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To study the impact of Google Classroom as a platform of learning and collaboration at the teacher education level

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Abstract

The purpose of this study was to assess the impact of Google Classroom Platform of learning at the teacher education level. Web-Based Learning Environment Inventory (WEBLEI) (Chang and Fisher 1998, 2003) and Google Classroom Evaluation Survey was used in this study. The sample of 60 students consisting of both males and females was collected from one college of education in Jammu city, where teaching-learning process was being conducted using the Google Classroom setup. Data analysis revealed that students could access the learning activities easily, they could communicate with other students in their subject electronically, they could decide when they wanted to learn, and they could work at their own pace. Results also showed that the students could regularly access online resources and they had the autonomy to ask their tutor what they did not understand. Students experienced a sense of satisfaction and achievement and they felt at ease in working collaboratively with other students. The students were also happy to print lectures and exercise materials from resources uploaded by their teachers. Responses to the Google Classroom Evaluation survey showed that the teachers were able to give better individual attention and students developed a group feeling in such a classroom setup. Students also felt that learning through the Google classroom was not boring and it was not a waste of time. They found it to be an effective medium of studying.

Keywords Google Classroom · WEBLEI · Teacher education · Collaborative learning · Higher education · Web-based learning environments

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1 Introduction

Technology has played a major role in improving the modern education system at various levels of learning whether it be school, college or university education. Not only has the use of technology increased to make the process of teaching and learning in the classroom more effective, learner centered and outcome focused but it has also given an impetus to the teachers to use it as a tool to bridge the gap between traditional learning and modern educational requirements for the overall development of the learner. A look at the use of various levels and in different settings, shows how rapidly various information and communication technologies are being adopted as a catalyst to enhance learning (Gupta and Fisher 2012). As the fastest growing mediator of distance and flexible education, the world wide web (www) has created new possibilities for the delivery of instructional materials (Kerrey and Isakson 2000). Although there continues to be enthusiasm in many quarters about the integration of the world wide web (www) into education in general, others have become disenchanted (Cuban 2001; Oppenheimer 2003). Regardless of one's stance, it should be clear that simply placing content online does not provide effective solutions for teaching and learning problems. Without employing appropriate theories instructional strategies in harmony with the unique features of the www, the expectations of higher learning outcomes will not be reached (Windschitl 1998). To sufficiently engage students in active learning and encourage sufficiently strong mental effort in a Web-Based Learning Environment, educators must attempt to stimulate and sustain student motivation through the design of effective interactions (Reeves and Reeves 1997). Some interactive programs accessible via the Internet may initially attract students' attention because of unique screen designs or the inclusion of features such as animation and sounds, but unless the interactions are designed to be cognitively engaging, students will become disenchanted and unmotivated (Lajoie 2000).

The twenty-first century science classroom consists laptops, personal digital assistants, and digital measuring devices. With the inclusion of this technology, there is often an assumption that these devices will automatically bring about revolutionary changes in teaching and learning processes. Specifically, it is assumed that the presence of technology will transform teacher- centered instruction to student centered instruction. In exploring this assumption, Cuban (2001) followed teachers in California's Silicon Valley and found that they either used technology to maintain their traditional teacher-centered practices or to enable their traditional instructional tasks, such as recording grades and creating data-bases. He concluded that technological weather in and of itself did not alone induce reform-based educational practices and that "computers have been oversold and underused". However, using technology to create student-centered learning environments in the classroom is possible. Google Classroom has also invaded the field of education and is being regarded as a tool having immense educational possibilities. Google Classroom is a free web service by Google for schools that aims to simplify creating, distributing and grading assignments in a paper less way. The primary purpose Google Classroom is to streamline the process of sharing files between teacher and students. It was introduced as a feature of G-Suite for education, formerly Google apps for education, on May 6, 2014 followed by its public release on August 12, 2014. In June 2015, Google announced a classroom API and a share button for websites, allowing school administrators and developers to further engage with

Google Classroom. In March 2017, Google opened classroom to allow any personal Google users to join classes without the requirement of having a G-Suite for Education account, and in April, it became possible for any personal Google user to create and teach a class. Google Classroom is one technology designed to enhance the learning experience. Google Classroom is an education application suite offering productivity tools such as email, document and storage for students and teachers. The tools offer opportunities for collaboration in real time and the ability to work remotely, among many other features (Google Classroom n.d.).

The present study attempts to study the web-based learning environments as provided by the Google Classroom setup at the teacher education level and to assess the effectiveness of this new type of blended learning environment. The main purpose of the study was to understand whether studying in a web-based learning environment helped students to comprehend the content in a more meaningful manner. For this purpose the Google Classroom Platform was used as it was a freely available web resource and could easily be used to create an online Education Learning Management System (ELMS) for the students. The Google Classroom provides the right kind of tools for delivering online content to students, creating interactions between teachers and students and within student groups through the Chat feature and help teachers in giving assignments and conducting online assessments in a secure and friendly manner. The Google Classroom provided the right setup for assessing the web-based learning environments and contribute towards the result of the study.

2 Review of related literature

2.1 Studies on the web-based learning environments

Chang and Fisher (2001) conducted a study on the validation and application of a new learning environment instrument to evaluate online learning in higher education. More and more academics are accepting the challenge of using the web-based or on-line learning in higher education to deliver coursework. Many web sites indicate that opportunities for students to receive coursework via the web are routine at most universities. The Internet/Web has become an important change agent in higher education and universities are reviewing their strategic plans to incorporate on-line learning. As a result of the increase in on-line courses, it is timely for learning environment research to focus on the Web. However, to date, no comprehensive instruments have been developed to assess on-line learning environments for higher education. A new web-based learning environment instrument is described in this paper. The Web-based Learning Environment Instrument (WEBLEI) contains four main scales. Three scales (emancipator, co- participatory, and qualia) are built upon the work of Tobin (1998). The other scale focuses on information structure and the design of on-line material. The rationale behind, and development of, the WEBLEI are described in the paper. Statistical analyses, Cronbach alpha reliability coefficient, factor analysis, and discriminated validity, indicated that the WEBLEI is a reliable and valid instrument. The paper also reports on findings involving the perceptions of undergraduate and graduate students utilising this new instrument.

Skelton (2007) conducted an investigation into the learning environments of blended delivery (e-learning and classroom) in a tertiary environment. His research describes investigating the learning environment of tertiary students undertaking their studies through a mixture of online learning management systems and traditional tertiary classroom delivery. A review of the literature examined traditional learning environments, pure online virtual environments and more recent literature pertaining to a blended environment. The examination of student and staff perceptions of learning environments in different contexts served to generate recommendations to help tertiary teachers optimise online and traditional teaching practices within a mixed-mode environment. Students' experiences of their learning environment were discovered through quantitative and qualitative methods. Quantitative data on students' experiences were gathered by using an adapted version of the Web-based Learning Environment Instrument (WEBLEI). Qualitative data on students' experiences were collected by discussion questions added to the WEBLEI survey. Qualitative data on the use of online and blended learning environment experiences by tertiary staff were gathered by email and supplementary interviews. The study synthesised results from these multiple sources within a tertiary institute environment and made recommendations and gave insight into optimal blended learning environments within the tertiary sector. Overall, the study provided a perspective on the psychology and strategic view of the learning environment for the future tertiary institute.

Chandra et al. (2012) conducted a research using the Web-based learning Environment Instrument (WEBLEI). Since its development, this instrument has been used to study a range of learning environments and this study presented the findings of two example case- studies that involve such environments. Qualitative data on students' attitudes were gathered through emails and written surveys. An attitude towards science survey was developed to determine students' attitudes towards their subjects. Qualitative data were also gathered through written surveys. The impact of such an environment on students' learning outcomes was determined through the analysis of their exam results achieved before and after experiencing web- based learning. Their results were also compared with the results of similar cohorts in previous years. Amongst other findings, it was found that the modified version of the WEBLEI was a valid and reliable instrument for use in junior science and physics classes. The study also established that students had positive perceptions of a blended web-based learning environment ant that such an approach had a positive influence on student's attitudes towards their subjects. The study also found that Web- based learning improved their performance across various performance domains of junior science and senior assessments.

Snell-Siddle (2012) conducted a study on tertiary students' perceptions of mobile technology enhanced learning environments and associations with outcomes in New Zealand. This research investigated the associations between students' perceptions of mobile technology enhanced learning environments and tertiary students' outcomes. This study used a modified form of the Web-based Learning Environment Instrument (WEBLEI), renamed the Mobile Enhanced Learning Environment Instrument (MOBLEI), to gather quantitative data about the associations between students' perceptions of mobile technology enhanced learning environments and student outcomes in a tertiary environment that uses different delivery modes. Qualitative data on students' perceptions were collected by discussion questions added to the MOBLEI questionnaire and through follow-up focus groups. The study has synthesised results

from both quantitative and qualitative sources and has provided an understanding as to how students perceive their mobile enhanced learning environments. The research has made a valuable contribution to the field of learning environment research by developing a new learning environment instrument that can be used with confidence in tertiary institutions in New Zealand to evaluate the increasing uptake of mobile technologies that are being used in an effort to enhance learning. It has also been able to provide insight into the associations that exist between students' perceptions of their mobile enhanced learning environments and their attitudinal and cognitive outcomes.

Gupta and Fisher (2012) conducted a study, which was the first of its kind in India and reports the use of a modified form of Technology-Rich Outcomes- Focused Learning Environment Inventory (TROFLEI) for assessing students' perceptions of their learning environments in technology-supported science classrooms. Analysis of data from 705 students from 15 classes provided evidence for the reliability and validity of the questionnaire in Indian science classroom settings. The same data were also used for studying gender differences and associations between students' perceptions of their technology- supported learning environments and three learner outcomes (attitude towards science, academic efficacy and academic achievement).

2.2 Studies on the use of Google Classroom

Basher (2017) conducted a study on the impact of Google classroom on the teaching efficiency of pre-teachers. The researcher followed the experimental approach in implementing the Google classroom on the research sample The controlled group was taught by the traditional way while the experimental group studied using Google classroom. The results showed that there were significant statistical differences in the result between the experimental and control group when Google classroom was used. The teaching efficiency of college students in each of the levels i.e. planning, execution and evaluation improved along with academic achievement in computers as compared to the traditional way of teaching.

Heggart and Yoo (2018) examined the effectiveness of using Google Classroom for final year primary teacher education students to encourage student voice and agency, and to consider how the platform might influence future pedagogies at the tertiary level. The data showed that Google Classroom increased student participation and learning and improved classroom dynamics. It also revealed concerns around pace and user experience. This data was used to construct a framework to evaluate of the use of online platforms. It identified four concepts (pace, ease of access, collaboration and student voice/agency) that explore the usefulness of other online learning platforms, as well as pedagogical practice.

In a study conducted in Oman (Al-Maroof and Al-Emran 2018) to examine the factors that affect the Students Acceptance of Google Classroom, it was shown that both the perceived ease of use (PEOU) and perceived usefulness (PU) positively influenced the behavioural intention, which in turn influenced the actual usage of Google classrooms. This study helped the decision makers of the higher educational institutions to have a better understanding of the effectiveness of using Google classroom by their students. It was assumed that it helps in measuring the level of students' acceptance to the previously mentioned technology.

A study to assess the teachers' perception on the effectiveness of Google Classroom was conducted in Pakistan (Abid Azhar and Iqbal 2018). The study

was carried out using a qualitative research design. The sample of the study, which used semi-structured interview method, consisted of 12 higher education teachers who have implemented Google Classroom for at least one semester in their classroom. Findings revealed that teachers perceive it as only a facilitation tool that can be used for document management and basic classroom management, without having a significant impact on teaching methodologies. The responses of the teachers indicate that lack of user-friendly interface is the main reason for its inefficiency. Further studies can be conducted by taking the students' perspective into account.

The present study is significant because it would be for the first time that the web based learning environment inventory (WEBLEI) would be used in Indian classrooms especially at the teacher education level and would thus contribute to the ever expanding field of web based learning environments. This research is also significant because it would assess the impact of Google Classroom as a platform of learning at the teacher education level. The study shall also provide valuable cross-sectional data between the age group of 25 to 35 regarding the effectiveness of the web-based classroom learning with students studying in M.Ed. and M.A. Education programmes. No study of a similar kind has been reported or published in India so far.

3 Objectives of the study

Following are the objectives of the study:

1. To determine the reliability and validity of the web-based learning environment inventory.
2. To study the web-based learning environments as provided by Google Classroom platform in terms of students' perceptions.
3. To investigate whether gender differences exist while learning through the Google Classroom platform.
4. To investigate whether significant differences exist based on the course of the student who are studying through Google Classroom platform.
5. To assess the effectiveness of the Google Classroom Platform at the teacher education level.

4 Sample for the study

The sample consists of 60 students who are studying in the M.Ed. and M.A. Education programmes in a selected college of education in Jammu where Google Classroom platform has been implemented to teach students. 45 students from the M.Ed. programme and 15 students from the M.A. Education programme were selected. The sample was chosen carefully so as to be representative of the population and comprise of coeducational classes in order to permit an unbiased test of gender differences. Purposive sampling technique was used in selecting the students.

5 Tool used

For the purpose of accomplishment of the objectives of the study, two research tools namely Web Based Learning Environment Inventory (WEBLEI) developed by Chang and Fisher (1998) and a self-prepared Google Classroom Evaluation Survey have been used. The WEBLEI measures student's perceptions across four scales i.e. Access, Interaction, Response, and Results. According to Chang and Fisher (1998), the first step in successfully using a web- based learning environment requires learner to effectively access the Internet. Consequently, the Access scale establishes the extent to which the variables associated with accessing this medium met student' expectations. Once the students have logged in successfully, they should be able to interact productively with their peers and their teachers. Hence, the Interaction scale explores the extent to which this is achieved from students' point of view. The Response scale gives an indication of how they felt about using a web-based medium and the Results scale gives an idea of whether they accomplished any of the learning objectives by using the learning resources accessed through this medium. A scale wise description of the WEBLEI is given in Table 1. Responses of the items are scored 1, 2, 3, 4, 5 respectively, from Almost Never, Seldom, Sometimes, Often to Almost Always.

6 Results of the study

This section reports on the reliability and validity of the WEBLEI questionnaire to assess the learning environments in a Google Classroom setup at the teacher education level. The quantitative data analysis to achieve all the research objectives is also provided in this section.

Table 1 Description of the Web Based Learning Environment Inventory (WEBLEI)

S. No.	Scale Name	No. of Items	Scale Description	Sample Item
1.	Access	8	Access scale establishes the extent to which the variables associated with accessing this medium met student expectations.	I can access the learning activities at times convenient to me
2.	Interaction	8	Interaction scale explores the extent to which this is achieved from student's point of view.	I was supported by positive attitude from my peers.
3.	Response	8	Response scale gives an indication of how they felt about choosing a web based medium.	I enjoy learning in this environment.
4.	Result	8	Results scale gives an idea of whether they accomplished any of the learning objective by using the learning resources accessed through this medium.	The scope or learning objective are clearly stated in each lesson

6.1 Validation of the WEBLEI

The data for the WEBLEI were collected from a sample of 60 students in a Google classroom setting with studentss pursuing M.A Education and M.Ed. programmes and were analysed for determining the reliability and validity of the WEBLEI questionnaire. The Cronbach alpha reliability coefficient was used as an index of scale internal consistency of the test items relative to other test items which are designed to measure the same construct of interest. A coefficient of 0.00 indicates a complete absence of a relationship, whereas 1.00 is the maximum possible coefficient that can be obtained (Fraenkel and Wallen 2000). A discrimination validity index (namely, the mean correlation of a scale with other scales) was used as evidence that each WEBLEI Scale measures a separate dimension that is distinct from the other scales in this questionnaire.

Table 2 illustrates the inter scale correlations between the four scales of WEBLEI. It is evident that all the scales are positively correlated with each other and that the inter scale correlations are significant ($p < 0.001$). This show that as the scale of WEBLEI are in harmony with each other and will contribute to the study of the web-based learning environments through the Google Classroom setup.

The result of the two statistical indices are reported in Table 3. The scales reliability estimates for the different scales from WEBLEI using individual student as the unit of analysis ranged from 0.73 for the Response scale to 0.85 for the Result scale. The reliability results of WEBLEI were consistently above 0.50. This suggested that the WEBLEI could be considered a reliable tool (De Vellis 1991) for the use at teacher education level for assessing the Google Classroom platform of learning. The mean correlation for the four scales of the WEBLEI ranged from 0.70 for the Access Scale to 0.75 for the Result scale (Table 3). This shows that WEBLEI is a valid tool for assessing the web-based learning environments as provided by the Google Classroom Platform.

7 Means and standard deviations of the WEBLEI

The data on the four scales of the WEBLEI were collected from 60 students studying at the M.A Education and M.Ed. level through a Google Classroom platform. Item means and standard deviations were computed to determine the nature of the Google

Table 2 Inter Scale Correlations for the Web-Based Learning Environment Inventory (WEBLEI)

Scale	Access	Interaction	Response	Result
Access	1	0.69**	0.72**	0.70**
Interaction		1	0.71**	0.78**
Response			1	0.76**
Result				1

$N = 60$ ** Correlation is significant at the 0.01 level (2-tailed).

Table 3 Internal Consistency Reliability (Cronbach Alpha Coefficient), Discriminant Validity (Mean Correlation with Other Scales) for WEBLEI

Scale	No. of Items	Alpha Reliability	Mean Correlation with other scale
Access	8	0.75	0.70
Interaction	8	0.81	0.72
Response	8	0.73	0.73
Result	8	0.85	0.75

N = 60

classroom Learning Environments using the WEBLEI. The data obtained are presented in Table 4.

From the results in Table 4 it can be seen that the mean scores of the different scales of WEBLEI ranges from 4.09 for the Interaction scale to 4.17 for the Access scale. This shows that the mean scores of WEBLEI are high which indicates that students are able to Access, Interact, Respond and find out the results of their study immediately. The results of the Access scale indicates that students can access the learning activities easily. The online material is available at their suitable locations, they can decide when they want to learn and they can work at their own pace. Data for the Interaction scale indicates that students can communicate with other students in their subject through the Google Classroom setup, they become self –disciplined in order to learn, they can regularly access online resources and they have the autonomy to ask their tutor what they do not understand. The response scale results indicate that students are able to interact with other students, students feel a sense of satisfaction and achievement, they enjoy learning in an online environment and they feel at ease when working collaboratively with other students.

Data on the Result scale indicates that students are happy to print lectures and exercise material from online resources, online resources enhance their learning and the students are more focused on what is to be learned. The value of standard deviations for all the WEBLEI scales is less than 1, which suggest that there are no more major deviations in student's perceptions of their web-based learning environment as assessed through the Google Classroom platform.

Table 4 Means and Standard Deviations (SD) for WEBLEI

Scale Name	No. of Items	Mean	Standard Deviation(SD)
Access	8	4.17	0.60
Interaction	8	4.09	0.65
Response	8	4.14	0.60
Result	8	4.13	0.72

N = 60

Table 5 Means, Standard Deviations and Significance of Difference between Means for Gender Differences in a Web –Based Learning Environment as Measured by the WEBLEI

Scale	Gender	Mean	Standard Deviation	*t*
Access	Female	4.17	0.61	0.22
	Male	4.25	0.62	
Interaction	Female	4.09	0.66	0.30
	Male	4.21	0.73	
Response	Female	4.14	0.61	0.07
	Male	4.17	0.63	
Result	Female	4.12	0.73	0.39
	Male	4.29	0.79	

N = 60, Male: $N = 3$; Female: $N = 57$.

8 Gender differences

The third research question was to investigate whether gender differences exist in Google classroom learning environments at the teacher education level. In the present sample of 60 students taken from one college, there were 57 (95%) female student and 3 (5%) male students who studied through the Google classroom learning environment. The means and standard deviations for each of the male and female groups were computed followed by a test of significance of difference between means (t –test for independent samples) on the four scales of the WEBLEI. The data obtained are presented in Table 5.

From the data analysis it is evident that there are no gender differences between male and female students in their Google classroom learning environments. From the information given in Table 4, it can be seen that out of the four scales of the WEBLEI none of the scale has statistically significant value. This could be due to the fact that there were less number of male students in the M.Ed. and the M.A Education programmes.

Table 6 Means, Standard Deviations and Significance of Difference between Course of study

Scale	Gender	Mean	Standard Deviation	*t*
Access	M.Ed.	4.19	0.66	0.55
	M.A	4.10	0.44	
Interaction	M.Ed.	4.04	0.66	1.15
	M.A	4.26	0.64	
Response	M.Ed.	4.18	0.66	0.69
	M.A	4.05	0.40	
Result	M.Ed.	4.07	0.78	1.12
	M.A	4.30	0.53	

N = 60, M.Ed. (N) = 45, M.A. (N) = 15.

9 Difference based on course of study

The means and standard deviations for each of the courses i.e. M.A. Education and M.Ed. were computed groups were computed followed by a test of significance of difference means (t –test for independent samples) on the four scales of the WEBLEI. In the Present sample of 60 students from one College, there were 45 M.Ed. students and 15 M.A. Education students. The data obtained are presented in Table 6.

From the data analysis it is evident that there are no course differences between M.Ed. and M.A Education students in their Google classroom learning environment. From the information given in Table 6, it can be seen that out of the four scales of the WEBLEI learning environment, none of the scales has statistically significant difference. Thus, the students of both M.A. Education and M.Ed. programmes perceive the google classroom learning environment to be similar.

10 Impact of GOOGLE classroom

In order to further evaluate the reactions, whether favourable or unfavourable, of the students selected for the study, towards learning through a Google classroom setup, the investigator prepared a Google Classroom Evaluation Survey containing 19 items. This survey was administered to a sample of 60 students in two classes who had studied through the Google classroom and earlier responded to the WEBLEI questionnaire. Each item in the survey could be responded in terms of 'Yes', 'No' and 'Doubtful' categories. After the administration of the survey, the responses given by the students were transferred to an Excel worksheet and the frequencies of responses to each item in terms of 'Yes', 'No' and 'Doubtful' responses were noted to arrive at an index of the students' reaction towards different aspects of the Google classroom. This was mainly done to determine the effectiveness of the use of google classroom at the teacher education level. The obtained frequencies were converted into percentages for the purpose of interpretation. The results are shown in Table 7.

The obtained results give a fairly good idea of the overall positive reactions of the students studying through the Google classroom setup. It can be concluded that the students have, by and large, been able to perceive the merit of Google classroom setup in line with the advantages of the use of technology which have been highlighted by several writers and researcher's details of whom have been given in the review of literature section. At the same time, having been long exposed to the classroom teaching by the teacher and being dependent upon text books, they have also been somewhat doubtful about the relative superiority of technology vis-à-vis text books, subject-matter and availability of help when needed. Nonetheless, the entire gamut of responses can be summed up by saying that almost 60 to 80% of the students in the group look forward to learning through Google classrooms rather than through more conventional methods. They also perceive their Google classes to be more interesting, livelier and more enjoyable. The students were more attentive, they found answering questions easier and the atmosphere more relaxed in the Google classroom. Students also felt that they were able to learn faster in such classes. In these response lies the success of the present experiment in particular and of the general superiority and hence desirability of introducing the google classroom setup.

Table 7 Responses to the Google Classroom Evaluation Survey

No.	Item	Yes	%	No	%	Doubtful	%
1	I found learning content in a Google classroom interesting.	48	80%	1	0.16%	11	18.33%
2	I was able to learn faster through online resources in a Google Classroom.	57	86.6%	3	5%		
3	I was more attentive while learning in a Google classroom that what I am in the classroom	54	90%	6	10%	5	8.3%
4	I felt that I was getting better attention in a Google classroom	44	73.3%	8	13.3%	8	13.3%
5	I could follow the subject matter in the Google Classroom easily than a text book.	41	68.3%	14	23.3%	5	8.3%
6	I had a pleasant experience using Google classroom from my mobile device.	52	86.6%	6	10%	2	3.3%
7	I was able to communicate with my classmates and share information easily through Google classroom.	52	86.6%	7	11.6%	1	1.6%
8	Responses to questions were provided quickly in a Google Classroom.	50	83.3%	4	6.6%	6	10%
9	I was able to complete my assignments easily through the Google classroom setup.	52	86.6%	7	11.6%	1	1.6%
10	The teacher was able to correct my assignments and provide me feedback in a Google classroom.	52	86.6%	4	6.6%	4	6.6%
11	Learning through Google classroom was an enjoyable activity as compared to regular class room teaching.	53	88.3%	1	1.6%	6	10%
12	Online resources provided through Google Classroom were of good quality and related to my curriculum.	51	85%	6	10%	3	5%
13	The teacher was able to share interactive multimedia resources through the Google classroom	53	88.3%	1	1.6%	6	10%
14	The teacher was more helpful in the Google classroom.	53	88.3%	1	1.6%	6	10%
15	I could revise my lesson better in a Google classroom.	48	80%	8	13.3%	4	6.6%
16	I found it easier to answer questions asked in a Google classroom	51	85%	1	1.6%	8	13.3%
17	I was not afraid of answering questions asked through Google Classroom.	49	81.6%	8	13.3%	3	5%
18	I found learning through Google classroom to be a waste of time and effort.	9	15%	46	76.6%	5	8.3%
19	I would look forward to learning through a google classroom setup	38	63.3%	22	36.6%		

11 Limitations of the study

The study has the following limitations which could be improved upon in subsequent studies:

1) The study was conducted in only one college of education in Jammu city as the Google Classroom setup was not available in other colleges for conducting the

online teaching-learning process. Having more colleges could contribute to the richness of the study.

2) The sample for the study was very small and thus the results could be considered mostly experimental. Once the study is conducted on a large scale than the actual implications of using the Google Classroom platform can be determined.
3) The study was conducted only at the teacher education level where the students are more mature and some of them have completed their graduate and post-graduate studies. The results would be interesting when this study would be done at different educational levels such as with the school and undergraduate level students.
4) An adequate mix of male and female students would have improved upon the results regarding gender differences in web based learning environments. Since the study was mainly done at the teacher educational level and there were more number of female students as compared to male students, hence, the results of gender differences cannot be generalized.

12 Discussion and conclusions

Google Classroom as a web-based technology has been recently used in the field of education to facilitate the teaching learning process. This paper presents the overall impact of Google Classroom learning environment in post-graduation classrooms of a teacher education college in Jammu. Two questionnaires were employed to provide quantitative data. Web-Based learning environment Inventory (WEBLEI) with Google Classroom Evaluation Survey. The WEBLEI questionnaire has been found to be reliable and valid for assessing the Web Based learning environments as supported by Google Classroom setup. The results show that the students perceived their Google classroom learning environments in a positive manner. Results on investigation of gender differences suggest that there are no gender difference and course differences in Google classroom learning environments as measured by the WEBLEI. Finally, on evaluating the reactions of students towards studying through a Google classroom, it was clear that more than 80% of the students enjoyed studying through such classroom setup. The results show that the overall objective of the study has been achieved as the impact of google classroom as a platform of learning and collaboration at the teacher education level has been established. To conclude, the results of the present descriptive study are in line with the results reported earlier by various researchers. The results favour the use of Google Classroom setup in colleges over conventional methods of teaching at the teacher education level. These results are similar to the results in studies conducted by Heggart and Yoo (2018), Al-Maroof and Al-Emran (2018) and Chandra et al. (2012). The present study provides valuable insights regarding the basis on which the Google classrooms score over regular classroom teaching in terms of students' reactions something about which information was not available earlier. The present study can therefore be acclaimed, in all humility, to be successful in achieving its main objective of reporting the impact of Google classroom as a platform of learning and collaboration at the teacher education level.

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Author 2 has been responsible for collection of data, review of literature and preparation of the thesis from which this paper has been developed.

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Data Availability The data and material for the said research is available with the office of our department. The scholar has provided the data with the college which has been collected as part of the Masters Dissertation.

Compliance with ethical standards

Competing interests The authors do not have any financial or non-financial competing interests.

List of abbreviations

WEBLEI, Web Based Learning Environment Inventory.;

www, World Wide Web.;

MOBLEI, Mobile Enhanced Learning Environment Inventory.;

TROFLEI, Technology Rich Outcomes Focussed Learning Environment Inventory.;

M.Ed., Masters in Education.;

M.A, Master of Arts.

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