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Participatory learning as a student-centered teaching technique during the COVID-19 pandemic

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Participatory learning as a student-centered teaching technique during the COVID-19 pandemic

Abstract

The study aimed to determine if there is a significant difference between peer and lecturer assessment scores and to explore the relationship between peer assessment scores and the study year of preservice teachers. Furthermore, the study explored the effect of Blackboard Collaborate online group presentations on the development of pedagogical skills of undergraduate pre-service teachers. Two hundred and sixty-two peer and lecturer assessment scores were compared, while 53 students completed the Google form survey. A Wilcoxon signed-rank test showed a statistically significant difference between peer scores and lecturer-moderated scores in different courses. However, the test did not show a statistically significant difference in the course N2. There was a statistically significant negative correlation between the study year and the difference in scores. The data revealed that the group presentations and assessment improved the pedagogical and assessment skills of the pre-service teachers. The findings are expected to inform practitioners about group presentation and peer assessment practices and their potential to improve pedagogical and assessment skills for preservice teachers during a period of crisis such as the COVID-19 pandemic.

Practitioner Notes

1. Students improved their presentation and assessment skills (professionalism) as they progress with their studies.
2. Moderation of peer assessment scores by professionals is critical in ensuring that the marks allocated by peers are authentic.
3. Frequent exposure to peer assessment and moderation followed by feedback to the students can significantly improve their pedagogical and assessment skills.
4. Furthermore, the contribution of peer assessment scores to the final score should be minimal due to the significant difference observed between the peer and lecturer scores.

Keywords

Online teaching, group presentations, peer assessment survey, Wilcoxon signed rank test

Introduction

The onset of the COVID-19 pandemic encumbered face-to-face learning (Agarwal & Kaushik, 2020). Simulated teaching and micro-teaching, processes where face-to-face peer learning was incorporated while students were in small groups in the presence of the lecturer, previously formed part of the practical learning process before students went into teaching practice. Simulated teaching is a synthetic environment created for preservice teachers to practice an individual's teaching experiences to acquire attitudes, concepts, knowledge and skills to improve the performance of pedagogical skills (Presnilla-Espada, 2014). In simulated teaching, multiple skills are practised simultaneously, and peers contribute to developing pedagogical skills through dialogue and mentorship (Presnilla-Espada, 2014). The skills are practised for about 5 minutes with a group of about five peers. In Micro-teaching, only one skill is practised at a time for a similar period and number of peers. Recently, the impact of the COVID-19 pandemic has made the implementation of either simulated- or micro-teaching challenging. The COVID-19 pandemic resulted in a need for a sudden shift from traditional face-to-face to emergency online learning. Although most tertiary institutions in developing countries were not well prepared for online teaching approaches (Anwer et al., 2021; Lodhi et al., 2021; Mbiydzenyuy & Silungwe, 2020), the academic staff and students in developed countries had already adapted to online teaching and learning approaches (Ferri et al., 2020; Hassan et al., 2020). Institutions in developing countries such as South Africa had to adopt new approaches to ensure continuity in the education sector. One such approach is participatory learning, a student-centered teaching technique where small groups of university students actively learn by searching for resources and participating in group interactions (Rahmanian & Nouhi, 2020).

Participatory learning

The onset of the pandemic called for adopting a participatory learning approach in which students design projects, execute them, and then assess and evaluate their peers' solutions (Pain et al., 2011), but in an online environment. The participatory learning approach is a process that involves a series of events that result in the construction of knowledge (Ciobanu, 2018). It is grounded in constructivist theories of learning (Vygotsky, 1978), which propose the active construction and application of knowledge to solve problems (Fernando & Marikar, 2017; Koohang & Paliszkiewicz, 2013; Mthembu & Mtshali, 2013). One premise of constructivist learning theory poses the challenge of engaging students in the learning process through participation in cooperative groups (Silalahi & Hutauruk, 2020). Interactions through discussions also help to change views. It is important for students to understand divergent views through assessment, interaction, and discussion, which improve critical thinking (Shen et al., 2004). Constructivist theory views personal experiences and prior knowledge as vital when students construct their own understanding and knowledge of the world (Ozdem-Yilmaz & Bilican, 2020). Gaining further experience and making connections between new and existing knowledge improve better understanding as people rethink previous misconceptions, make evaluations, and modify their perceptions (Dagar & Yadav, 2016).

Adopting a participatory learning approach was necessary during the COVID-19 pandemic. Microteaching and simulated teaching became difficult to implement as students were faced with multiple challenges of online teaching such as unavailability of necessary data, difficulties in connecting to the internet, and the challenges of using unfamiliar online platforms (Ferri, et al., 2020; Irfan et al., 2020; Kaisara & Bwalya, 2021; Khatoony & Nezhadmehr, 2020). In addition, lecturers were not spared these challenges as they were used to the universally adopted face-to-face mode of instruction (Chung, et al., 2020; Ilias et al., 2020; Ogbonnaya et al., 2020).

Blackboard Collaborate

Learning management systems, such as Blackboard, played a key role in facilitating learning and teaching throughout the pandemic. There are many learning management systems used in Higher Education, but this study will only focus on Blackboard Collaborate, which was available to the students participating in the study period described in this publication. Blackboard Collaborate allows students to engage with course materials asynchronously, allowing some flexibility in how they engage with courses. Furthermore, Blackboard Collaborate (BC), a web-based system integrated in the Blackboard LMS, features text, voice chat and an interactive whiteboard that allows collaborative videoconferencing sessions where tutors and peers can interact through discussion boards or email (Chen et al., 2020; Reese, 2014).

Blackboard Collaborate is a convenient and flexible platform that allows students to balance studies with work or other responsibilities (Buxton, 2014; Hrastinski, 2008). Since students have more time to engage with ideas and formulate responses, higher-order thinking skills can be developed (Alexander et al., 2014). Asynchronous discussions promote equal participation and prevent the talk from being dominated by a small group of students (Huang & Hsiao, 2012). However, Chou's (2002) study noted that student interaction on discussion boards is often limited to posting personal viewpoints rather than criticism of the views of other students. Furthermore, students may experience delays in receiving feedback or responses from tutors due to the flexibility in time of this mode of learning (Alexander et al., 2014). In addition, communicating in an asynchronous online environment may create a feeling of loneliness or lack of connection with peers and tutors (Kaufmann & Vallade, 2020).

The videoconferencing functionality of the Blackboard Collaborate software package offers opportunities for carrying out instruction at the university level with students attending classes synchronously at multiple locations *(*Tonsmann, 2014). The synchronous delivery mode is live and aims to replicate face-to-face instruction (Rudd & Rudd, 2014). The key features of web conferencing include video and audio streaming, recording capabilities, text messaging, an interactive whiteboard, live polling and quizzes, sharing of files and applications, and breakout rooms for students to interact in small groups (Cornelius, 2014). Furthermore, videoconferencing provides immediate feedback where students can ask questions in a live session and receive prompt responses (Martin et al., 2012). Further benefits include the spontaneity of discussion similar to that experienced in a campus-based classroom and the ability to read non-verbal communication signals if tutors and students use their video cameras during synchronous sessions. (Rudd & Rudd, 2014). Despite the numerous benefits of Blackboard collaborate, studies done on implementing Blackboard Collaborate in online units in the Australian context are relatively scarce (Chen et al., 2020). The same is true in the African context.

Effect of online group presentations on the development of pedagogical skills/practical experiences

This section focuses on the benefits of online group presentations with special reference to previous empirical studies. This is likely to give insights into the benefits of online group presentations on developing pedagogical skills. In the study by Ortega-Dela Cruz (2020), approaches that move toward diversified feedback appeared to be the most preferred teaching approach for students, followed by learning partnership and inquiry-based instruction. According to O'Connor and Sharkey

(2013), student learning is high when the setting accommodates diverse learning preferences. The findings of the study by Hews et al. (2022) indicate that participation in cooperative groups motivates students. In the Ortega-Dela Cruz (2020) study, students expected professors to use technology to support traditional instruction. The students were inclined to diverse teaching approaches, and experiential, interactive, and collaborative learning was also motivating. They belong to a unique generation that is optimistic, collaborative, team-oriented, and highly reliant on technology (Chaudhuri, 2018).

Blended learning approaches, which incorporate the traditional and online approaches, seem to motivate learners and have the potential of bringing about better professional development among preservice teachers. Furthermore, interactive and collaborative learning have been observed to be among the teaching approaches preferred by students.

Peer-Assessment

Students' involvement in peer assessment and feedback promote deep learning (Falchikov & Goldfinch, 2000). Sadler and Good (2006) hold the view that judging the correctness of the answers of peers provides the opportunity for students to deepen their understanding of a topic and change their ideas after observing multiple pedagogical skills. Group presentations and peer evaluations help students become aware of their own strengths and weaknesses (Seifert & Feliks, 2019). Furthermore, according to Blau et al. (2020), classrooms become more productive through cooperative groups and a sense of shared ownership in the learning process is developed (Blau et al., 2020). Studies (DiCamilla & Anton, 1997; Storch, 2005) have also revealed that learners who work collaboratively develop grammatical accuracy, vocabulary, and discourse. Supena et al. (2021) also highlight that peer assessment nurtures higher order thinking skills as students judge the work of others. This is important since pre-service teachers are engaged in formative assessment, which is central to their reflective practice and the development of their future pupils. Peer assessment is time-efficient since it offers quick and detailed feedback.

Assessment and instruction are often viewed as separate activities with different purposes (Graue, 1993), while some researchers view assessment as a critical part of the learning process (Appiah & Van Tonder, 2018; Shepard, 2000). However, in the participatory learning approach, assessment and learning are complementary processes, in which students learn from each other through presentation and peer evaluation (Patchan et al., 2018). COVID-19 driven online and blended learning fueled the need for student-driven learning and student engagement, increasing interest in using peer evaluation as part of the assessment process (Wanner & Palmer, 2018). However, peer assessment is associated with many challenges, including favoritism, which results in a deviation from the assessment criteria.

Peer assessment is a structured learning process where learners critique and consider and specify the level, value, or quality of performance of other equal-status learners and provide feedback to each other on areas that need improvement (Topping, 2009). In the peer assessment process, several studies highlighted the need to provide students with evaluation criteria (Adachi et al., 2018; Li et al., 2020; Wanner & Palmer, 2020). Peer assessment practices should develop lifelong learning skills (Ibarra-Sáiz et al., 2020). It is vital to first provide basic teaching and assessment skills and examples of what must be done before students participate in peer assessment (Chien et al., 2020; Chng & Lund, 2018). Training must focus on the skills that will be assessed. Training in assessment criteria is also needed to ensure consistency. Validation of the rubric by different experts is critical to ensure that it yields similar results on assessment.

Assessment can provide motivation to engage in group discussions, as peers would expect the peer assessment marks to contribute to their final grading. Peer assessment can improve the performance of other students through the feedback they give each other during interactions. Several studies (Double et al., 2020; Landry et al., 2014; Li & Gao, 2016; Li et al., 2020) observed a positive effect of peer assessment on student performance. However, in the study by Li and Gao (2016), the positive effects of peer assessment on student performance were more pronounced among low- and average-performing students than among high-achieving students. Peer assessment can also stimulate students to develop self-evaluation competencies, which are important in professional development (Boud & Molloy, 2013).

Tornwall (2018) indicates the need for students to be well prepared to participate in peer evaluation, as it can have negative consequences such as a sense of incompetence, nervousness, and hostility in the learning environment. In the study by Stančić (2021), students expressed concerns related to their grading competence and responsibility for their peers' scores. Students can be biased when evaluating their friends (Nita & Anam, 2021). In the study by Maria de Jesus et al. (2020), students revealed a lack of confidence in the fairness of the assessment by peers. The study by Ahmed and Al-Kadi (2021), which compared the preferences for online and face-to-face peer assessment, revealed that online peer assessment is ineffective due to the barriers students have in the use of technology. Although peer assessment has been integrated as a strategy to promote student learning in the higher education sector, little has been studied on how students at different learning levels may benefit from peer assessment (Li & Gao, 2015). Furthermore, Li et al. (2016) highlighted that the accuracy of peer ratings compared to lecturer ratings is a major concern for both lecturers and researchers. The concern has also grown with the increase of peer assessment on digital platforms imposed by the onset of the COVID-19 pandemic.

Thus, the study aimed to answer the following research objectives:

- Determine if there is a significant difference between peer and lecturer assessment scores during Blackboard online group presentations and assessment by pre-service teachers.
- Explore the relationship between peer evaluation scores and the year of study of teachers in preparation for service.
- Explore the effect of Blackboard Collaborate participatory online group presentations on the development of pedagogical skills of undergraduate preservice teachers.

Research methodology

Study context

In this study, a survey research design was used. The survey enables the researcher to gather data from a large sample over a short period (Rice et al., 2017). The study was carried out at a rural university in South Africa. Three hundred and fifty (350) university students in the science methodology courses L1 (142 students), L2 (107 students), N1 (61 students), and N2 (40 students) were taught about the application of constructivist theory in teaching science during April 2021 by one science teaching methodology lecturer. Students in courses L1 and N1 were in year three of their studies, while students in courses L2 and N2 were in year four of their studies. Furthermore, courses L1 and L2 were for science students in the Further Education and Training phase, while N1 and N2 were training towards teaching science in the intermediate phase. Several examples of how to apply the theory in the classroom were given to students in all courses. The use of Bloom's taxonomy in setting questions of different cognitive levels was illustrated with examples. Students

were also taught how to use Blackboard Collaborate online learning platform to present a topic. Training on how to use the rubric in the evaluation was conducted before the implementation of the peer assessment process.

The students worked in groups of five to select a science topic and prepare a Blackboard Collaboration PowerPoint presentation on the topic (e.g. mitosis and diffusion). Each student had to use Bloom's taxonomy to prepare questions of different cognitive levels based on the topic presented to peers. To assess the quality of the presentation, the peers used a rubric (Appendix 1). The rubric focused on five areas: prior knowledge and terminology relevant to the topic, PowerPoint presentation notes, cognitive level of assessment questions, clarity of Blackboard Collaborate online presentation, and their effectiveness in the use of Blackboard platform.

Validity and reliability of the rubric

To ensure the validity and reliability of the rubric, three experts reviewed the rubric. The experts evaluated three pilot presentations using the rubric. Experts discussed and modified the rubric. The students then presented and evaluated each other. The final peer mark of the presenter was calculated using the individual peer marks to obtain an average. The evidence in the form of audio recordings and PowerPoint presentations was downloaded and submitted to the lecturer for moderation. The lecturer's mark and the average peer marks were recorded separately on a mark sheet. Students who did not submit their evaluations were excluded from the analysis, leaving 262 students (N1-42; N2-33; L1-84; L2-103) whose peer evaluation scores for the presentations were compared with the lecturer's scores.

Normality Test

The normality test of the data sets for the marks was performed using the Kolmogorov-Smirnov test and the Shapiro-Wilk test (Table 2). The normality test is critical as it assists in determining the specific inferential test to use in comparing results. All data sets for the marks (L1, L2, N1 and N2) did not meet the normality condition (Table 2). Therefore, the non-parametric Wilcoxon signed rank test was used to compare the scores of the peers and the lecturers. All tests were carried out at a significance level of 5%. Furthermore, descriptive statistics (mean, standard deviation, mean rank, minimum, maximum, and percentiles, Table 3, and Table 4) were obtained for each set of results. Inferential statistics: The Wilcoxon Signed Rank Test (Table 5) was used to determine if the differences in the median rank scores for peer assessment and lecturer assessment were significant. Spearman's correlations were also calculated to establish whether there was a correlation between the study year and the difference in peer marks and moderated marks.

Google form survey

A Google Form survey was then sent to students to complete while they were conducting Their teaching practice (Appendix 2). The form had nine aspects that had to be rated on a five-point Likert scale (1 strongly disagree, 2 disagree, 3 neutral, 4 agree, and 5 strongly agree). The students indicated whether the group presentations helped them teach and assess better when using Bloom's taxonomy during teaching practice and if the group presentations were useful in improving their pedagogical skills and creating divergent views on best teaching practices. They also rated whether group presentations were useful in acquiring online blackboard teaching strategies and making audio recordings of PowerPoint presentations. Finally, they rated how they experienced the usefulness of presentations in improving the skills of teaching practical activities. Only 53 students responded to

the survey. Manfreda et al. (2008) found that the average response rate for online surveys was 11 percent. Evans and Mathur (2018) indicate that the low rate has dropped even further since then. The reliability of the Google form questionnaire was tested by computing the Cronbach alpha using SPSS version 27.

The overall reliability test score of 0.98, imply that the research instrument was reliable (Table 1).

Table 1

Overall reliability test results

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.982	.985	9

A reliability test was also conducted to ensure that the questionnaire could be trusted to secure consistent results. According to Malhotra (2007), the scale is reliable if the Cronbach alpha values are equal to or exceed the recommended threshold of 0.70. A Cronbach's alpha value of 0.98 indicates excellent reliability (Table 1). Table 2 shows the item reliability test results.

Table 2

Item reliability

	SM-ID	SV-ID	CI-TC	SMC	CA-ID
VAR1	29.2222	55.723	.943	.944	.980
VAR2	29.9444	52.355	.874	.884	.983
VAR3	29.3148	55.842	.871	.846	.982
VAR4	29.2222	54.591	.960	.951	.979
VAR5	29.3333	52.792	.957	.951	.978
VAR6	29.2963	55.760	.937	.929	.980
VAR7	28.9815	54.849	.906	.860	.981
VAR8	29.3889	53.186	.957	.947	.978
VAR9	29.5926	49.793	.956	.952	.980

Note. SM-ID: Scale mean if item deleted; SV-ID: Scale variance if item deleted;
CI-TC: Correctional item-total correlation; SMC: Squared multiple correlation;
& CA-ID: Cronbach's alpha if item deleted

The reliability score for all items under study was above 0.70 (Table 2). High reliability scores (above 0.9) indicate the reliability of the research instrument. The Cronbach's alpha value if the item was deleted was above 0.9 for all items, indicating that the items measured the same construct. To ensure validity, the questionnaire was reviewed by a questionnaire design expert and ambiguous questions were clarified. Pilot testing was also done to improve the clarity of variables in the questionnaire.

The researcher obtained ethical clearance from the University Ethics Clearance Committee and informed consent was obtained from each participant.

Results

The study results are presented in the form of tables, followed by clarifications. The first section compares the results of peer assessment scores and lecturer assessment scores, while the latter part presents the information that determines the relationship between the study year and the differences between peer and lecturer scores. The last part presents the students' views on various aspects of Blackboard Collaborate online group presentations and assessments.

Table 3 shows the results of normality tests the Kolmogorov-Smirnov test and the Shapiro-Wilk test.

Table 3

Normality tests using the Kolmogorov-Smirnov test and the Shapiro-Wilk test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistics	df	Sig.	Statistics	df	Sig.
Peer marks N1	.123	42	.112	.937	42	.023
Moderated marks N1	.181	42	.001	.891	42	.001
Peer marks N2	.118	33	.200*	.955	33	.181
Moderated marks N2	.158	33	.036	.916	33	.014
Peer marks L1	.102	84	.032	.963	84	.016
Moderated marks L1	.175	84	.000	.857	84	.000
Peer marks L2	.179	103	.000	.904	103	.000
Moderated marks L2	.182	103	.000	.792	103	.000

Note. *. This is a lower bound of the true significance.

a. Lilliefors significance correction

a variable is *not* normally distributed if 'Sig'. < 0.05.

A Shapiro-Wilk test indicated that the peer scores for the N1 course did not follow a normal distribution, D (42) = 0.94, p = 0.023 (Table 3). A Kolmogorov-Smirnov test indicated that the moderated marks for N1 did not follow a normal distribution, D (42) = 0.18, p = 0.001. Both the Kolmogorov-Smirnov and the Shapiro-Wilk tests showed that the scores for all courses did not follow a normal distribution, except the peer scores for N2, where D (33) = 0.18, p = 0.200 for the Kolmogorov-Smirnov test and D (33) = 0.96, p = 0.181 for the Shapiro-Wilk test. Hence, non-parametric tests were used for the comparisons, in addition to correlation tests. The two normality

tests were generated simultaneously in the SPSS output; hence, they were all used in the interpretation.

Table 4 presents descriptive statistics for peer and moderated marks for four courses.

Table 4

Descriptive statistics for peer and moderated marks for four courses

			Std.			Percentiles		
Course code	N	Mean	Deviation	Minimum	Maximum	25th	50th (median)	75th
Peer N1	42	35.79	6.85	25.00	47.00	30.75	35.00	43.25
Moderated N1	42	29.21	3.36	25.00	35.00	25.00	29.00	31.25
Peer N2	33	33.94	3.41	27.00	39.00	31.00	34.00	37.00
Moderated N2	33	32.45	2.60	26.00	36.00	31.00	32.00	35.00
Peer L1	84	36.24	5.70	24.00	47.00	31.00	36.00	41.00
Moderated L1	84	28.49	3.05	25.00	41.00	26.00	28.00	30.00
Peer L2	103	33.91	5.40	25.00	55.00	30.00	33.00	36.00
Moderated L2	103	30.60	5.85	9.00	54.00	29.00	32.00	34.00

Note. Table 4 reflects the higher mean, median, and 75th percentile values of the marks allocated by peers than the marks assigned by the lecturer in all courses.

Table 5 presents mean ranks and sum of ranks for four courses in the study.

Table 5

Mean ranks and sum of ranks for four courses in the study

		N	Mean Rank	Sum of Ranks
Moderated N1 – Peer N1	Negative ranks	31[a]	23.24	720.50
	Positive ranks	9[b]	11.06	99.50
	Ties	2[c]		
	Total	42		
Moderated N2 – Peer N2	Negative ranks	13[d]	12.81	166.50
	Positive ranks	8[e]	8.06	64.50
	Ties	12[f]		
	Total	33		
Moderated L1 – Peer L1	Negative ranks	56[g]	29.50	1652.00
	Positive ranks	1[h]	1.00	1.00
	Ties	27[i]		
	Total	84		
Moderated L2 – Peer L2	Negative ranks	48[j]	30.85	1481.00
	Positive ranks	9[k]	19.11	172.00
	Ties	46[l]		
	Total	103		

Key:

a. Moderated assessment score N1 < Peer assessment score N1

b. Moderated assessment score N1 > Peer assessment score N1

c. Moderated assessment score N1 = Peer assessment score N1

d. Moderated assessment score N2 < Peer assessment score N2

e. Moderated assessment score N2 > Peer assessment score N2

f. Moderated assessment score N2 = Peer assessment score N2

g. Moderated assessment score L1 < Peer assessment score L1

h. Moderated assessment score L1 > Peer assessment score L1

i. Moderated assessment score L1 = Peer assessment score L1

j. Moderated assessment score L2 < Peer assessment score L2

k. Moderated assessment score L2 > Peer assessment score L2

l. Moderated assessment score L2 = Peer assessment score L2

In course N1, the moderated assessment scores of the lecturer were lower than the peer assessment scores in 31 scripts, higher than the peer assessment scores in nine scripts, and equal to the peer assessment scores in 2 scripts of the respondents (Table 5). The same trend was observed for course N2, with 13 lecturer-moderated assessment scores lower than peer assessment scores and 8 higher than peer scores, while 12 scores did not show any difference. In the L1 course, 56 lecturer assessment scores were lower than peer assessment scores, one lecturer assessment score was higher than peer score, while 27 assessment scores did not show any difference. In course L2, 48 lecturer assessment scores were lower than peer assessment scores, 9 lecturer assessment scores were higher than peer scores, while 46 lecturer assessment scores were equal to peer assessment scores. The lecturer assessment scores were lower than the peer assessment scores for most of the participants in all courses.

Table 6 shows the Wilcoxon Signed Rank Test Statistics for peer and lecturer moderated marks for the four courses.

Table 6

Wilcoxon Signed Rank Test Statistics for peer and lecturer moderated marks for the four courses

	ModeratedN1 – PeerN1	ModeratedN2 – PeerN2	ModeratedL1 – PeerL1	ModeratedL2 – PeerL2
Z	-4.178[b]	-1.786[b]	-6.569[b]	-5.216[b]
Asymp. Sig. (2-tailed)	.000	.074	.000	.000

b. Based on positive rank.

A Wilcoxon signed rank test showed a statistically significant difference between the peer scores and lecturer-moderated scores in N1 (z = -4.178, p = 0.000); L1 (z = -6.569, p = 0.000); L2 (z = -5.216, p = 0.000, Table 6). However, a Wilcoxon signed rank test did not generate a statistically significant difference between the peer scores and lecturer-moderated scores in N2 (z = -1.786, p = 0.074). In courses N1, L1, and L2, the peer assessment scores were significantly higher than the

lecturer scores. In course L2, there were no significant differences between peer and lecturer assessment scores.

Table 7 shows Spearman correlation between the year of study and the difference between peer marks and lecturer moderated marks for the third and fourth year intermediate science courses.

Table 7

Spearman correlation between the year of study and the difference between peer marks and lecturer moderated marks for the third and fourth year intermediate science courses

Cohort		Year of study	Difference in marks
Intermediate Science Course (N1 & N2)	Correlation coefficient	1.000	-.500**
	Sig. (2-tailed)		.000
	N	75	75
Senior Science Course (L1 & L2)	Correlation coefficient	1.000	-.296**
	Sig. (2-tailed)		.000
	N	187	187

Note. ** The correlation is significant at the 0.01 level (2-tailed).

A Spearman correlation was performed to determine the relationship between the study year and the difference between the peer score and the lecturer-moderated score in the intermediate science courses, N1 and N2, and the advanced education and training courses, L1 and L2 (Table 7). There was a moderate and negative correlation between the study year and the difference in scores, which was statistically significant (r = -.500, n = 75, p = .000) for the courses, N1 and N2. Spearman correlation revealed a weak negative correlation between the study year and the difference in scores, which was statistically significant (r = -.296, n = 187, p = .000), for the courses L1 and L2. In simple terms, as students move from the third year to the fourth year, the difference between lecturer and peer assessment scores becomes smaller.

Table 8 shows the presentations by the benefit group on the development of pedagogical skills.

Table 8

Presentations by the benefit group on the development of pedagogical skills (N = 53)

	SD	D	N	A	SA
Group presentations before teaching practice helped me to teach better during teaching practice	1(2%)	2(4%)	12(23%)	30(56%)	8(15%)
Group presentations were useful in improving my assessment practices.	0(0%)	2(4%)	15(28%)	27(50%)	10(18%)

The presentations in groups were useful in improving my pedagogical skills.	1(2%)	0(0%)	14(27%)	32(60%)	6(11%)
Discussions after group presentations were useful in creating divergent views on best practices in teaching.	1(2%)	3(6%)	12(22%)	27(50%)	11(20%)
Discussions after group presentations were useful in understanding questions of different cognitive levels according to Bloom's taxonomy.	2(4%)	4(7%)	14(27%)	23(44%)	10(18%)
Discussions after group presentations were useful in understanding online teaching strategies	1(2%)	2(4%)	15(28%)	27(50%)	8(16%)
Discussions after group presentations were useful to understand how to make audio recordings in PowerPoint presentations.	1(2%)	3(6%)	6(11%)	26(49%)	17(32%)
Feedback on group presentations helped me improve my teaching during teaching practice	1(2%)	7(13%)	12(23%)	24(45%)	9(17%)
Group presentations should be used in practical activities.	5(9%)	8(15%)	10(19%)	20(37%)	11(20%)

Students responded by ticking on a Likert scale: SD strongly disagree, D disagree, N is neutral, A agrees and SA strongly agree. Data were entered into SPSS to generate the frequencies for all variables in Table 8.

Most of the students (71%) agreed (56% agree and 15% strongly agree) that group presentations helped them teach better during teaching practice (Table 8). A large proportion of the students (68%) agreed (50% agree and 18% strongly agree) that group presentations improved their assessment practices. A large percentage of students (71%) agreed (60% agree and 11% strongly agree) that group presentations improved their pedagogical skills. Almost a similar proportion of students (70%) agreed (50% agreed and 20% strongly agreed) that group presentations were useful in creating divergent views on best practices in teaching. A significant proportion (62%) of the students also agreed (44% agree and 18 % strongly agree) that discussions after group presentations were useful in understanding questions of different cognitive levels according to Bloom's taxonomy. Furthermore, a high proportion of students (66%) agreed (50% agreed and 16% strongly agreed) that group presentations improved their online teaching strategies. Eighty-one percent of the students agreed (49% agreed and 32% strongly agree) that presentations were vital to improve their skills to make audio recordings. Sixty-two percent (62%) of the students agree (45% agree and 17% strongly agree) that feedback was critical to improving their teaching skills. Fifty-seven (57%) percent of the students agreed (37% agree and 20% strongly agree) that it is important to include science practical activities where the students work in groups and present to each other to learn more about teaching science practical skills (Table 8).

Discussion

Given the dearth of literature on how students at different learning levels may benefit from peer assessment (Li & Gao, 2015), the study contributes by adding to the limited literature. Furthermore, the study contributes to the body of knowledge by suggesting how the accuracy of peer ratings compared to lecturer ratings, which is a major concern for both lecturers and researchers, can be improved.

The lecturer-moderated assessment scores were significantly lower than the peer assessment scores in N1, L1, and L2. The Wilcoxon signed rank test showed statistically significant higher median peer scores than moderated median scores by the lecturer. The results agree with the results of Machado et al. (2008), where the tutor assessment scores were lower than the peer assessment scores. A careful analysis of some of the peer-assignment scores on the rubric revealed a lack of objectivity, as some students awarded higher scores than their peers deserved. This observation is consistent with previous studies (Bozkurt, 2020; Izgar & Akturk, 2018; Zhou et al., 2020) in which students were reluctant to give low scores to their peers despite the low quality work. Students need to be professionally developed to enhance objectivity in the assessment process. "Engaging students as partners in assessment can take time to set up, but support and more practice can speed up the process (Falchikov, 2005, p. 149)."

In the intermediate science courses N1 and N2, there was a moderate negative correlation, while in L1 and L2, there was a weak negative correlation between the study year and the difference in scores, which was statistically significant in both cases. As students move from the third year to their fourth year, their level of professionalism increases, and hence they exercise a higher degree of professionalism in their work due to the transition that occurs after taking several professional courses. The findings are consistent with the observation by Seifert and Feliks (2019) that practice has a significant effect on improving one's pedagogical and assessment skills.

The results of the Google form questionnaire indicate that participatory learning through group presentations and peer evaluations was vital in enhancing various skills in preparation for teaching practice. Students affirmed that group presentations improved their pedagogical practices (71%) and assessment practices (68%). A large proportion of students (70%) said that group presentations helped them have divergent views on best practices in teaching, including online teaching and audio recordings of PowerPoint presentations. Several studies (Ibarra-Sáiz et al., 2020; Reinholz, 2016; Stančić, 2021) have indicated the critical role peer learning through collaboration plays in understanding concepts.

Students also agreed that the presentations helped them understand questions of different cognitive levels according to Bloom's taxonomy. Peer assessment can improve the performance of other students through the feedback they give each other during interactions. The responses of students to peer learning are consistent with observations in several studies (Double et al., 2020; Landry et al., 2014; Li and Gao, 2016; Li et al., 2020) where there was a positive effect of peer assessment on student performance. Similarly, the study by Rahmanian and Nouhi (2020) revealed a significant increase in the mean score of academic achievement in the group that participated in active and collaborative learning than in the control group. According to Boud and Molloy (2013), peer assessment stimulates the student to develop evaluation competencies that are vital to the professional development of teachers. In Bozkurt's study, the findings corroborate that peer assessment helps students recognize their own shortcomings as they learn by observing the work of peers (2020). Furthermore, peer assessment enhances constructive contribution to each other's work,

gaining assessment skills, and developing critical thinking skills (Bozkurt, 2020). Peer assessment plays a critical role in the development of a cooperative learning environment that is essential to meet the educational needs of initial teacher education students in the 21st century (Bozkurt, 2020).

Students also indicated that feedback from the lecturer after moderation was valuable, as it highlighted some areas that had to be improved and what was done well during the presentations. Highlighting a wide variety of pedagogical and assessment problems in which students did not perform well during their group presentations was critical, as it helped them avoid similar mistakes as they moved into teaching practice. This was verified by Andy-Wali and Wali (2018), who found that the supportive practices of lecturers and peers provided the necessary support that is critical for the student to perform better during teaching practice. Group presentation and assessments, therefore, provide a platform for socio-constructivism through student-student and student-lecturer interaction (Mafugu, 2021).

Although most of the students (71%) indicated that group presentations were useful in improving their pedagogical skills, a relatively large proportion of students (27%) neither agreed nor disagreed that group presentations were valuable, while only one (2%) student strongly disagreed. Students learned to select the relevant content for presentation. The lecturer focused on selected presentations and gave feedback to the entire class. They also prepared questions of different cognitive levels based on their presentation. The process involved a variety of techniques, such as systematic group work, managed learning, and individual activities that, according to Van Leeuwen and Janssen (2019), promote effectiveness in teaching. A combination of pedagogical strategies and their joint applications can ensure that student teachers improve their pedagogical skills (Van Leeuwen & Janssen, 2019). These findings also corroborate the views of Mafugu (2021), Ndoye (2017), and Hawe and Dixon (2017) that lecturer-student and peer-peer interactions help students think deeply about their learning and take action to reduce their deficiencies in knowledge and skills. Furthermore, engaging students in the assessment and feedback process motivates them, as they develop a feeling of ownership of the learning process (Wanner & Palmer, 2018).

The study findings add to the literature of other international studies that explored the impact of participatory online group presentations on the development of pedagogical and assessment skills during the COVID-19 pandemic. Of particular significance is the finding that students improved their pedagogical and assessment skills through the use of peer-peer interaction and feedback from the lecturer. The flexible learning model was useful in scaffolding digital competencies to promote high-quality graduate attributes.

Strengths and limitations of the study

The findings are expected to inform practitioners about peer presentation and assessment practices that are more likely to improve pedagogical and assessment skills for pre-service teachers. Furthermore, peer assessment scores contribution to the final score should be minimal due to the significant difference observed between the peer and lecturer scores. The findings also inform practitioners that moderations of peer evaluations by the lecturer are critical as they assist the lecturer in seeing the strengths and weaknesses of the students. The effectiveness of online group presentations was only evaluated using a survey that sought to obtain only the level of agreement of participants on various variables. The use of a control where there could have been no intervention (no peer presentation and assessment) and an experimental group with some intervention followed by observations of selected members of the two groups could have produced better results. However, the use of the control was avoided as it could have disadvantaged the group that would not have

been involved in this process. The COVID-19 pandemic limited the observations, since it was necessary to avoid social gatherings.

Conclusions

The findings are expected to inform practitioners about group presentation and peer assessment practices that are more likely to improve pedagogical and assessment skills for pre-service teachers.

A Wilcoxon signed rank test showed a statistically significant difference between the peer scores and lecturer-moderated scores in three courses, while it did not generate a statistically significant difference between the peer scores and lecturer-moderated scores in one course. In the intermediate science courses N1 and N2, there was a moderate negative correlation, while in L1 and L2, there was a weak negative correlation between the study year and the difference in scores, which was statistically significant in both cases. Therefore, the students improved their presentation and assessment skills (professionalism) as they progress with their studies. Moderation of peer assessment scores by professionals is critical to ensure that the marks assigned by peers are authentic. Frequent exposure to peer assessment and moderation followed by feedback to students can significantly improve their pedagogical and assessment skills. Online group assessment and presentations improved the pedagogical and assessment skills of the student teachers. This was evident from the responses from the Google form survey data. The audio-recorded PowerPoint presentations can be used to teach the next cohort of students about some of the good pedagogical practices to enhance their professional development.

Peer assessment can be implemented in formal assessments. However, the contribution of the marks to the final score should be minimal due to the significant difference observed between the peer and lecturer scores. Online group presentations provide the lecturer with the opportunity to assess the pedagogical skills of students, especially in instances where students do their teaching practice in their hometowns, which are not accessible to the lecturer. Furthermore, students learn from the strengths and weaknesses of their peers. The moderations of peer evaluations by the lecturer are critical as they assist the lecturer in seeing the strengths and weaknesses of the students. This will help in providing feedback, helping students improve their pedagogical and assessment skills. Additionally, peer assessment can reduce the marking workload for lecturers in instances where class sizes are large. Anonymous peer evaluation can help improve the accuracy of evaluations. More research on group presentation and peer evaluation is required in different subjects and institutions to ensure that the results can be generalized.

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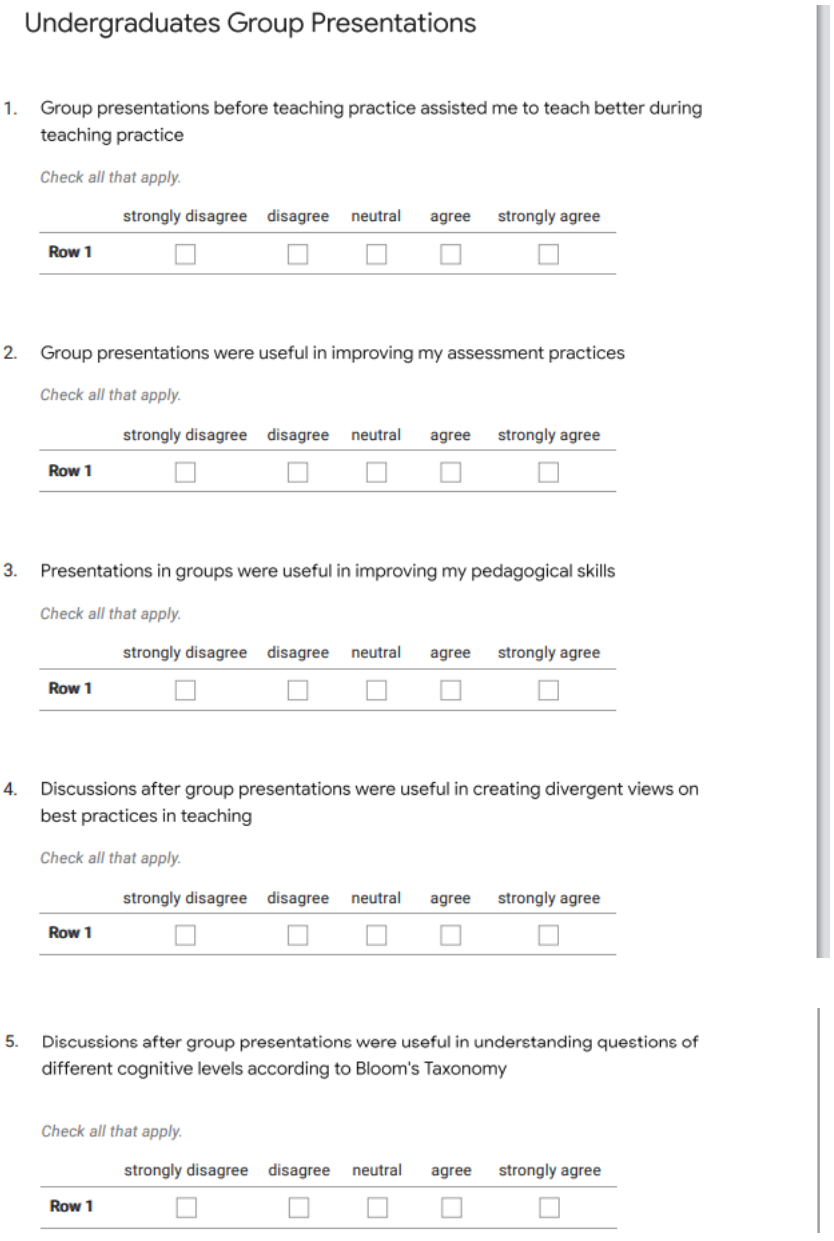
Appendix 1: Assessment Rubric

Ability to use an online platform	Online Presentation	Assessment consists of questions of different cognitive levels asking about different science	Notes/powerpoint well written capturing the most important issues of the methodology and	Prior knowledge related to the practical activity
8-10 Effective use of collaborate, skype, zoom or Microsoft teams	7-10 A very clear and comprehensive presentation. Logical presentation	8-10 Low order and higher order cognitive skills reflected. A clear memorandum or rubric is available	8-10 Well written and comprehensive notes are presented.	8-10 All the appropriate terminology was well explained with clear examples given. Prior knowledge was considered before new knowledge delivery
5-7 Use of WhatsApp and a video to demonstrate/moderate	5-6 The presentation was good but not clear in some instances	5-7 Only low order with limited high order questions and the memorandum/rubric is available	5-7 Well written and comprehensive notes are presented with some gaps	5-7 Reasonable number of terms were explained. Prior knowledge was adequately considered
3-4 Struggles to make use of the selected platform. The video/audio presented does not show competency in teaching	1-4 Presentation was not clear and no clear logic was followed.	1-4 Only low order questions. Memorandum is not clear/not available	1-4 Notes are written but not comprehensive. The student copied without understanding(no examples/missing key details)	3-4 Limited terminology but prior knowledge was considered
				1-2 Limited terminology was explained with many gaps in the explanations
1-2 Only presented a powerpoint without audio or video	0 Late presentation/No presentation	0 No assessment Questions	0 No notes available/Late submission	0 No relevant terminology and prior knowledge considered

Appendix 2: Survey Questionnaire



Undergraduates Group Presentations

1. Group presentations before teaching practice assisted me to teach better during teaching practice

Check all that apply.

	strongly disagree	disagree	neutral	agree	strongly agree
Row 1	☐	☐	☐	☐	☐

2. Group presentations were useful in improving my assessment practices

Check all that apply.

	strongly disagree	disagree	neutral	agree	strongly agree
Row 1	☐	☐	☐	☐	☐

3. Presentations in groups were useful in improving my pedagogical skills

Check all that apply.

	strongly disagree	disagree	neutral	agree	strongly agree
Row 1	☐	☐	☐	☐	☐

4. Discussions after group presentations were useful in creating divergent views on best practices in teaching

Check all that apply.

	strongly disagree	disagree	neutral	agree	strongly agree
Row 1	☐	☐	☐	☐	☐

5. Discussions after group presentations were useful in understanding questions of different cognitive levels according to Bloom's Taxonomy

Check all that apply.

	strongly disagree	disagree	neutral	agree	strongly agree
Row 1	☐	☐	☐	☐	☐

6. Discussions after group presentations were useful in understanding online teaching strategies

Check all that apply.

	strongly disagree	disagree	neutral	agree	strongly agree
Row 1	☐	☐	☐	☐	☐

7. Discussions after group presentations were useful in understanding how to make audio recordings in PowerPoint presentations

Check all that apply.

	strongly disagree	disagree	neutral	agree	strongly agree
Row 1	☐	☐	☐	☐	☐

8. The feedback on group presentations assisted me to improve my teaching during teaching practice

Check all that apply.

	strongly disagree	disagree	neutral	agree	strongly agree
Row 1	☐	☐	☐	☐	☐

9. Group presentations should be used in practical activities

Check all that apply.

	strongly disagree	disagree	neutral	agree	strongly agree
Row 1	☐	☐	☐	☐	☐