



## A Study On Medical Student's Perception Of The Usefulness And Practical Challenges Of Digital Game-Based Approach To Aid Learning

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### Abstract

**Background:** Civilization has changed in many ways during the past few decades and dramatic shifts are likely to continue in digital technology. Medical education has gone online because of the covid 19 pandemic. Teachers need to help students and develop the ability to collaborate effectively in many ways in their learning aspects. Students should be able to transform the information into new knowledge and ideas to develop novel solution paths in their careers. In that way DGBL(digital game-based learning) is used to enhance students' motivation by providing the self -paced learning platform. However various challenges arise during DGBL which include reliability and network issues.

**Aim Of The Study:** This study was conducted to assess the medical student's perception of the usefulness and practical challenges of DGBL.

**Methods:** One hundred first-year undergraduate medical students were enrolled in the DGBL games related to physiology subject in this study. A questionnaire with items regarding practical challenges, reliability, and usefulness of DGBL tools was used. Each item was related on a five-point Likert scale and the response was analyzed anonymously. A large percentage of students used mobile phones 82% to undertake DGB tests.

**Results:** Although most of the students 72%  $P < 0.001$  felt that DGBL helped them substantially in learning the subject, network issues were considered to be a serious concern 84%  $P < 0.001$ . Among the various games used, problem-solving using video clips was found to be the most reliable 84%  $P < 0.001$ . MCQ-based assessments done in DGBL were more interesting than classroom teaching,

**Conclusion:** The results of the study suggest that Medical Students found DGBL helpful for their learning despite the concerns about practical challenges. It has also triggered them to achieve the objective of improving learning effectiveness as they obtain a sense of accomplishment and develop an attitude towards gaining victory in games. Some students felt that it demands more time and proper infrastructure needed beyond playing games.

**Keywords:** DGBL, Covid 19 pandemic., Student motivation, Medical education

### Introduction

Global Health & economy was much affected by the Covid19 pandemic. This indirectly had an impact on medical education. With the progress in technology,

teachers have chosen Game-Based learning platforms to encourage students' skills(1). In this study, the key game design elements like a choice filling, collaboration, feedback sessions, and other

instructional designs were used which had a positive impact on student engagement (2) Digital game-based learning can also be defined as an “Instructional method that incorporates educational content or learning principles into a computer or video games to engage learners” (3) DGBL can take learning to the next level and support educators. The theme is engagement and motivation. In engagement, the student sees the activity as personally meaningful & worthy of trying to get motivated when he has the desire to begin learning or taking part in the process with inherent satisfaction (4). When students work with friends in small groups, they have the opportunity to communicate with others and work together to achieve a common goal during gameplay (5). This study aims to determine medical students' perception of the usefulness of DGBL in terms of feedback they receive for their performance and practical issues while selecting strategies related to the cognition aspect of learning. There must be some practical issues and they should be considered specially, if grading is done. Also, students should be familiar with the problem-based model for which digital games should be designed with multiple challenges (6). The advantages should be well appreciated when comparing it with conventional classroom teaching.

### Methods:

The study was conducted in the Department of Physiology, ESIC Medical College in Chennai India. One hundred first-year undergraduate medical students who were present and well versed with electronic gadgets were included in the study after obtaining informed consent. DGBL was conducted considering the needs and characters of learners and also knowing the objective and goals of the lesson. Designing, evaluating, and selecting games that met the needs of the learners were categorized by the teachers. Reflections for the game session were done by the faculty in the Dept of Physiology using motivational strategies like problem-solving, MCQ, interactive win state, and challenge. Feedback was sent through Google form and students were asked to submit the answers in a stipulated time. Collaboration is a game design element that was used in DGBL to support the social aspect of learning. Quiz, the Oral commentary was also used to match the motivational strategy. Students' perceptions of the various GBL tools conducted by the Dept from June to September

were assessed using a questionnaire with twenty-one items. Most of the items were rated using a 5-point, Likert scale. A few open-ended questionnaires for students' suggestions were also included to make DGBL more reliable and feasible. The questionnaires were sent to students through Google form and their responses were assessed anonymously. No identifying data of the student was collected. Data were presented as a percentage. Analysis was done on the  $X^2$  test where a p-value  $<0.05$  was considered statistically significant. Analysis and presentation of data were done using Microsoft excel.

### Results

Out of the 100 students to whom the questionnaires were sent 98 responded. The questionnaire had a few items about students, location, the device they used, and the availability of private space without any disturbance at home. The majority of Students were from a Suburban area 28%. and Urban 60%. while a small proportion 10% from rural areas figure 1. Most students used mobile phones and more than 75% of students had an undisturbed room at home. In collaborative games design, students were divided into groups of six each playing the game where the grouping strategy of cooperative learning was evaluated. The questionnaire contained 21 items which were rated on a 5pt Likert scale. The items were grouped as practical issues, usefulness in learning, and affective factors. The 5 ratings on the Likert scale were Strongly Agree, Agree, Neutral, Strongly Disagree, and Disagree. For performing Statistical analysis using  $X^2$  test, the number of students who responded with Agree and strongly agree were pooled, and similarly disagree and strongly disagree were pooled.

### Practical Challenges.

Network issues were considered to be a matter of serious concern by most of the students who participated in the study ( $P < 0.001$ ). About 55% of students strongly agreed and 35% agreed with the item on network issues in the questionnaire. The home environment was considered more distracting and 57% of students with poor performance may depend on those with better performance in traditional cooperative learning if group members fail to effectively discuss (8). Most of the students agreed 65%  $P < 0.001$  that they could adhere to specified time limits while playing DGBL.

**Feedback & Usefulness In Learning**

A majority of students perceived that DGBL has helped them learn the subject by 75%  $P < (0.0001)$  improving their learning effectiveness as they obtain a sense of accomplishment. Regarding the problem-solving model, a considerable fraction of students chose to be neutral (30%) while an almost equal number of students had opposing views  $P = 1.801$  Since the DGBL should be designed with multiple challenges.

**Reliability.**

The majority of the students who participated in this study were 52%.  $P=0.115$  felt that DGBL induces learning motivation. A large percentage of students 40% gave a neutral opinion for questionnaire items related to the problem-solving model since they have to precede cognitive thinking to overcome the challenge in games, especially in the competition process. Among others, a significant percentage of students thought that 42%  $p < 0.05$  they appear burnout in the gaming process which requires constant thinking and 35% felt that constant monitoring is necessary  $P = 0.215$ , and many students 62% felt that they were more involved in this learning experience and had more fun in contrast to classroom teacher-centered learning approach  $p < 0.001$

**Affective Factors**

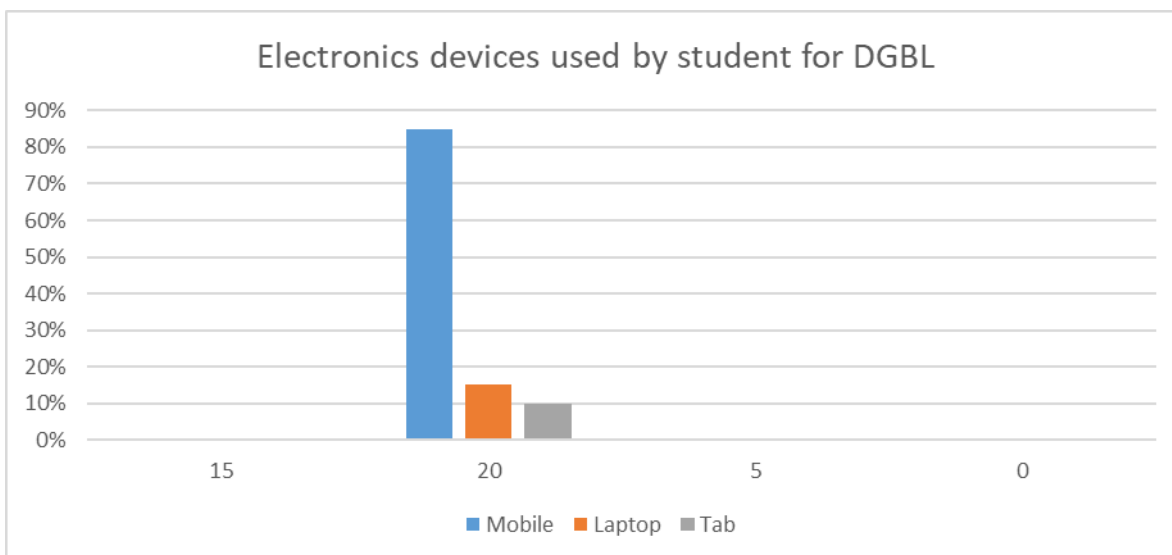
Most of the students considered DGBL as important as the classroom teacher-centered learning approach

60%.  $P < 0.001$  majority of the 74%.  $P < 0.001$  felt that DGBL supports students in making progress towards meeting learning goals. Opinions were mixed about the stress factor, the needs, and the characteristics of the learners. Close to half the number of students 48% felt that DGBL were stress-free since they prefer to learn at their own pace and do things without continuous supervision. while 32% disagreed with the item on the questionnaire  $P = 0.082$

**Various DGBL Methods**

Regarding DGBL using MCQs quick simple games focusing on what is taught most students found it was practically feasible 70%.  $P < 0.001$  and feedback was much faster 82%.  $P < 0.001$ . A Large percentage of 85%  $P < 0.001$  of students felt that problem-solving model games were the most reliable among the various game designs. Most students 80%  $P < 0.001$  felt it was difficult to answer certain knowledge-centered questions and risk-taking since competing with time was a concern, but a considerable fraction of students 50%.  $P < 0.001$  felt this type of DGBL was practically difficult because of network connecting issues. About half of students 52%  $P < 0.05$  felt that certain games were challenging and complex since students have to precede cognitive thinking to overcome that issue and a large fraction of students 75%.  $P < 0.001$  found difficulty in adhering to time, especially in an interactive session of the competition.

**FIGURE 1 ELECTRONIC DEVICES USED BY STUDENTS FOR DGBL**



**TABLE 1. RESPONSE OF STUDENTS TO ITEMS RELATED TO PRACTICAL ISSUES IN DGBL**

Item	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	P value
DGBL is more difficult and doesn't replace traditional learning strategies	5.1	38.1	21.06	29.9	10.3	0.742
Challenge like network issues and digital literacy is a matter of concern in the conduct of DGBT	1	9.2	7.2	39.1	48.4	<0.001
Students become addicted, and less time socializing with friends & family	7.2	2.06	17.5	31.9	27.8	<0.001
Requires self-discipline and might get a victim of cyberbullying wherein increases anxiety.	3.1	15.4	20.6	47.4	18.5	<0.001

TABLE :1 For computing p values, the number of agreeing and strongly agreed responses were pooled. Similarly, disagree and strongly disagree were pooled. significant difference ,P<0.001,n=98

**TABLE 2- RESPONSE OF STUDENTS TO ITEMS RELATED TO USEFULNESS OF DGBL**

DGBL increases student memory, strategic thinking problem-solving ability.	3.1	7.2	19.6	59.8	15.4	<0.001
Not always aligned to teaching on learning goals	9.2	25.7	34	29.9	6.2	0.902
Enhances motivation among disengaged learners.	10.3	21.6	28.8	39.1	5.1	0.152
Response of students to items related to reliability of DGBL						
Lack of in-person interaction gap in learning resources	12.3	34	41.2	15.4	1.2	0.0003
Requires prior learning experience and strict monitoring	7.2	23.6	33	34	7.2	0.219
Does not require instructor feedback	9.2	26.8	18.5	41.2	9.2	0.118

For computing p values, the number of agreeing and strongly agreed responses were pooled. Similarly, disagree and strongly disagree were pooled. significant difference ,P<0.001,n=98

**TABLE 3 RESPONSE OF STUDENTS TO ITEMS RELATED TO AFFECTIVE FACTORS IN DGBL**

Item	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	P value
DGBL is a low-risk competition and the	12	9.2	31.9	46.4	15.4	<0.001

development of soft skills possible						
Flexibility, affordability, and individualization in playing.	11.3	21.6	23.7	38.1	10.3	<0.084
offers immediate signs of achievement and progress.	1	8.2	21.6	50.5	23.7	<0.001
Increases aggressive thoughts and behavior.	6.2	15.4	38.1	36.1	9.2	<0.003

TABLE 3 For computing p values, the number of agreeing and strongly agreed responses were pooled. Similarly, disagree and strongly disagree were pooled. significant difference ,P<0.001,n=98

**TABLE: 4 RESPONSE OF STUDENTS TO ITEMS RELATED TO VARIOUS DGBL METHODS**

Word games, puzzles.MCQs	2	1.03	23.7	55.6	13.4	<0.001
DGBL methods are more practically feasible, motivate students						
Offers immediate signs of accomplishment	2	4.1	14.4	60.8	23.7	<0.001+
Adhering to time is better than traditional learning	3.1	8.2	15.4	60.8	17.5	<0.001+
Competitive exercises, problem-solving games						
Improves mental skills, logic skills	4.1	13.4	28.8	48.4	10.3	<0.001+
Requires prior experiences takes away studying time for other subjects	5.1	25.7	20.6	40.2	13.4	0.013+
Group dynamic issues compromise PBL effectiveness	5.1	8.2	12.3	45.3	34	<0.001+
Video Games Cooperative learning						
Video games in practice are difficult because of network issues	3.1	7.22	10.3	44.3	40.9	<0.001+
Infrastructure problems	4.1	18.5	24.7	38.1	19.6	<0.001+
DGBL is less stressful than traditional learning.	5.1	4.1	11.3	44.3	40.2	<0.001

Yield fantastic result, reward to students when the task is completed	9.2	22.6	26.8	29.9	16.1	0.899
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TABLE :4 For computing p values, the number of agreeing and strongly agreed responses were pooled. Similarly, disagree and strongly disagree were pooled. significant difference , $P < 0.001, n = 98$

**Discussion**

In a pandemic situation like covid, DGBL has gained potential especially to enhance students Learning. This study documents that DGBL is a proven educational innovation effective in the Global North and is showing promise in the South(7). Games provide imaginative play, challenges, and competition. Students could develop knowledge and skills related to academic topics and life situations. Games could enhance students' performance, algebraic thinking, and reading ability(9). The medical institution has conducted DGBL as a platform even in pre-covid times to facilitate learning and it was well appreciated by students. Also, students' problem-solving ability, Strategic planning, and Cooperation were of great benefit in DGBL(10) The problem-solving model builds confidence and help them face problem with a positive attitude. The purpose of this study was to determine the first-year medical student's perception of the usefulness, and feasibility of DGBL which can be used as an innovative tool for enhancing students learning achievement in a short time. Students also provided suggestions for implementing the various DGBL methods so that they could become reliable and feasible tools. On observation, a very large percentage of students, who participated in the study used mobile phones. of course, few were having technical glitches, especially network issues(11). Most of the students were from urban and semi-urban areas and had private space at home. A small fraction of students from rural areas had poor network connectivity. These issues were taken into consideration to remove any unfair disadvantage to a certain proportion of students. Despite the data being collected anonymously a considerable percentage of students chose to remain neutral for questionnaire items regarding problem-solving models with

multiple challenges which need continuous monitoring(12). Most of the students perceived that DGBL had motivated them to study and helped them to learn substantially in learning physiology.

An overwhelming majority of the students felt that problem-solving concepts which students acquire in DGB instruction could be deepened with multiple challenges. Most of the students felt that DGBL improved their learning ability and presented great benefits to their learning motivation. (13) Also the teaching strategy of cooperative learning was much beneficial to students participating in groups except for network connectivity issues(16). While answering open-ended questions students had mixed opinions about the use of DGBL tools. Some students felt it was necessary and safer under the current circumstances of the pandemic, but they emphasized the need for strict monitoring(15). A considerable number of students did not prefer DGBL because of practical challenges. However, they considered it essential in pandemics since games like lubricant and catalyst could help them learn without stress and have fun(14).

**Conclusion.**

The results show that medical students who participated in the study appreciated the usefulness, learning motivation & achievement in a short time. It has also triggered them to achieve the objective of improving learning effectiveness as they obtain a sense of accomplishment and develop an attitude toward gaining victory in games. Some students felt that it demands more time and proper infrastructure needed beyond playing games. Beyond this teacher exerted higher effort in selecting designs. in instructional models, engagement in learning. Some students suggested Digital game-based technologies

must be both an object and a tool for education while strict monitoring needed wherever feasible Also mobile apps designed for entertainment can be potentially used for education. Psychologists in recent years stressed the necessity for students to learn through the gaming process. Also they suggested games as a primary method to connect psychological processes and abstract thinking.

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