive dimensions of collaborative learning. In: Sawyer KR, editor. *The Cambridge Handbook of the Learning Sciences*. New York: Cambridge University Press; 2014. pp. 418–38.
28. Mlotshwa N, Tunjera N, Chigona A. (2020). Integration of MOODLE into the classroom for better conceptual understanding of functions in Mathematics. *South African Journal of Education, 40(3)*.
29. Novo-Corti I, Varela-Candamio L, Ramil-Díaz M. E-learning and face to face mixed methodology: Evaluating effectiveness of e-learning and perceived satisfaction for a microeconomic course using the Moodle platform. *Comput Hum Behav.* 2013;29(2):410–5.
30. Paul R. (2015). *The critical thinking community*. Retrieved January 6, 2021, from <http://www.criticalthinking.org/pages/dr-richard-paul/818>.
31. Peterson AT, Roseth CJ. Effects of four CSCL strategies for enhancing online discussion forums: Social interdependence, summarizing, scripts, and synchronicity. *Int J Educational Res.* 2016;76:147–61.
32. Petruzzellis L, d'Uggento AM, Romanazzi S. (2006). Student satisfaction and quality of service in Italian universities. *Managing service quality: An international journal*. Retrieved January 7, 2021, from [https://www.researchgate.net/profile/Luca-Petruzzellis/publication/242349117\\_Student\\_satisfaction\\_and\\_quality\\_of\\_service\\_in\\_Italian\\_universities/links/0deec5231ab25755a5000000/Student-satisfaction-and-quality-of-service-in-Italian-universities.pdf](https://www.researchgate.net/profile/Luca-Petruzzellis/publication/242349117_Student_satisfaction_and_quality_of_service_in_Italian_universities/links/0deec5231ab25755a5000000/Student-satisfaction-and-quality-of-service-in-Italian-universities.pdf).
33. Phielix C, Prins FJ, Kirschner PA, Erkens G, Jaspers J. Group awareness of social and cognitive performance in a CSCL environment: Effects of a peer feedback and reflection tool. *Comput Hum Behav.* 2011;27(3):1087–102.
34. Rahman NAA, Hussein N, Aluwi AH. Satisfaction on blended learning in a public higher education institution: What factors matter? *Procedia-social and behavioral sciences.* 2015;211:768–75.
35. Reiter-Palmon R, Sinha T, Gevers J, Odobez JM, Volpe G. Theories and models of teams and groups. *Small Group Research.* 2017;48(5):544–67.
36. Ritter LA, Sue VM. Systematic planning for using an online survey. *New Dir Evaluation.* 2007;115:15–22.
37. Rummel N. One framework to rule them all? Carrying forward the conversation started by Wise and Schwarz. *Int J Computer-Supported Collaborative Learn.* 2018;13(1):123–9.
38. Salvetti F, Bertagni B. e-REAL: Enhanced reality lab. *Int J Adv Corp Learn.* 2014;7(3):41.
39. Scardamalia M, Bereiter C. Knowledge building and knowledge creation: Theory, pedagogy, and technology. In: Sawyer RK, editor. *Cambridge Handbook of the Learning Sciences*. New York: Cambridge University Press; 2014. pp. 397–417.
40. Smeekens AEFN, Broekhuijsen-van Henten DM, Sittig JS, Russel IMB, Cate T, Turner OTJ, N. M., & van de Putte EM. Successful e-learning programme on the detection of child abuse in emergency departments: a randomised controlled trial. *Arch Dis Child.* 2011;96(4):330–4.
41. Virtanen MA, Kääriäinen M, Liikanen E, Haavisto E. The comparison of students' satisfaction between ubiquitous and web-based learning environments. *Educ Inform Technol.* 2017;22(5):2565–81.
42. Vuopala E, Hyvönen P, Järvelä S. Interaction forms in successful collaborative learning in virtual learning environments. *Act Learn High Educ.* 2016;17(1):25–38.
43. Weerasinghe IS, Fernando RL. Students' satisfaction in higher education. *Am J educational Res.* 2017;5(5):533–9.
44. Weinberger A, Stegmann K, Fischer F. Learning to argue online: Scripted groups surpass individuals (unscripted groups do not). *Comput Hum Behav.* 2010;26(4):506–15.

## Tables

**Table 1** Exploratory factor analysis of the student satisfaction scale

Item	First factor	Second factor
The first factor: learning satisfaction		
1. I feel that the course met my expectations.	.914	
2. I achieved the study objectives of the course.	.754	
3. I gained new knowledge in class.	.625	
4. I actively made an effort to achieve the objectives of the course.	.623	
5. I think that the difficulty level of the course content was appropriate.	.553	
The second factor: e-learning environment satisfaction		
6. The e-learning environment motivated me to learn the course content.		.907
7. I found that the e-learning environment was very useful.		.750
8. I think it is important to use an e-learning environment in teaching.		.671
Eigenvalue	4.382	1.064
Percentage of variance	54.8%	13.3%
Total percentage of the factor model		68.1%
Cronbach's alpha	.847	.830

**Table 2** Exploratory factor analysis of the collaborative learning scale

Item	First factor	Second factor	Third factor
First factor: promoting group collaboration			
1. All group members actively participated in class activities.	.946		
2. All group members were in a positive learning atmosphere.	.938		
3. All group members had fluent interactions and profound discussions.	.846		
4. The group members prompted each other to study.	.749		
5. The group members had enough background knowledge on the subject of the course.	.654		
6. All group members can clearly explain the learning objectives.	.643		
Second factor: teacher's role in the collaborative learning environment			
7. The teacher's feedback prompted me to study.		.954	
8. Teachers actively improved opportunities for cooperation.		.891	
9. Teaching materials prompted diverse group discussions.		.688	
10. The e-learning environment made learning activities more flexible for all groups.		.360	
Third factor: the role of students in the collaborative learning environment			
11. My learning skills are a prerequisite for successful collaborative learning.			.878
12. My own learning motivation is a prerequisite for successful collaborative learning.			.810
13. Successful completion of learning tasks requires collaborative learning.			.356
Eigenvalue	5.584	2.700	1.032
Percentage of variance	43.0%	20.8%	7.9%
Total percentage of the factor model		68.1%	71.7%
Cronbach's alpha	.921	.835	.764

**Table 3** Descriptive Characteristics, Perceived Satisfaction, Collaborative Learning and Study Achievement of the Participants ( $n = 84$ )

Characteristics	Nonmoodle group ( $n = 52$ )		Moodle group ( $n = 32$ )		Total ( $n = 84$ )		<i>Z</i>	<i>p</i>
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		
Gender							-1.85	.064
Male	9	17.30	5	15.60	14	16.67		
Female	43	82.70	27	84.40	70	83.33		
Academic performance (GPA) <sup>a, b</sup>							-1.85	.064
2.6-4.0	14	26.90	15	46.90	29	34.52		
1.6-2.5	20	38.50	9	28.10	29	34.52		
1.1-1.5	12	23.10	8	25.00	20	23.81		
0-1-0	6	11.50	0	0	6	7.14		
Residential area							-1.08	.282
North region	38	73.10	27	84.40	65	77.38		
Central region	7	13.50	3	9.40	10	11.90		
Southern region	4	7.70	2	6.30	6	7.14		
East region	3	5.80	0	0	3	3.57		
Birth order							-0.86	.389
Oldest	24	46.20	13	40.60	37	44.05		
Middle	8	15.40	4	12.50	12	14.29		
Youngest	11	21.20	6	18.80	17	20.24		
Only child	9	17.30	9	28.10	18	21.43		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			<i>t</i>	<i>p</i>
Age (years)	19.35	2.68	19.75	.88			-0.82	.412
Perceived Satisfaction	32.54	3.08	33.34	3.09			-1.16	.249
Collaborative learning	51.31	6.44	53.84	4.41			-1.96	.053
Study achievement	27.79	3.19	27.22	3.27			.79	.433

Note. <sup>a</sup>GPA: Grade point average is an indicator of academic performance. <sup>b</sup>Cutoff points: GPA from Chen et al. (2015). *Z*: Z score. *M*: Mean. *SD*: Standard deviation

**Table 4** Pretests and Posttests on Perceived Satisfaction, Collaborative Learning and Study Achievement Tests Using Paired *t*-test ( $n = 84$ )

Variables	Nonmoodle group (n = 52)				95% CI		Moodle group (n = 32)				95% CI	
	M	SD	t	p <sup>†</sup>	Lower	Upper	M	SD	t	p <sup>†</sup>	Lower	Upper
Perceived Satisfaction												
Pretest	32.54	3.08	-84	.405	31.98	34.10	33.34	3.09	-4.11	<.001***	34.50	37.19
Posttest	33.04	4.26					35.84	2.99				
Collaborative learning												
Pretest	51.31	6.44	-1.81	.077	51.29	55.33	53.84	4.41	-3.96	<.001***	55.80	60.95
Posttest	53.31	8.14					58.38	5.73				
Study achievement												
Pretest	27.79	3.19	-54.02	<.001***	70.30	73.32	27.22	3.27	-63.73	<.001***	79.36	83.21
Posttest	71.81	5.92					81.28	4.66				

Note. \*\*\*  $p < .001$ . M: Mean; SD: Standard deviation; CI: Confidence Interval. The  $p^{\dagger}$  was calculated by the paired  $t$ -test to compare the pretests and posttests of the nonmoodle group. The  $p^{\dagger}$  was calculated by the paired  $t$ -test to compare the pretests and posttests of the moodle group.

**Table 5** Nonmoodle and Moodle Groups on Perceived Satisfaction, Collaborative Learning and Study Achievement Tests Using One-way ANOVA ( $N = 84$ )

Source	SS	df	MS	F	p	$\eta^2$	95% CI	
							Lower	Upper
Perceived Satisfaction								
Between Groups	155.89	1	155.89	10.62	.002**	.115	33.59	35.30
Within Groups	1204.14	82	14.69					
Total	1360.04	83						
Collaborative learning								
Between Groups	508.66	1	508.66	9.48	.003**	.104	54.20	57.48
Within Groups	4400.58	82	53.67					
Total	4909.24	83						
Study achievement								
Between Groups	1777.87	1	1777.87	59.30	<.001***	.420	75.32	77.77
Within Groups	2458.55	82	29.98					
Total	4236.42	83						

\*\*  $p < .01$ ; \*\*\*  $p < .001$ . SS: Sum of squares; df: Degrees of freedom; MS: Mean squares; F: F-ratio;  $\eta^2$ : Partial eta-squared; CI: Confidence Interval.

## Supplementary Data

Supplementary Data 1 and 2 are not available with this version.

## Figures

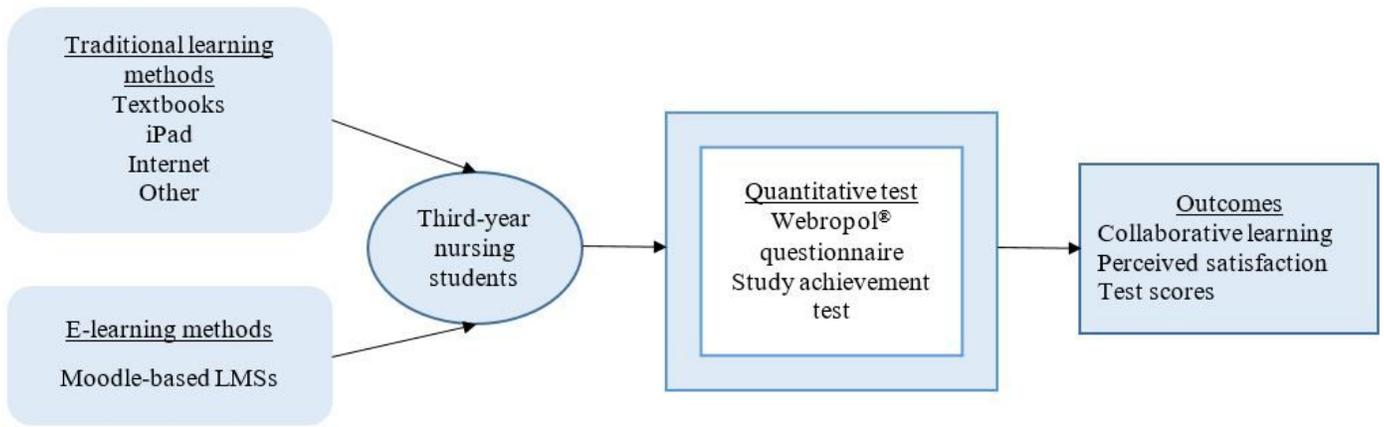


Figure 1

Diagram summarizing the study framework.

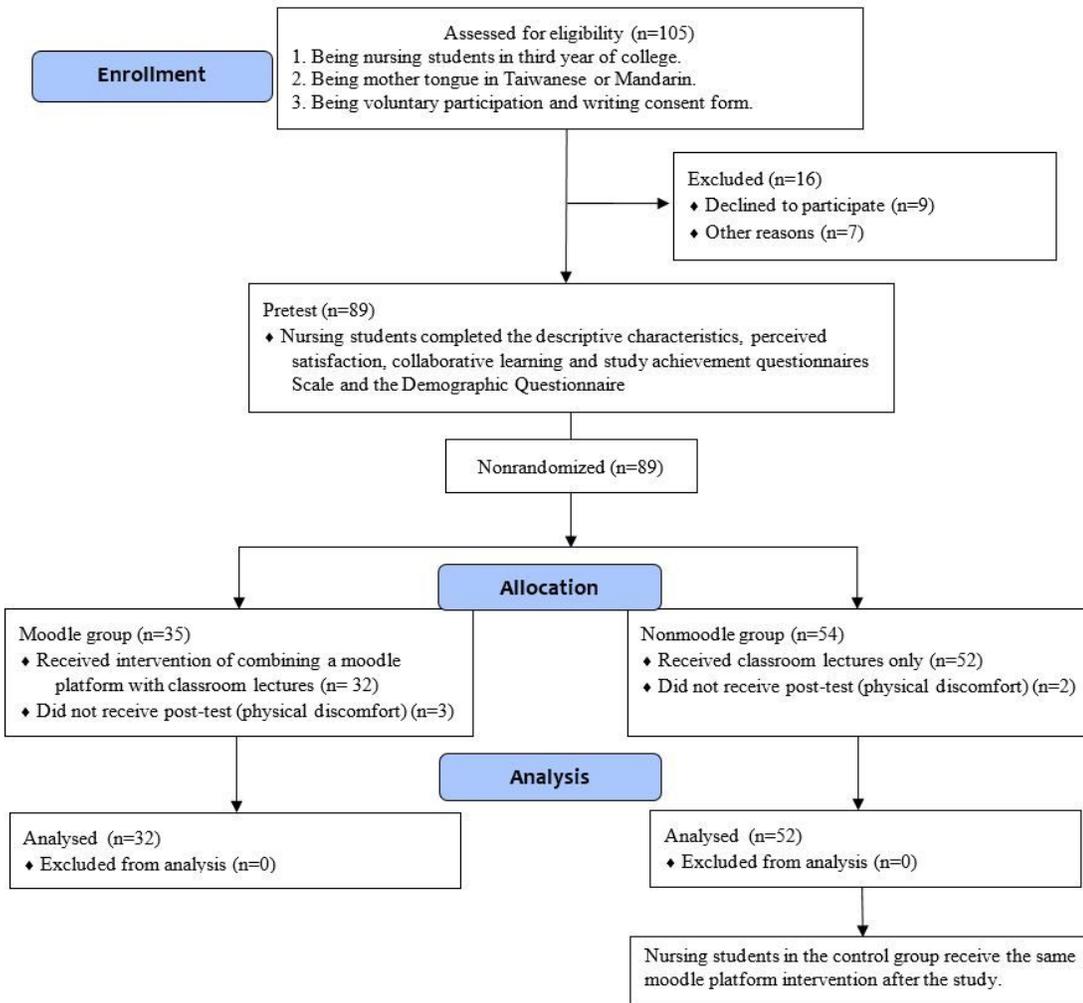


Figure 2

Summary of study flow diagram.

## Movie Survey

Welcome to answer these questions.

**1) Your gender?**

Female  Male

**2) Which media formats of movies are suitable for you? (can choose multiple boxes)**

Blu-ray  DVD  CD  VHS  Online streaming



Figure 3

An example of a Webropol® questionnaire.


You are logged in as Steve Hargaden (Logout)

**Main Menu**

- EGRPS HomePage
- Access your files from home
- Acceptable Use Policy
- Terms of Use
- Site news

**My courses**

- French 1
- English 9
- Test Behrendt
- EGRMS VIDEO YEARBOOK
- Test Williams
- DDT Mayes Page
- Health
- 8th Grade Social Studies
- Biology
- Sensory Processing/Sensory Integration in the Classroom
- Test Pfister

**Site news** [Subscribe to this forum](#)

We are now using Moodle 1.7.2+  
by Jeff Crawford - Saturday, 25 August 2007, 04:45 AM

The Technology Department is pleased to announce that the EGRPS Moodle System has now been upgraded to version 1.7.2+!

This is a significant upgrade from the previous version, 1.5.3+.

This is just a milestone upgrade. The Technology Department plans to perform one more Moodle upgrade before the start of the 2007-2008 school year.

Thanks,  
Jeff Crawford  
Manager of Networking and Security  
East Grand Rapids Public Schools

[Edit](#) | [Delete](#)

[Discuss this topic](#) (0 replies so far)

Welcome to Moodle!  
by Jeff Crawford - Sunday, 19 February 2006, 11:52 PM

**Calendar**

January 2008

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Find:

[Next](#) [Previous](#) [Highlight all](#)  [Match case](#)

Done

Figure 4

Home page of the interface platform, showing the main menu, discussion topics, and calendar.



**My courses**

- Adobe Certification 2012-13 CS6 Web Design
- Alison Patterson Lit
- Btec L2 Dip in IT Unit 1: Communicating in the IT Industry
- BTEC Level 2 Diploma in IT Tutorial
- BTEC Level 3 Extended Diploma IT NSF1B Assignment Submission
- Btec Level 3 Unit 56 Digital Communication J Dean
- City and Guilds Employability Course (Professional Development)
- Computer Systems (FD 11-12)
- ECDL/ICDL 2011\_12\_DOL
- FE Student Induction 2012
- ICT Essential Skills - Sharon Kirk
- Installing Computer Hardware (FD 11-12)
- Unit 02: Computer Systems
- Unit 1: Communications and Employment Skills
- Unit 14: Event Driven

**Unit 14: Event Driven Programming**

**BTEC Level 3 Extended Diploma IT NSF1B Assignment Submission**

**Alison Patterson Lit**

**ICT Essential Skills - Sharon Kirk**

**Unit 1: Communications and Employment Skills**

**Unit 25: Maintaining Computer Systems**

Assignment: Main Points in H&S Legislation  
 Due date: Wednesday, 21 September 2011, 09:30 AM  
 Not submitted yet (1 year 237 days late)

Assignment: Policies and Procedures Dropbox  
 Due date: Monday, 1 October 2012, 04:40 PM  
 Not submitted yet (225 days 19 hours late)

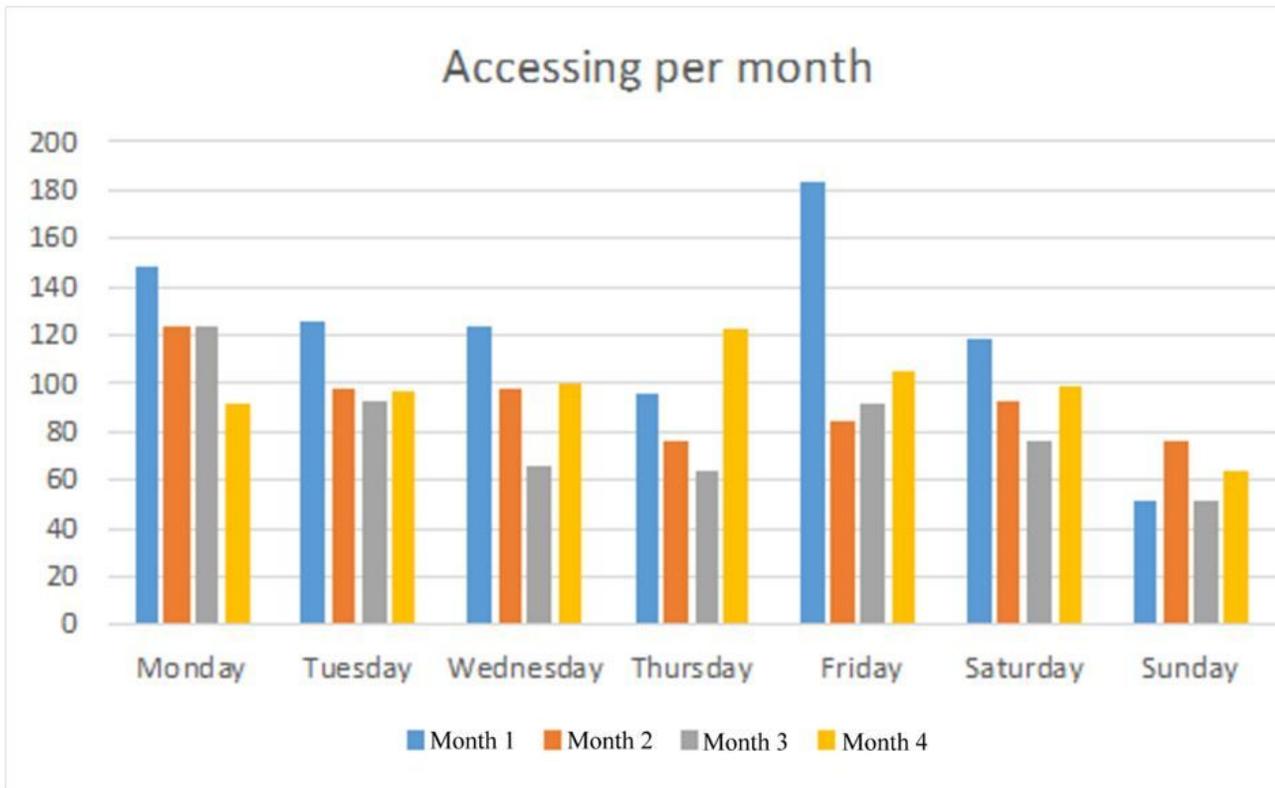
Assignment: Prioritising Maintenance

**Moodle Tools**

- Courses**  
Search for a course
- Explore Digital Library**  
Explore software available in the digital library
- Library Catalogue**  
Search, request, renew books or ebooks for your study
- Course Un-enrol Form**  
Use this form if you have accidentally enrolled yourself on the wrong Moodle course
- New Course Request**  
Staff can use this form to request a new course be created on Moodle
- Delete Course Request**  
Staff can use this form to have their course deleted
- Recover Course Request**  
Staff who did not move their course before the Halloween break (2011) can use this link to attempt retrieval of a course

Figure 5

An example page showing how a student could access "My courses" from the main menu and enter the virtual classroom for the course.



**Figure 6**

The frequency with which nursing students used the Moodle platform in this study.