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Research Article

Research on Synchronous Collaborative Learning Model of Legal Education Based on Web3.0

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ABSTRACT

Modern technology and shifting corporate demands are driving a rapid evolution in legal education. This study will describe an innovative preliminary investigation that uses state-of-the-art technology to provide an alternative method of instruction in response to the industry's growing demand for graduates with strong technical aptitude along with strong interpersonal and teamwork skills. The exploratory inquiry combines a more traditional methodology with an approach that emphasizes the benefits of online collaboration for student learning as a teaching and assessment tool in order to reimaging a legal unit. Students who completed an online collaborative activity as part of the unit's assessment filled out an online survey to express their thoughts about the online collaborative experience. In order to promote collaborative work and improve learning processes, group work has become a vital instrument. Many academic studies have been written about group dynamics and how they affect both collective and individual performance. This study discusses the experiences of the students after analyzing the data from the online survey to identify recurrent themes. This article creates learning experiences that encourage cooperation and communication within the legal field by utilizing online resources, infrastructure, and learning design processes. Results from this study indicate that students typically establish synchronous groups based on their knowledge levels. Furthermore, students say that one of the main factors in the formation of the groups was working on themes of shared interest.

Keywords: Collaborative Learning, Legal Education, Online Learning, Online survey.

1. Introduction

Information and communication technologies (ICT) and video technologies specifically, have played a significant role in the so-called digital transformation in recent years. ICT comes in a wide range of formats with an abundance of tools, platforms and services. In addition to a necessary part of everyday life, these are now taught and trained by a large number of adults and youth globally [1]. Massive open online courses (MOOCs), blended learning and discussion-based online courses are a few of the many forms of online learning that are becoming more and more prevalent on college campuses. Increasing access to college-level courses is one of the objectives of online learning efforts, especially through MOOC [2]. The features of contemporary learning platforms include content access through various client applications, sharing, monitoring and personalization. Furthermore, new platforms for virtual worlds (VWs) and metaverse two more online learning mediums are starting to appear. An everlasting multiuser virtual environment built on computer interaction. Each user is represented by a unique avatar that can communicate with other users simultaneously [3]. Commonly formed and originating in social interactions, affective experiences are a staple of education. Collaborative learning is growing in popularity in both conventional classrooms and virtual learning contexts. It captures the social aspect of affective experience [4]. The field of wireless communication technology has advanced in recent years. The industry is investigating Sixth Generation (6G) wireless communication technology due to the extensive implementation of Fifth Generation (5G) systems and the maturity of Fourth Generation (4G) technology. Industry and academia concur that the next generation of 6G networks, space-air-ground integrated networks, will be able to provide the high and low latency requirements of massively networked humans for system performance [5]. Students in this module completed a range of projects in

online legal clinics, courts, jails, legal aid groups and schools. Many of these projects require oral presenting skills. To help students be more engaged in their clinical practice, training materials on communication and presenting techniques are given to them. Distance learning is acknowledged as a difficult setting for honing presentation abilities [6]. Advocating for this reform to raise the bar for engineering education and better equip students for the global market are two accrediting bodies: the National Board of Accreditation (NBA) and the National Assessment and Accreditation Council (NAAC). As per the statutory agencies, the Outcome-based education (OBE) approach has emerged as a crucial factor for quality enhancement, sustainability and accreditation worldwide, particularly in India [7]. Video conferencing services allowed students to participate in English classes, providing a new avenue for computer-mediated communication (CMC) between teachers and learners [8]. The widespread use of computer and network technologies in education, along with the increasing demand to foster students' critical thinking and collaborative learning abilities, has made online learning an important and well-liked teaching technique [9]. Competency-based learning has drawn attention from all around the world to the importance of preparing lifelong learners to handle challenging situations when they arise in the future. Competencies are the most important, broadly useful skills that may be used in a variety of contexts. A competency is the ability to fulfill the expectations placed on oneself and oneself by society for contributions to the community and individual achievement, as well as the ability to integrate and apply learning results to overcome obstacles in a particular setting [10]. The study [11] described the design and execution of a virtual dissection exercise for a hybrid synchronous learning environment used in a first-year undergraduate engineering course on thermodynamics and energy systems. Many teachers' pedagogical approaches and students' learning orientations had been shaped by the College English course goal. Pupils will naively believe that passing tests and mastering the fundamentals of reading will be sufficient and that additional skills like speaking, writing, listening and translating were not that crucial [12]. The findings [13] demonstrated the critical role that synchronous peer-to-peer working meetings play in the advancement of deep learning. The optimal way to leverage synchronous communications to complement a problem-solving methodology has not received much attention in the literature to date. The SOLO taxonomy has been used to analyze communication session transcripts to examine the week-by-week progression of deep learning. The study [14] looked into how children's cooperative activities were made easier by technology support for their synchronous contacts. They specifically examined whether sharing a workspace facilitates understanding between participants in computer-based collaborative activities. The study attempts to provide a basic overview of the recommended groupware contents. The experimental study [15] that was conducted to ascertain the Groupware's acceptability was described. The research utilized an empirical methodology grounded in the unified theory of technology acceptance and usage to ascertain students' behavioral intentions (BI) to consent the use of said groupware within the setting of higher education in Algeria. The study [16] provided that vast educational data collected throughout the teaching and learning process was vital for teaching administrators, instructors and students. It offered an overview of the existing and relevant applications of educational visualization research. Teachers, administrators and students can benefit from the best approach that massive educational data visualization offers. Online education offered adaptable options for various study styles and promotes lifelong learning. Universities around the world increasingly provided their entire curriculum online, as opposed to individual courses or modules. The idea behind the study was that students ought to have the freedom to learn the skills and information necessary for their careers through online resources in addition to regular classroom settings [17]. The study [18] encouraged researchers and practitioners to apply cooperative learning intervention programs in elementary and secondary physical education. When they assert that they use this educational style in the classroom, they had to be precise. Researchers now feel that social features and collaborative learning improve students' learning activities because of the growing popularity of online learning in school. Consequently, as online learning promotes students' intellectual development, higher education establishments ought to support its use in instruction [19].

1.2 Key Contributions

- Web 3.0 aims to reduce reliance on centralized organizations and servers.
- ANOVA is used to identify differences that are statistically significant. In order to assess student performance and determine whether there is a statistically significant difference between the actual and projected frequencies, two data sets are compared using the chi-square test.

The rest of the paper is as follows: The experimental methodology is thoroughly detailed in Part 2. The results and discussion is covered in Parts 3 and 4, and the conclusion is covered in Part 5.

2. Methods

This section will describe the procedures used to collect and evaluate data to ascertain the preliminary investigation and the unit design's effects from the students' point of view. Participants were asked to submit an online survey in order to assess the effectiveness of the collaborative project. Research on a Web3.0-based synchronous collaborative learning strategy for legal education is intriguing and cutting edge; it has the potential to completely change how legal education is delivered and experienced.

2.1 Dataset

Investigating how students perceive and interact with a synchronous, collaborative learning environment is the goal of this study. Thirty people were in the experimental group, twenty-nine in the control group, and fifty-nine freshmen in the university's information technologies department participated in this quantitative study. Nine weeks total for the study comprised two weeks for data collecting and seven weeks for the implementation process [20].

2.2 Web 3.0

Data is organized in Web 3.0 so that computers can grasp what it means. To do this, it is necessary to leverage linked data, metadata, and defined ontologies in order to make information more useful and accessible. Web 3.0 intends to make it possible for various websites and services to connect with one other seamlessly. As a result, data and services can be connected with other platforms and programs. Web 3.0 significantly incorporates AI. The web becomes increasingly individualized and intelligent as a result of its assistance in comprehending user preferences, context, and content. Common examples include chatbots, recommendation engines, and content curation. The goal of Web 3.0 is to lessen dependency on centralized institutions and servers. Users are frequently empowered and data ownership and control are guaranteed via blockchain technology and decentralized protocols.

In Web 3.0, enhanced privacy and security measures are essential. Users now have more control over their data, and transactions and conversations are frequently secured using cryptographic techniques. Users will be at the heart of the web experience thanks to Web 3.0. Giving people more control over their data and preferences will enable more individualized and useful information and services. Web 3.0 search engines strive to deliver more precise and context-aware search results. They are able to offer answers rather than just links because they are aware of the motivation behind searches. The adoption of decentralized applications that operate on block chain networks is encouraged by Web 3.0. These programs frequently function without a central authority and are open source.

2.3 Formulation of Questionnaires

To gather information about students and their group formation practices, as well as to gauge how the students view Study Book as a learning tool. The discoveries pertaining to the examination of the established groupings are the main subject of the article's next part. Information on the students' backgrounds, cultures, hobbies, and degree of expertise in relation to the course are all included in the questionnaire. Research interests and knowledge level were two questions that students had to respond to. Furthermore, questions regarding group formation were posed to the students.

2.4 Statistical Analysis

2.4.1 Analysis of Variance (ANOVA)

An analytical statistical method ANOVA is used to compare the mean of several groups or circumstances to identify significant differences. The variance is examined to evaluate the measured mean differences to the random expectation. Data are categorized for the ANOVA analysis based on a categorical independent variable. Frequently, the relevant variable is a continuous metric. The hypothesis that distinct groups have substantially different values for the mentioned variables is tested using an ANOVA. Examining the disparities in means are statistically significant, it evaluates the variance differences between and within groups. The formula for the most popular type of ANOVA is as follows:

$$Total\ Sum\ of\ Squares\ (SST) = Sum\ of\ Squares\ between\ (SSB) + Sum\ of\ Squares\ within\ (SSW) \quad (1)$$

A) Total Sum of Squares (TSS)

ANOVA and regression analysis employ the sum of squares to gauge a dataset's overall variability or dispersion. It assesses how far the answer variable deviates from its mean and acts as a standard for determining the significance of other sources of variation.

B) Sum of Squares between (SSB)

The SSB, also known as the between-groups sum of squares, is a statistical tool used in ANOVA to evaluate the variability or dispersion of the data across many groups or categories. It gauges how much the group means depart from the dataset's average overall.

C) The sum of Squares within (SSW)

A statistical tool used in ANOVA to assess the variability or dispersion of the data inside each group or category is the SSW, sometimes the sum of squares computed inside each group. It establishes how each group's data points depart from the corresponding group means.

The formula for figuring out these components is as follows:

$$SST = \Sigma(H - \widehat{H})\text{^}2 \quad (2)$$

$$SSB = \Sigma\left(n * \left(\widehat{H}s - \widehat{H}\right)^2\right) \quad (3)$$

$$SSW = \Sigma\left(h - \widehat{H}z\right)^{2v} \quad (4)$$

Where: h identifies a single data point in the collection.

$\widehat{H}s$ Stands for the average of each group or condition

The variable n denotes the number of data points in each condition or group.

The degrees of freedom associated with each element are determined once the sum of squares components has been calculated:

$$tlSST = N - 1 \quad (5)$$

$$tlSB = F - 1 \quad (6)$$

$$tlSW = N - F \quad (7)$$

N is the number of data points across all groups. L stands for the number of groups under comparison.

Mean squares (MS) are calculated by adding up all the yards and counting the number of independent variables:

$$MSB = SSB / tlSB \quad (8)$$

$$MSW = SSW / tlSW \quad (9)$$

The A-value is then determined by dividing the MSB by the MSW to determine the significance level of the differences between the two sets of data:

$$A = MSB / MSW \quad (10)$$

The A-A-distribution is then used to calculate the b-value associated with the l-value and degrees of freedom. If there are no discernible differences between the groups, the p-value is the likelihood that the result will be as bad as the observed E-value. Significant differences in mean across groups or conditions are shown if the p-value is less than a predetermined significance threshold, like 05.

2.4.2 Chi-Square test

The chi-square test examines two data sets to determine whether the actual and predicted frequencies vary statistically significantly. The test determines whether there is a link between the variables by contrasting the observed and predicted occurrences of each. The chi-square test determines how much actual frequencies deviate from those that would be expected. There is a difference in how the chi-square goodness-of-fit test statistic and the

chi-square test of independence are computed. The B-value of the chi-square test indicates the likelihood that the same or similar results would be seen without any association between the variables. A correlation exists between the two variables if a statistically significant difference exists between the observed and predicted frequencies. Examining statistical outliers using the chi-square(y^2)test is possible.

$$Z^2(D,i,j) = \sum_{w_i\in\{0,1\}}\sum_{w_j\in\{0,1\}}\frac{\left(N_{w_iw_j}-F_{w_iw_j}\right)^2}{F_{w_iw_j}} Z^2(E,i,j) = \sum_{w_i\in\{0,1\}}\sum_{w_j\in\{0,1\}}\frac{\left(N_{w_iw_j}-F_{w_iw_j}\right)^2}{F_{w_iw_j}} \quad (11)$$

$$I(U,C) = \sum_{w_i\in\{0,1\}}\sum_{w_j\in\{0,1\}} B(U=w_i, C=w_j) log_2 \frac{P(U=w_i,C=w_j)}{P(U=w_i)P(C=w_j)} \quad (12)$$

U is a random variable that takes values w_i=1, and F is a random variable that takes values.

$$I(U,F) = \frac{F_{11}}{F} log_2 \frac{FF_{11}}{F_1F_1} + \frac{F_{01}}{F} log_2 \frac{FF_{01}}{F_0F_1} + \frac{F_{10}}{F} log_2 \frac{FF_{10}}{F_1F_0} + \frac{F_{00}}{F} log_2 \frac{FF_{00}}{F_0F_0} \quad (13)$$

If X^2 is large, the independence hypothesis, which states that the predicted and observed numbers are equivalent, is false. The following is a more straightforward mathematical method for calculatingY^2:

$$X^2(D,i,j) = \frac{(F_{11}+F_{10}+F_{01}+F_{00})*(F_{11}+F_{00}-F_{10}F_{01})^2}{(F_{11}+F_{01})*(F_{11}+N_{10})*(F_{10}+F_{00})*(F_{01}+F_{00})} \quad (14)$$

A large discrepancy between the actual and anticipated frequencies suggests that the variables are not independent. The chi-square test statistic establishes how much the sample data deviates from perfect independence.

2.4.3 Advantages of virtual cooperation

A) Distributing the work

The students felt that the workload was less because the team members shared the entire workload; numerous students also made comments on how the workload was made simpler when working together.

B) Social education

Learning as a social endeavor was the third advantage the students noted from their online collaborative experience. Social elements like getting to know other students and forming relationships with them for social and academic reasons were involved in this. Although students reported that they particularly enjoyed the group projects and that interacting with other students increased their sense of engagement in the course, it is true that they frequently feel abandoned and that no one is interested in participating. Because they were collaborating on this project, some of the full-time students were able to interact with their peers in ways that they had not been able to before.

C) Education community

In general, the participants in this research stated that they had a good experience working together with their classmates virtually. Students expressed how much they enjoyed the group projects. But the group was strong and worked well together. Discussing ideas and incorporating them into the final proposal was a great experience. Working with others not only allowed to focus on my study topic but also deepened my grasp of the other fields. Regarding the benefits of cooperation, the students talked about how much they enjoyed collaborating and learning from others, how they could reach agreements, and how much they thought their group members appreciated their efforts. Respondents who worked with others reported feeling less alone, with 91% stating that they were a part of a vibrant online learning community. The majority of students said that the group project gave them a sense of belonging to a team and that their opinions mattered. Instead of reading about one person's perspective, students felt that discussing challenges that Indigenous Australians faced and having them share what they had learned were wonderful ways to reinforce what they had learned. They also appreciated the variety of viewpoints that the learning community provided.

D) Disciplinary expertise

The students believed that group collaboration enhanced their ability to study the subject matter in-depth. It allowed them to possess a comprehensive understanding of the unit overall. The student perceived what seemed to

be foundational effort to support the idea of expanded discipline knowledge. Comparing the online cooperation versus working alone, children were able to study more deeply.

E) Online collaboration's challenges

Less research has been done on the drawbacks of using online cooperation in legal education. Looking back on their online collaboration experience, the study participants recognized the following five challenges: group commitment and stability, student performance, student learning preferences, and group and assignment logistics.

F) Team dynamics

Group logistics was the last barrier to the online collaboration. This included group formation particularly when there were time zone differences because the students were from different places and technical difficulties. Students may form their own groups, but it was challenging to do so because they were dispersed across several sites and may not have known each other from previous classes. Students usually choose for online learning because of the perceived lack of flexibility that comes with having to meet the group's deadlines regardless of their own circumstances.

It was more challenging to adjust the task to fit other people's schedules. The timetables of the team meetings were allegedly annoying to the students. Students discovered, however, that in order for me to participate effectively and interact with other students, I had to hasten my studies due to the reality of working with others. The students' familiarity with the various online collaboration areas that each group selected varied significantly. Their engagement in the spaces was affected in terms of competency and confidence as a result.

3. Results

The online survey using open-ended questions revealed four main advantages for participants who collaborate electronically with their peers to finish the assessment tasks. Increasing discipline knowledge, fostering a learning community, considering education as a social endeavor, and providing homework was a few of these benefits. The student replies are summarized in Figure 1. Table 1 presents the online collaboration's numerical results.

Table 1: Numerical outcomes of online collaboration

Parameters	Values (%)
Learning Community	46
Discipline Knowledge	23
Social Learning	20
Workload distribution	11

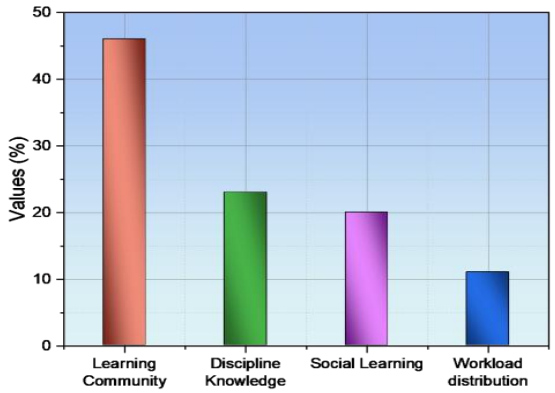

Figure 1: Perceived advantages of online cooperation for students

Research on the drawbacks of using online cooperation in legal education is scarce. When considering their online collaborative experiences, the study participants recognized five challenges: student performance, student learning preferences, group logistics, group stability and commitment, and assignment logistics. These five locations are shown visually in Figure 2. Table 2 displays the quantitative findings of the challenges with virtual cooperation.

Table 2: Quantitative results of difficulties in virtual cooperation

Parameters	**Values (%)**
Assignment logistics	38
Group stability & commitment	24
Student performance	24
Preference for individual Tasks	8
Group Logistics	6

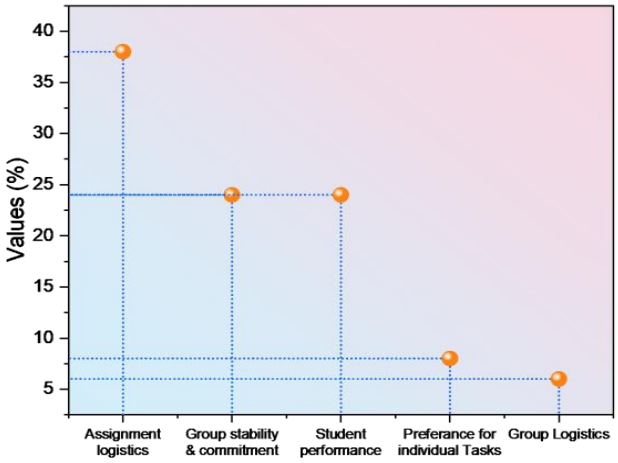

Figure 2: Perceived difficulties that students face when collaborating online

An independent samples t-test was run for each category to determine the impact of collaborative synchronous learning environment (CSLE) on social, cognitive, and teaching presence. Table 3 and Figure 3 shows the T-test numerical results for Experimental Group.

Table 3: T-test numerical results for Experimental Group

Dependent Variable	**Experimental**	
	Mean	SD
Social Presence	26.9	6.17
Cognitive Presence	42.77	3.89
Teaching Presence	47.37	3.9

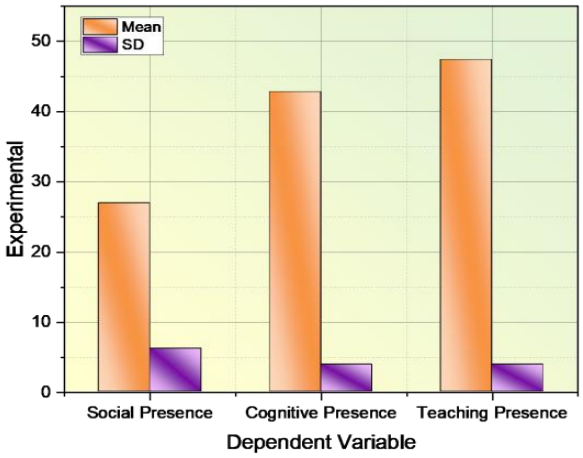

Figure 3: Community of inquiry scores for experimental group

An independent samples t-test was run for each category to determine the impact of collaborative synchronous learning environment (CSLE) on social, cognitive, and teaching presence. Table 4 and Figure 4 shows the T-test numerical results for Control Group.

Table 4: T-test numerical results for Control Group

Dependent Variable	**Control**	
	Mean	SD
Social Presence	26.59	5.29
Cognitive Presence	37.31	5.89
Teaching Presence	44.83	5.04

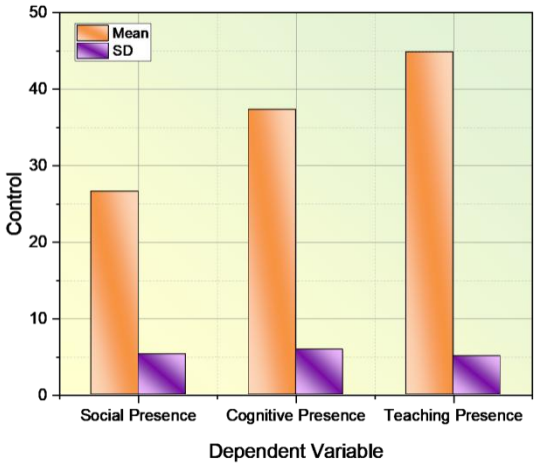

Figure 4: Perception scores of the community of inquiry for control group

Investigations were conducted to compare the perceptions of the community of inquiry between the experimental and control groups. Table 5 presents the results of the independent samples t-test. The neighborhood's sense of inquiry ratings are displayed in Figure 5.

Table 5: Sense of inquiry scores for the community

Groups	Mean	SD
Experimental	117.03	11.73
Control	108.72	14.56

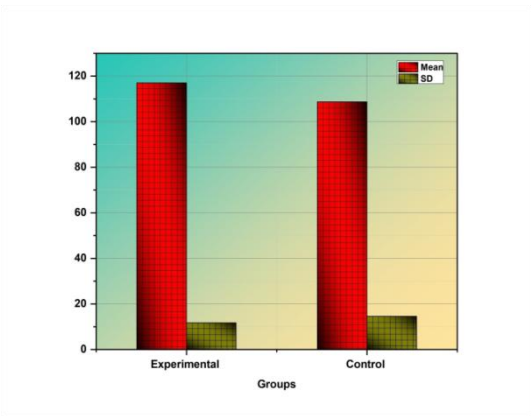

Figure 5: Sense of enquiry ratings for the neighborhood

3.1 Student Performance

This disenchantment may have arisen from the traditional focus placed in law schools on individual work and competitiveness, which might be at odds with the abilities and mindset required for productive teamwork. Students' high standards for themselves and the individuals they work with have an impact on how others perceive them. Many students hold themselves and their coworkers to high standards, which has an impact on how other people perceive them. The fact that the team was able to use electronic networking to stay in contact with and receive feedback from each member of the team is a success in and of itself. Students' achievement in both individual and group learning is displayed in Figure 6. Table 6 shows the numerical outcomes of student performance.

Table 6: Numerical outcomes of Student Performance

Parameters	Student Performance	
	Mean	SD
Individual Web 3.0	42.75	2.318
Collaborative Web 3.0	46	2.505

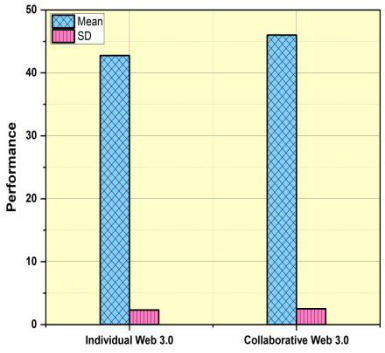

Figure 6: Comparison of Student Performance

3.2 Logistics of assessment

According to the self-report data, the third problem was assessment logistics, which encompassed leadership, deadline setting, and policy extensions in addition to scheduling. A handful of pupils realized they had to deal with the problems; to overcome these demanding obstacles, difficult dialogues are necessary. It's crucial to discuss effective collaboration strategies when working through the logistics of an online learning group work assessment.

3.3 Stability and dedication of the group

The students' initial point of contention was the stability and commitment of the organization. Students had several weeks until the census date because they had finished the online collaborative activity at the start of the semester. This implied that some groups had member losses while working on the mission. Certain groups discovered that their cooperative activities were unstable as a result of students withdrawing from the unit. It was really an individual exercise until the group was stabilized. During the task completion period, there was variation in the amount of time that participants could dedicate to the collaborative task. Alternatively, some studies have discovered that well-functioning teams fairly assigned tasks and met deadlines, leading to better quality results and more peaceful group dynamics. If this research is to be accepted, the dynamics within certain groups rather than the group activity itself are the problem. Subsequent research endeavors will aim to assist groups in achieving good functioning inside the virtual learning setting. Law schools ought to keep in mind that companies value team players, and graduates may find that their penchant for working alone makes them less marketable to employers. A t-test for independent samples was used to see if there was a significant difference in the interaction level scores between the groups. Table 7 presents the analysis results. Group interaction level ratings are displayed in Figure 7.

Table 7: Levels of interaction ratings between groups

Groups	Values	
	Mean	SD
Experimental	61.03	4.84
Control	56.69	5.27

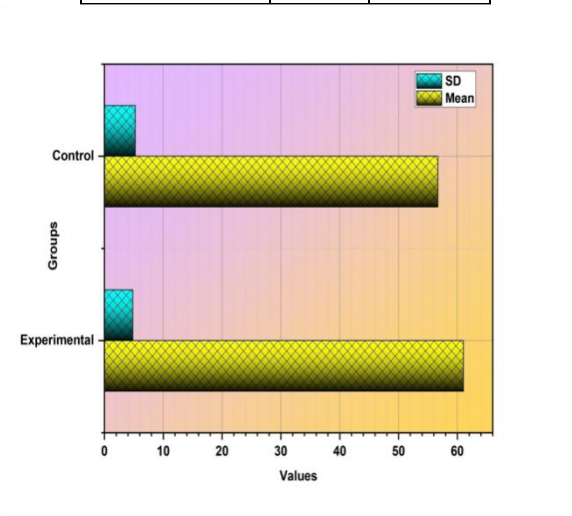

Figure 7: Interaction level ratings between groups

4. Discussion

It is recommended that five factors be taken into account when organizing online collaboration in legal education, based on the insights gained from this preliminary investigation and other prior studies in this field. When conducting cooperation for learning objectives, it is important to take into account the practical implications as early as possible in the design stage. Course design and learning materials must to provide support for students who are not accustomed to utilizing online collaboration for legal education. The known obstacles or difficulties associated with online cooperation should be taken into consideration while creating the learning activities,

resources, and evaluations. The second reason is that learning activities that helped the groups establish rapport, trust, and a mutual understanding of how each other works best would enhance the students' experiences with online collaboration. Thirdly, there needs to be a plan in place for the clear instruction of online collaboration skills that are applicable to the legal industry. This would give students skills and procedures that they may apply after receiving their degree, modeling the standards needed in the workplace.

The fourth suggestion is that during the degree program, online collaboration should be used for a range of tasks, including client interviews, group presentations, and other specialized group outputs. Instructors must understand the technology that students can afford to utilize for virtual collaboration as well as the ways in which they will work together. For this assignment, the teacher set up discussion boards for each group on the learning management system, but she also made it possible for groups to collaborate using a technology that suited them. Certain constraints impair the study's potential applicability. This study was first conducted as a preliminary investigation with a small participant count and no data triangulation. Second, the information may not be typical of all law students at other colleges because it was gathered from a single regional university. Finally, there are certain drawbacks to the self-report data utilized in the online survey, such as response bias and potential discrepancies in how survey questions and rating scales are interpreted or comprehended. As such, the survey should undergo reliability and validity testing. The purpose of this study was to add to the existing conversation regarding legal education reform, not to make any generalizations.

5. Conclusion

This research presented the findings of a preliminary investigation into the application of virtual collaboration in legal education to support students in acquiring the necessary competencies and collaborative abilities. Furthermore, the study outlined how students perceived the benefits and drawbacks of virtual collaboration in the field of law and offers guidance to educators on how best to facilitate virtual collaboration. Based on their survey responses, the majority of students seemed to be happy with their online collaboration experience overall. Future study should consider integrating CSLE into other courses, as the course is mostly practice-based, in order to evaluate its effectiveness. Two of the study's scales, the online course interaction level determination scale and the community of inquiry scale, were not administered as pretests before implementation because their contents correlated with tasks that were planned to be completed during the implementation phase.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, author-ship, and/or publication of this article.

Data Sharing Agreement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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