Students’ perspectives on the use of smart devices during problem-based learning sessions: whether it is helping or obstructing the learning

Abdulaziz Boqaeid¹, Khaled Rafea Aldraihem¹, Omar Alotaibi¹, Ahmed Alageel¹, Abdulaziz Abdullah Aldbas¹, Moeber Mohammed Mahzari¹,²,³*

ABSTRACT

Background: Problem-based learning (PBL) is a teaching method that promotes student learning of principles, improves problem-solving abilities, and provides opportunities for working in groups. Use of mobile devices has recently increased by undergraduate students to access online information during PBL process.

Objectives: This study aimed to assess whether using of electronic devices during PBL sessions benefit students and tutors or not.

Methods: A cross-sectional study was conducted among students (males and females) from, College of Medicine, King Saud Bin Abdulaziz University for Health Sciences (KSAU-HS). The participants were selected using a non-probability convenience sampling technique. A self-administered questionnaire consisting of five points Likert scale was used.

Results: Out of 231 participants, 74.5% were males, most of them (86%) were undergraduate entry-level students from fourth year of the medical program. Most of the students thought that electronic devices during PBL sessions should be made optional (81.6%); however, 75% thought that using electronic devices is important, and 72.3% indicated that it enhances group learning. However, 19.3% students perceived a negative impact on the group dynamics and 15.3% reported that it decreases the participation level.

Conclusion: Most of students at KSAU-HS preferred the use of electronic devices during PBL sessions. It is recommended to conduct more studies regarding this topic in more than one university at Saudi Arabia and worldwide, due to lack of these studies locally and globally.

Keywords: College of Medicine, electronic device, mobile device, problem-based learning.

Introduction

Problem-based learning (PBL) is a new and innovative learning/teaching method that aimed to improve the way of delivering medical education in an integrated, coherent, and focused manner [1]. Additionally, PBL is a teaching method that promotes student learning of principles and concepts by using complex real-world problems as well, also it could promote and improve problem-solving abilities, develop skills of critical thinking and communication skills, provide opportunities for working in groups, and life-long learning [2]. PBL other than any other teaching strategies put the medical students in the center, giving them commitments and curriculum tasks through

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leading roles during the classroom process, which
needs spending a lot of time to prepare problems and
materials before class, as well as it emphasizes students’
subjective initiative [1].

PBL is implemented strategy in the medical schools
worldwide, which contributed for 100 schools out of
126 schools in the United States, and affected practice
and thinking of medical students for the past 30 to 40
years [3]. PBL is considered as a pedagogical approach
that focused on gaining skills to comprehend large-scale
and systemic change, especially through its interactions
with social skills [3]. In the traditional methods, students
failed to use what they learnt to solve the clinical
problems, which they encounter in the real life, but PBL
would increase knowledge’ retention, improve student’s
interest in the content, help students transfer concepts to
new problems, and improve self-directed learning [4].

Use of electronic devices during PBL sessions remained
under-research, use of mobile devices, such as smart
phones, electronic book readers, laptop, computers,
and tablets, etc. have increased in the last years among
students during PBL tutorials, which might be attributed
to the widespread of Wi-Fi connectivity anytime and
anywhere on campuses, and their low cost [5]. A previous
study was conducted in Hong Kong in 2012 and showed
that students became mobile enabled and more interested
in learning opportunities provided by mobile devices [6].
Wood et al. [7] reported that use of mobile devices by
tutors during PBL in a hybrid-PBL medical curriculum
enhanced gathering of information by students. Another
study reported that using electronic devices during PBL
tutorials promoted full engagement with PBL process’
collaboratively [8]. Additionally, another study reported
positive attitudes of tutors by introducing electronic
devices during PBL session for information retrieval and
note-taking, which reported a positive effect on group
dynamics [9]. Therefore, the current study aimed to
investigate whether using or not using electronic devices
during PBL sessions would benefit students and tutors.

Subjects and Methods

A cross-sectional questionnaire-based study was carried
out for 2 years at King Saud bin Abdulaziz University
for Health Sciences (KSAU-HS) among students at
College of Medicine to assess whether using or not
using electronic devices during PBL sessions would
benefit study students and tutor. A non-probability convenience
sampling technique was used to select the participants
of the study. The study included both male and female
students from KSAU-HS and only students from phase
II (preclinical phase) were included in the study. A self-
administered questionnaire was developed, face validity,
content validity, and a pilot study were done.

An online well-constructed questionnaire was
disseminated and self-administered by each participant.
The questionnaire consisted of five Likert scale. After
obtaining permission from the participant and assuring
their confidentiality, the participants were asked to fill
out the questionnaire. At the end of the questionnaire, an
email was provided for any inquiries about any unclear
questions. Informed consent was obtained before the
commencement of data collection.

A total of 231 students responded, and filled questionnaires
were reviewed for completeness and accuracy before
data entry. The data were analyzed using Statistical
Package for the Social Sciences program, version 22.0.
For the qualitative data, frequency and percentages
were presented in tables. p-value < 0.05 was considered
significant.

Results

Most of the participants (74.5%) were males. Around
46.5% were aged 21 years, and were fourth year medical
students (62.8%). Furthermore, most of them (86%) were
stream I high school entry students (Table 1).

Most of students indicated that use of electronic
devices during PBL sessions should be made optional
(81.6%), 75% considered the use of electronic devices
as important, and 72.3% thought that use of electronic
devices during PBL enhances group learning. More
than half of the participant (56.6%) indicated that using
electronic devices during PBL helped in knowledge
retention, 50.4% thought that using electronic devices
supplemented printed materials during PBL sessions, and
46% reported that the use of electronic devices during
PBL decreases preparation efforts prior to the session.
Low percentage of the participants (30.7%) showed
that use of electronic devices during PBL affects tutors’
fairness toward student’ evaluation, 19.3% reported that
use of electronic devices during PBL negatively affects
group dynamics, 18% thought that use of electronic
devices during PBL should not be allowed, and the
lowest percentage of the participants (15.3%) reported
that use of electronic devices during PBL reduces the
level of participation (Figure 1).

Table 1. Demographic characteristic of the study
participants.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
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<td>172</td>
<td>74.5</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>59</td>
<td>25.5</td>
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<tr>
<td>Age categories</td>
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<td>39</td>
<td>17.0</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>107</td>
<td>46.5</td>
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<tr>
<td></td>
<td>22</td>
<td>48</td>
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</tr>
<tr>
<td></td>
<td>23-29</td>
<td>36</td>
<td>15.7</td>
</tr>
<tr>
<td>Year of the study</td>
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<td>145</td>
<td>62.8</td>
</tr>
<tr>
<td></td>
<td>fifth year</td>
<td>86</td>
<td>37.2</td>
</tr>
<tr>
<td>Medical school entry level</td>
<td>Stream 1 (high school entry level)</td>
<td>196</td>
<td>86.0</td>
</tr>
<tr>
<td></td>
<td>Stream 2 (graduate entry level)</td>
<td>32</td>
<td>14.0</td>
</tr>
</tbody>
</table>
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There were no significant association between the demographic characteristics as the p-value was higher than 0.05. Regarding gender, age, batch, and stream there was no significant difference between males and females \((p = 0.84, p = 0.353, p = 0.61, \text{ and } p = 0.16, \text{ respectively})\) (Table 2).

**Table 2. The total score of agreement level in all questions about electronic devices use during PBL.**

<table>
<thead>
<tr>
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<th>Total score</th>
<th>Mean</th>
<th>SD</th>
<th>p-value</th>
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<td></td>
<td>0.84</td>
</tr>
<tr>
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<td>32</td>
<td>5</td>
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<tr>
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<td>0.353</td>
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<td>Stream 2 (graduate entry level)</td>
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**Discussion**

PBL is a new teaching approach that is widely adopted by health professional programs as a model for curriculum design, an inquiry-based pedagogical approach, and as constructivist educational philosophy [10]. The PBL tutor had an effective role on the successful outcome of PBL for students [11,12]. Using electronic device during PBL sessions increased in the past years, most researchers reported that use of mobile devices has increased the opportunity to critique and access new information sources directly in the first tutorial, while other believed that using electronic devices during PBL process might distract students from their communication with their peers [5]. Therefore, the current study aimed to assess if using electronic devices during PBL session benefits the medical students or not.

The current study results showed that most students preferred using electronic devices during PBL sessions; hence, 81.6% showed that its use should be made optional, 75.0% thought that using it is important, and 72.3% indicated that its use enhances group learning. However, 19.3% students believed a negative impact on the group dynamics and 15.3% reported that it decreases the participation level. These findings in agreement with previous study which reported that use of mobile devices during PBL process improved gathering of the information and changed the PBL process in a hybrid-PBL medical curriculum [7]. Another study recommended use of mobile device during PBL process which favors superficial learning and address facilitators’ concerns regarding the potential for distraction [13]. Also, another study reported that using electronic devices had a positive impact on taking notes,
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retrieval of the information, and had a positive impact on the group dynamics [9], in alignment with that our study showed that only 19.3% of the students perceived harmful impact of electronic devices use on group dynamics. The current results disagreed with a previous study which was carried out among medical students at University of Limerick. The study’ participants were obliged to own iPads to access learning sources for their courses and they reported that use of electronic devices during PBL sessions resulted in students with less engagement. They reported that use of electronic devices during PBL tutorials reduced full engagement with the collaborative PBL process, which might impact group dynamics during PBL. Additionally, the same study explained that students who were allowed to use electronic devices during PBL process showed low engagement and their confusion disrupted group dynamics, also they reported a conflict between tutors and students which was disruptive [8]. Furthermore, it was reported that some tutors preferred banning the use of mobile devices in PBL tutorials, because they wanted students to focus on PBL discussion rather than relaying information that they read from their devices without comprehension of what they read. At the same time other tutors preferred use of electronic devices to allow students to search for information in real time, promoting informed discussion accompanied with understanding what they read and gather [5]. Other studies are in harmony with the current findings and reported that using mobile devices during PBL process provided frameworks and guidelines for assessing and implementing mobile learning [14-16]. Although, there are limited studies regarding this topic, most of the global studies are consistent with the current findings. The strength of the study was that it included both the gender males and females with a relatively good sample size (231). On the other hand, the current study also has limitations including the fact that the study was conducted in only one university, one college, and involving only two level students.

Conclusion

Most of students at KSAU-HS preferred use of electronic devices during PBL sessions. It was recommended to conduct more studies regarding this topic in more than one university at Saudi Arabia and worldwide, due to lack of these studies locally and globally.

List of Abbreviations

KSAU-HS King Saud Bin Abdulaziz University for Health Sciences
PBL Problem-based learning

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Funding

None.

Consent to participate

Written informed consent was obtained from all the participants.

Ethical approval

The study was approved by the IRB of National Guard Hospital [RYD-18-418912-126209] on 2 September, 2018.

Author details

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References

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