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# BLENDED LEARNING PRACTICES OF SCIENCE TEACHERS IN THE SECONDARY SCHOOLS OF PUNJAB

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## ABSTRACT:

*Blended learning is a combination of traditional, face-to-face learning, and e-learning. This pedagogical approach combines online (asynchronous and/or synchronous) and face-to-face contact time between teachers and students and/or between students in a course (Birbal, 2018). Science teachers throughout the world used a multiplicity of teaching strategies including blended learning approaches. They start enhancing student achievements and opportunities through blending technology in their classroom instruction. There are many challenges for both educational organizations and science teachers because of using digital technologies to train their learners for jobs and different task-related learnings. This study aimed to determine perceptions of secondary school science teachers regarding their practices of blended learning in science classrooms. Data was gathered using quantitative research techniques. The study based on the Likert scale conducted an online survey. A descriptive survey of 166 both male (n=66) and female (n=100) science teachers' perceptions regarding blended learning practices in science classrooms was conducted. Both descriptive and inferential statistics including t-test techniques were used to analyze the collected data. The findings of this study indicate that no statistically significant differences in teachers' perceptions in both males and females about the practices of blended learning in science classrooms. The findings also showed that there was no significant difference in teacher perceptions towards integrating ICT for science teaching, especially in the group who were trained through the blended learning approach. Besides, the results of this study indicate that as diverse science teachers recognized the benefits of blended learning, teachers also showed their increased interest in the use of blended learning for effective instructional delivery. This research augments a small literature base probing the use of blended learning in science classrooms.*

***Key Words:*** *Blended learning, Instructional practices, science teachers*

## Introduction

Blended learning (BL) materialized the maximum standard of teaching instruction in the education system (Medina, 2018). Blended learning settings that mix online and physical mechanisms are comprehended as precarious approaches for education organizations (Wang, Chen, Tai, & Zhang, 2019). Blend of technology engages the uses of online resources for valuable and efficient teaching practices and incorporating different technologies like internet, hardware and software applications, social media systems, tablets, digital cameras, mobile devices, and especially computers (Waters, Kenna, & Bruce, 2016). Graham (2006) stated BL as theoretically perspective, BL is a mixture of teaching from two generally distinct methods of instruction and education, Virtual learning and face to face learning style (Nuruzzaman, 2016). In science, teaching inquiry emphasizes increasing learners' capabilities to enquire and assess queries to be examined, reflect the variance among pieces of evidence and views, and articulate clarifications from suggestions (Cairns, 2019).

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An inquiry-based approach to teaching science was strongly emphasized in the Inquiry and the National Science Education Standards report. In the USA science teachers are demanded to practice blended learning for bringing valuable teaching instruction and inquiry-based teaching in the science classrooms (NSTA, 2015). Despite this demand from NSTAs' science transformation in teaching practice, several science teachers endure indefinitely just about how to use blended learning in their classroom practice. On the other side, NSTA defined that, in effect blended learning into science teaching and classroom assistances to encouragement and help learner acquiring in science education (NSTA, 2015; Mentor, 2019). BL appears to be a teaching practice that would be involved in inquiry-based teaching, to produce superlative information (Tawil, 2018). In 2017, Suwono study on guided inquiry-blended learning stated that guided inquiry-based education formulates that learners engaged in such an education process convert significant knowledge and education learners (Suwono, Susanti, & Lestari, 2017). The blend or merge of blended learning and guided inquiry supports a more influential and strong approach to science teaching that is developmentally approachable, justifiable, and thought-provoking too (Longo, 2016). There are many challenges for both educational organizations and science teachers because of using blended learning to train their learners for jobs and different task-related learning. Although most science teachers will not agree on how to meet these challenges in teaching because of the repaid use of technology. Schwartz (2016) note down, science teachers don't frequently identify accurately how to impart and show their practice obviously for the reason that several of the instructions and necessary courses look like to force in the opposed track (Calcara, 2019). Science teachers frequently struggle to reconcile differentiated instruction, tasks, and content in the very standardized context in which they find themselves today. It is needed in secondary schools to improve teaching and instruction practice in science education, now the teacher is responsible to equilibrium their approaches of teaching instruction and applying a blended learning inventiveness, secondary school learners will be offered through a first-class instruction that not only ready them for college and university, although reflects modified and distinguished education (Longo, 2016). To encounter the issues, forthcoming science teachers require to be visible to blended learning as a tool in their professional progress (O'Byrne & Pytash, 2015; Shand & Farrelly, 2018). A satisfactory study was requiring about, how science teachers perceive and understand blended learning for science learners to expand position, performing, attainment in science, assignment completion, and learner-centered education in a science subject (Dolenc & Abersek, 2015; DePountis, 2015; Schmidt & Fulton, 2016). The literature review also reveals a gap, to get ready forthcoming science teachers to develop skillful at instruction in numerous designs and information related concept and use of blended learning for science teachers.

**Significance of the Study**

Through a quantitative survey from the science teachers, this study will highlight the problems and issues like slow internet availability, access to gadgets/platforms, high strength of students in the classes. The teachers in Pakistan will be able to help children with differentiated abilities and disabilities to cope with a normal class. This study will be help full to highlight the new issues related to secondary school science teachers and also will be useful to enhance learning

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technology and help to satisfy science teachers and speed up the learning step for students having outstanding capacities in science classes.

**Objectives of the study**

Keeping in sight the above contextual, the study aimed to define science teachers' views and perception of the basic concept of blending learning, practice in science classrooms, and challenges of blended learning.

The objective of the research was to:

i. Identify the perception of blended learning by science school teachers.
ii. Find out the science teachers' (both male and female) perceptions regarding their practices of blended learning in science classrooms.
iii. Clarify science teachers' (both male and female) challenges regarding blended learning and their practice in the science classroom.

**Research Questions**

i. What are the difference in science teachers' (both male and female) perceptions of blended learning in the science classroom?
ii. What are the difference in science teachers' (both male and female) perceptions regarding their practices of blended learning in science classrooms?
iii. What are the differences between (both female and male) science teachers' challenges regarding blended learning and their practice in the science classroom?

**Null Hypothesis of the Research**

$H_O1$: There is no statistically significant difference in science teaches' (both male and female) Perception of blended learning.

$H_O2$: There is no statistically significant difference in science teachers' (both male and female) perceptions regarding their practice of blended learning in science classrooms.

$H_O3$: There is no statistically significant difference between both female and male science teachers' challenges regarding blended learning and their practice in the science classroom.

**Literature Review**

The term blended learning (BL) established by Graham and Friesen, turn around bimodal instruction, encompassing a computer-facilitated component, a face to face or co-presenting section (Bryan & Volchenkova, 2016). BL propositions the mixture of diverse collective relations designs in an asynchronous and synchronous situation that encounters dissimilar (Medina, 2018). In 2013, Caner and Guzer expressed that blended learning (joined online elements and pointing teaching) has been accumulative in the meantime of the century. Several researchers have extolled these current expansions inspiring educators to accept combined (Tawil, 2018). BL as a pedagogic methodology blends face-to-face and virtual (synchronous or asynchronous) and interaction time among teachers and learners and learners in a content (Graham, Woodfield, & Harrison, 2013; Birbal, 2018). The word blended learning also recognized as mixed education style, covers ridiculous knowledge approaches. A blended learning platform might contain single or supplementary program mixtures like merging offline and online education settings, merging cooperative and separate education settings, merging non-structured and structured education setting, merging instructional methodologies to products an optimum education result through or without instructional technology (Ceylan, & Elitok,

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2017).The mixing of online teaching and face-to-face teaching is entitled blended learning (BL), it usually takes on crossways advanced education through some researchers discussing it as the "novel outmoded model" (Dziuban, 2018). In 2002, Driscoll agreed and has defined four modules of blended learning: a blend of styles of web-based tools, a blend of several instructional methods, a blend of somewhat practice of instructional tools by face-to-face educator-led working out, and a blend of instructional technology by definite occupation responsibilities in instruction to generate an operative blend of knowledge and at work (Longo, 2016). However, blended learning appears to be a teaching practice that would be included in novel philological education, in instruction to products the superlative information.BL combines the various types of educational tools in the learning environment, like simultaneous online/ cooperation software, self-directed internet-based learning program, electric presentation sustenance schemes (EPSS) surrounded among the job-task setting, and learning managing schemes (Seage & Türegün, 2020). BL blends several many undertakings, combines the virtual environment, face-to-face teaching, and self-directed knowledge. Mostly blend of synchronous (old-style teacher-led teaching, and virtual classroom), asynchronous self-directed learning, and organized on the job preparation through a qualified person or teacher (Maulida, Suparwoto, Pramudya & Sulsworo, 2020). There are different dimensions of BL such as blending online and offline education, blending self-directed and animate, Cooperative education, blending organized and unorganized education, and blending learning presentation sustenance and practice (Damanik, 2020).

As the practices in the education system blended learning has approximately face-to-face class teaching, however besides have approximately class meetings that are substituted by virtual teaching (Tawil, 2018). Livingstone stated in 2015, that school organization must create each effort to exchange teacher-centered approaches with extra learner-centered styles. One approach that may be used to assist a supplementary student-centered style is BL (Birbal, 2018). The necessity for a novel theoretic context for learning practices stands up, in the relation of a learner-centered theoretic context that mainly focuses on learners and their education. The philosophy of fundamental discriminated teaching has significantly crushed instruction throughout the world, annoying main variations in the techniques teachers identify and practice instruction (Cairns, 2019). Just before understanding the practices and strategies of BL in the education system a teacher especially science teachers would be practice BL for his /her self for professional improvement (Shand, & Farrelly, 2017). Science teachers must distinguish the demand to modify work pattern teaching practices for the students who are living in the 21st-century; teaching practices that at this time standardize the subject that learners obtain (Faulkner & Latham, 2016, p.137). Many researchers have claimed that science teachers must be applied blended learning tools and resources through teaching practices to support secondary education in public schools for reaching the maximum constructive education and teaching results (Elmendorf & Song, 2015; Hao & Lee, 2015; Lim, 2015; Pittman & Gaines, 2015; Brenner & Brill, 2016; Ritzhaupt, Huggins-Manley, Dawson, AgacliDogan, & Dogan, 2017; Mentor, 2019). In science education, blended learning with teaching practices increases knowledge in science (Guler & Sahin, 2015). Mentor (2019), challenged and claimed that for science teaching useful teaching approaches and practice make well to support other teachers in excellently applying different tools and resources of technology in science teaching and science classroom. To

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address this difficulty, future science teachers should be presented with blended learning as a device in their expert improvement (O'Byrne & Pytash, 2015, Shand, & Glassett, 2018). In Pakistan, most science educators simply stroll into study halls holding their yellow journals, which they have acquired from the first "instructors". Their talks are only a sort of ready-made formula book for showing logical ideas (Aslam, 2017). An investigation proposal was that the most proper techniques ought to be chosen in instructing and figuring out how to create understudy learning (Kazi, Mahboob, Muhammad, & Inayat, 2017). While science teachers don't recognize whatever to perform, they frequently perform additional of whatever they recognize. In various cases, that aims to support classroom performance and practices that have time-consuming carry on their significance. The learners of the 21st-century demands and requires to expand critical thinking abilities and problem-solving through blended learning into the classroom of science (Flogie & Abersek, 2015; Ramma, Samy, & Gopee, 2015; Mentor, 2019, p. 4). So, science teachers must have an understanding the blended learning with guided inquiry in the classroom as a blended learning tool for the learners to built 21st-century education achievable (Sadaf, Newby, & Ertmer, 2016). Here are features of blended learning that associate with science teachers' perceptions regarding blended learning practices for both male and female teachers and there was no difference between both perception and attitude regarding blended learning concept (Turner, 2018). The gap identifies through the works of literature that surveys and researches interested in blended learning remain to be disjointed and numerous significant problems and challenges keep on uncultivated. Consequently, it is a need to investigate the science teacher's perception regarding blended learning and to identify the different challenges of blended learning in science classrooms.

**Research Methodology**

The paradigm of the research was positivism and data were gathered using quantitative research techniques. Due to the COVID-19 situation in Punjab, a google form was developed for an online survey from science teachers to study how science teachers perceive blended learning in the science classroom. One standard questionnaire (self-constructed) was used to collect the data about the perception of science teachers regarding blended learning practices on the five-point Likert scale. The validity and reliability of the questionnaire were checked by pilot testing. In this study, the content validity of the questionnaire was approved by experts and 0.958 reliability was obtained with Cronbach's appropriate alpha coefficients. The population for this study was all science teachers in secondary schools of Punjab. Total 166 both male (n=66) and female (n=100) responded the google form. To test the study hypotheses, the researcher implemented inferential statistics, and to analyze, and interpret the data, t-test techniques were used.

**Data Analysis and Interpretation**

To analyze the data, descriptive statistics (mean and standard deviation) and inferential statistics (independent sample t-test) were used. All statistical tests will accomplish at significance alpha level 0.05. To calculate and analyze the data, SPSS statistical software was used.

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Table 1: *Group Statistic to test the perception of blended learning by science school teachers*

| Gender | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|
| Male | 66 | 33.4545 | 6.16986 | .75946 |
| Female | 100 | 34.8100 | 6.84857 | .68486 |

The table showed the descriptive statistics for each group (male and female). Male n=66, sample mean x= 33.45and sample standard deviations s=6.16986 female n=100, mean x=34.81, and sample standard deviations s=6.84857. The below table 2 is the Independent Sample Test Table, showing all the appropriate test statistics and p-values.

Table 2: I*ndependent sample test table to test perception of blended learning by science school teachers.*

**Independent Samples Test**

| science teachers' (both male and female) perception of blended learning | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | F | Sig. | t | df | Sig (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | Lower | Upper |
| Equal variances assumed | .753 | .387 | -1.297 | 164 | .196 | -1.35545 | 1.04480 | -3.41844 | .70753 |
| Equal variances not assumed | | | -1.325 | 149.004 | .187 | -1.35545 | 1.02265 | -3.37622 | .66531 |

Independent sample t-tests were conducted on the perception of blended learning to check for signification to difference amongst the science teachers (both male and female). The Sig. (2-tailed) value is .196. This value is greater than .05. So, the null hypothesis is accepted. Consequently, there is no statistically significant difference in science teachers' (both male and female) perception of blended learning.

Table 3: *Group Statistic to test the science teachers' (both male and female) perceptions regarding their practice of blended learning in science classrooms.*

**Group Statistics**

| Gender | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|
| Male | 66 | 21.4848 | 4.29756 | .52899 |
| Female | 100 | 23.0900 | 6.31352 | .63135 |

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Table 3 showed the descriptive statistics for each group (male and female). Male n=66, sample mean x=21.48 and sample standard deviations s= 4.29756 female n=100, mean x=23.09, and sample standard deviations s= 6.31352. The below table 4 is the Independent Sample Test Table, showing all the appropriate test statistics and p-values.

Table 4: *Independent sample test table to test science teachers' (both male and female) perceptions regarding their practice of blended learning in science classrooms*

**Independent Samples Test**

| use of blended learning for practice in science classrooms | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | Lower | Upper |
| Equal variances assumed | 4.069 | .045 | -1.807 | 164 | .073 | -1.60515 | .88843 | -3.35939 | .14909 |
| Equal variances not assumed | | | -1.949 | 163.82 | .053 | -1.60515 | .82367 | -3.23154 | .02123 |

Independent sample t-tests were conducted on perceptions of the use of blended learning for practice in science classrooms to check for signification to difference amongst the science teachers (both male and female). The Sig. (2-tailed) value is .073. This value is greater than .05. So, the null hypothesis is accepted. Consequently, there are no statistically significant differences in science teachers' (both male and female) perceptions regarding their practice of blended learning in science classrooms.

Table 5: *Group Statistic to test the science teachers' (both male and female) challenges regarding blended learning and their practice in the science classroom*

**Group Statistics**

| Gender | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|
| Male | 66 | 22.8333 | 5.44224 | .66989 |
| Female | 100 | 24.2300 | 6.21477 | .62148 |

Table 5 showed the descriptive statistics for each group (male and female). Male n=66, sample mean x=22.83 and sample standard deviations s=5.44224 female n=100, mean x=24.23, and sample standard deviations s= 6.21477. The below table 6 is the Independent Sample Test Table, showing all the appropriate test statistics and p-values.

Table 6: Independent sample test table to test the science teachers' (both male and female) challenges regarding blended learning and their practice in the science classroom

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**Independent Samples Test**

| perceptions of the benefits of blended learning and their use for practice in science classroom | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | Lower | Upper |
| Equal variances assumed | 1.089 | .298 | -1.487 | 164 | .139 | -1.39667 | .93897 | -3.25070 | .45736 |
| Equal variances not assumed | | | -1.528 | 151.402 | .128 | -1.39667 | .91378 | -3.20207 | .40874 |

Independent sample t-tests were conducted on perceptions of the challenges of blended learning and their practices in the science classroom to check for signification to difference amongst the science teachers (both male and female). The Sig. (2-tailed) value is .139. This value is greater than .05. So, the null hypothesis is accepted. Consequently, there is no statistically significant difference between both female and male science teachers' challenges regarding blended learning and their practice in the science classroom.

**Discussion**

This study aimed to determine the perceptions of school science teachers regarding the practices of blended learning in science classrooms. The perception of the teacher plays a vital part in somewhat form of inventiveness and creativity which would get on to encourage learners' knowledge but teachers have confidence in the consequence of a method, technique or practice, supposing achievement since the professional attitudes or approaches does complete unreasonable. The findings of this study indicate that no significant differences in teachers' perception (both male and female) of blended learning in science classrooms in Punjab schools. Here are features of blended learning that associate with science teachers' perceptions regarding blended learning practices for both male and female teachers and there was no difference between both perception and attitude regarding blended learning concept (Turner, 2018). It is important that trained the science teachers for their professional expansion strategies of blended learning. Teachers' perception ensures a significant part in the least form of creativity which would get on to support the learner in science education (Mentor, 2019). The findings also showed that there was no significant difference in teacher perceptions towards integrating ICT, especially in the group who were trained through the blended learning approach Mostly blend of synchronous (old-style teacher-led teaching, and virtual classroom), asynchronous self-directed learning, and organized on the job preparation through a trained person or teacher (Maulida, Suparwoto, Pramudya & Sulsworo, 2020). Also, the results of this study indicate that as science teachers recognized the benefits of blended learning, teachers also increased their use of blended learning for instructional delivery and student learning. Science teachers must distinguish the demand to modify work pattern teaching practices for the students who are living in the 21st-

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century; teaching practices that at this time standardize the subject that learners obtain (Faulkner & Latham, 2016, p.137).

According to this study Pakistani science teachers promote and support teaching through a blended learning approach and this specifies the expected attainment that might originate end to end with the usage of blended learning practices in the science classroom. Just before understanding the practices and strategies of BL in the education system a teacher especially science teachers would be practice BL for his/her self for professional improvement (Shand, & Farrelly, 2017). Therefore, science teachers who distinguish the possible assistances of blended learning for learner attainment might be additional possible to accept blended learning integration with inquiry and usage it to improve instruction and education in the science classroom (Kazi, Mahboob, Muhammad, & Inayat, 2017). Institutes might need to evaluate science teacher perception (both male and female) and trained the science teachers to decrease the challenges, to definitely influence science teacher perception and attitude to increase the practice of blended learning in science classrooms. The challenges signified by the members might be overwhelmed through training science teachers in what way to carry out blended learning methods (Turner, 2018).

**Recommendation**

This study was limited only to science school teachers. This study adds to the limited knowledge related to blended learning by science school teachers in Punjab and provides direction for additional study. The results of this study may be put on in different levels of teaching and universities. Additional research is desirable to define the best operational usage of blended learning. Further researches of these rudimentary perceptions might offer a vision into the teaching approach. It is a need to explore issues related to blended learning among teachers through in-depth study. The issues and challenges regarding blending learning that is faced by science teachers might be decreased and solved by training the teachers with approximately different approaches to blended learning in Pakistan.

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