Article title: The effect of using smart learning and online teaching strategies in motivating students to study sciences at Bethlehem University

Authors: Nader Abu Saad[1], Ahmad Atiya[2], Mohammad Zawahrah[3]

Affiliations: Software Engineering, Bethlehem University. 9 Freres Street, Bethlehem, Palestine[1], Computational Sciences & Engineering, Bethlehem University, 9 Freres Street, Bethlehem, Palestine[2], Arts, Palestine Ahliya University, Bethlehem, Palestine[3]

Orcid ids: 0000-0001-8932-9619[1]

Contact e-mail: nabusaad@bethlehem.edu

License information: This work has been published open access under Creative Commons Attribution License http://creativecommons.org/licenses/by/4.0/, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. Conditions, terms of use and publishing policy can be found at https://www.scienceopen.com/.

Preprint statement: This article is a preprint and has not been peer-reviewed, under consideration and submitted to ScienceOpen Preprints for open peer review.

Links to data: https://docs.google.com/spreadsheets/d/1_6xx256CHhAvsfz4DVXPiBMSixNI23sPZ-r_54Sz7E/edit?usp=sharing
https://drive.google.com/file/d/1RBI0l8iztSqD_78q7NVS7C-hD_XFye8TB/view?usp=sharing

DOI: 10.14293/S2199-1006.1.SOR-.PPKCBAJ.v1

Preprint first posted online: 06 October 2022
The effect of using smart learning and online teaching strategies in motivating students to study sciences at Bethlehem University

Nader Abu Saad  
nabusaad@bethlehem.edu  
Bethlehem University, Bethlehem, Palestine

Ahmad Atiyha  
aatiyha@bethlehem.edu  
Bethlehem University, Bethlehem, Palestine

Mohammad Zawahrah  
m.zawahra@paluniv.edu.ps  
Palestine Ahliya University, Bethlehem, Palestine
Abstract

Due to the advancement in today’s world technology and the challenges faced by Covid-19 during which face to face teaching and learning became difficult to attain. Thus the need arose to utilize online modern technologies and smart learning techniques to carry out the teaching and learning missions. The social media has also played a major factor in spreading out information among students and teachers on smart learning tools, software and online applications which provided large means for accomplishing the desired tasks in teaching and learning in different areas including multimedia, programming, web development, and the various domains of natural sciences. This study was intended specifically to examine the influence of online teaching and smart learning on motivating students learning in the different disciplines of the Faculty of science. The survey was completed by 60 science students and it showed that there is no statistically significant correlation between students using online studying and online smart learning with high motivation.

The methodology

The objective of this study is to explore the effect of using smart learning strategies and online teaching in motivating students learning at Bethlehem University and to attract them to study natural sciences. We will also investigate the influence of social media in this respect. This is important in increasing the number of students and their desire for active participation learning of natural science, through the use of interactive learning strategies, by employing the applications of advanced smart devices, and providing a creative smart environment that contributes to making the learning process at Bethlehem University more dynamic as a result of employing these applications.

Smart learning refers to a new linguistic term that deals with the use of advanced mobile phones, laptops, iPads and tablets that help share information and documents using advanced applications in the teaching and learning processes such as Google Docs, Google Drive, Drop Box, and electronic platforms such as E-class Moodle used at Bethlehem University. These applications are provided by modern smart devices, including smart phones, mobile devices, and Interactive Smart Boards, while these specifications and features were not available in the old versions of the interactive whiteboard, not even in old smart phones.

The study was designed and adapted under a non-experimental quantitative methodology in which students from Bethlehem University were targeted. A sample of the study consisted of 60 male and female students enrolled in Fall 2021 at Bethlehem University from the five different departments in the faculty of Science which are Software Engineering, Medical Labs, Chemistry, Computer Simulation in Science and Engineering.

A survey consisting of 20 question divided into two major areas that are Online Teaching Strategies and Smart Learning Strategies was conducted. The questions were prepared in an adequate manner to gain sufficient and precise knowledge that will allow us to develop and improve the online teaching techniques at Bethlehem University and elsewhere.

Introduction

Bethlehem University is one of the leading universities in the use of technology and its tools in university education. Since its foundation, students have had sufficient experience in using e-learning and its tools, that is why it was easy to move and switch from face-to-face education to Online as the rest of the world due to the closure of educational institutions as a consequence of COVID-19.

This study focuses not only on the online teaching strategies but on the effectiveness levels and
proficiency applied in terms of the utilization of smart learning tools and environment.

In the 21st century, at the end of 2019 in Wuhan, the high technology business hubs of China experience an epidemic of an entirely distinctive coronavirus appeared that had killed a few thousand Chinese within the fifty days of spreads and thousands of other citizens are suffered. The novel virus was nominated as COVID-19 novel coronavirus by the Chinese scientists (Shereen et al. 2020). Later on, in a shorter period, this COVID-2019 spread worldwide. Several country’s economies are severely affected due to COVID-2019. Further, the outbreak has changed the operating conditions all over the globe within a month. The consequences of a pandemic are unstoppable and uncontrollable for many industries of the world. Later on, almost 120 countries have stopped face-to-face learning; approximately a billion students’ education is effected worldwide with COVID-19. Most of the higher education system is operating through the E-learning (Azzi-Huck and Shmis 2020; Shahzad et al. 2020a, b). Meanwhile, to tackle the COVID-19 pandemic, almost all the world, and including Malaysian higher education ministry, has issued the ordered to close the public school and higher education closure as an emergency measure to stop spreading the infection. Spreading the infection.

This study focuses not only on the online teaching strategies but on the effectiveness levels and proficiency applied in terms of the utilization of smart learning tools and environment.

In previous literature it has indicated that Since COVID-19 pandemic occurred learning happened essentially mediated through connected smart devices that demand digital skills and reinforced Smart learning (A.Pérez Escoda, F.J.Lena-Acebo & R.García-Ruiz Digital Education Review - Number 40, December 2021-).

The study will undergo implementation. Upon completion of the study, the data will be analyzed and interpreted to reach appropriate recommendations.

Literature review

Effects of COVID-19 in E-learning on higher education institution students: the group comparison between male and female.

In response to the emerging and ever solution to the COVID-19 outbreak. This study proposes a theoretical framework based on literature and model to determined E-learning portal success. The study compared males and females to E-learning portal usage. The study objective is to check the difference between male and female E-learning portals’ accessibility among the students’ perspective. The study included service quality, system quality, information quality, user satisfaction, system use, and E-learning portal success. The empirical data of 280 students participated from the different universities of Malaysia through google surveys analyzed using the Partial Least Squares Structural Equation Modelling.

The study further divided the full model into two domains, which are female and male. In the male model, information quality and system quality have direct relationships with user satisfaction. Information quality also supported the relationship with system use. At the same time, there is a positive relationship between user satisfaction and E-learning portals. Likewise, in the female model, E-service quality and Information quality both are supported by system use and user satisfaction. Similarly, system quality has a positive relationship with user satisfaction, and user satisfaction has a positive relationship with E-learning portals. The study will be further helpful for the Malaysian universities policy-makers such as top management, ministry of higher education, Malaysian universities union in designing the policies and programs on E-learning Portal Success in the country. The findings of the study reveal that males and females have a different level of in terms of usage of towards E-learning portals in Malaysian Universities.

This study showed that there are differences in the use of e-learning in Malaysian universities, during the Corona Period Which was not apparent at Bethlehem University due to the total transfer of e-learning and the necessity of students are encouraged to use technology in education due to the lack of alternatives, which shows that there is
no differences regards of gender in the use of technology in education

1. The impact of online learning during COVID-19: students’ and teachers’ perspective

The purpose of this study was to conduct an online survey regarding teacher’s and student’s perception and experience related to online classes. Delivery of classes through online medium has been a recent modification brought out by the education system in India in the wake of the current pandemic situation. Thus, this survey describes college and university teachers and students’ perceptions and concerns with regard to taking online classes that have been made mandatory in the wake of COVID19. The sample consisted of 70 teachers and 407 students from colleges and universities in Bangalore city. Online survey method was used for the purpose of data collection. The findings show that the following areas are important for teacher and student satisfaction with online classes, these areas are: quality and timely interaction between student and professor, technical support availability, structured online class modules, and modifications to accommodate conduction of practical classes.

The survey questions assessed the general perception and experience of both students and teachers about online classes. The teacher survey had a cross-section of 6 demographic questions and 26 questions regarding teacher’s perception about taking online classes. Out of the 26 questions 3 items were open ended wherein the teachers were asked to tell what according to them were the positive and negative aspects of online teaching and what were the applications usually used by them to take online classes. The students survey consisted of 6 demographic questions and 19 questions regarding student’s perception about online classes. Two open ended questions regarding the positive and negative aspects about online classes were kept. Response choices consisted of pre-defined options of agree, disagree and neutral. The purpose of the survey was not to collect psychometric data and thus the survey did not make use of validated psychometric tools. Due to the current COVID-19 situation, the survey was conducted online using google forms. The form was made available online on 2nd May’20 for 2 weeks. Teachers and students from Bangalore colleges and universities which were conducting online classes were approached and asked to complete the survey. A total of 76 teachers and 412 students participated in the survey. For the teacher’s survey 70 teachers completed the entire survey i.e. 92.1% of the total sample, whereas for the students 407 of them completed the entire survey i.e. 98.7% of the total sample. Hence the data of only 70 teachers and 407 students were considered for the analysis. No incentives were offered for responding to the survey. The details about the survey was shared with the respondents. Completion of the survey was taken as a form of consent to participate.

The survey was done to get an understanding of the experience and perception of teachers and students about the recently introduced online mode of teaching. The survey results are divided into two sections, namely, perception of teachers and perception of students about online classes. The results for both are discussed separately.

Teachers perception about online classes

The teachers survey had items assessing three dimensions: online v/s classroom mode, personal factors and students’ factor during online classes. The results of the survey showed that 86.9% of the teachers reported that they preferred classroom teaching method more than online teaching mode. 11.8% preferred online classes.
Students perception about online classes:

The students survey had items assessing two dimensions: online v/s classroom mode and personal factors during online classes. The results of the survey showed that 87.1% of the students reported that they preferred classroom teaching method more than online teaching mode. 12.9% preferred online classes.

At Bethlehem University based on the results obtained from the survey and the perception of students about online classes, there was no difference between online learning along with smart learning compared to classroom in person teaching mode. Thus our findings contradict to a good extent with the above results. This is due to the total transfer of e-learning and the necessity that students are encouraged to use technology in education due to the lack of alternatives, which shows that there is no differences with regards to weather learning was conducted online or face-to-face.

Key Words

| Smart Learning               | It reflects how advanced technologies are enabling learners to digest knowledge and skills more effectively, efficiently and conveniently |
| Online Teaching Techniques  | The process of educating others on virtual platforms. This type of teaching involves live classes, video conferencing, webinars, and other online tools. |
| Smart Devices               | Interactive electronic media that understand simple commands sent by users and help in daily communication activities. Some of the most commonly used smart devices are smartphones, tablets, iPads, smartboard, smart glasses and other personal electronics. |

Quantitative Approach Refers to quantitative research which is the process of collecting and analyzing numerical data. It can be used to find patterns and averages, make predictions, test causal relationships, and generalize results to wider populations.

Data Collection and Analysis

The research used a qualitative approach and the survey was conducted through the GOOGLE form; the links were shared with the student through the Gmail. Science students at Bethlehem University participated in the E-learning survey. The study employed a cross-sectional survey method. In Figure 1, the students in different year levels 1st year (16.4%), 2nd year (25.5%), 3rd Year (21.8%) and 4rth year (36.4%) have participated in the online survey conducted from December to January 2021.
This research consisted of two parts, one tackled Online Teaching Strategies and the other investigated Smart Learning Strategies. In the first part different questions from which significant measures were observed. Examples are shown below:

1. Online technology tools came in handy as replacement to the software that you intended to use in person.

2. Did you feel that the smart learning technology used for online teaching and learning at BU was sufficiently adequate? Results are shown in Figure 3.

3. How do you rate the impact of smart learning tools and techniques (mobiles, tablets, laptops, video recordings ...etc.) in the learning and teaching process during COVID-19 period?

What is the effect of Smart Learning on you desire and passion for learning sciences?

We observed from the responses in the first part of the questionnaire on Online Teaching Strategies, a large number of students agreed that Online technology tools came in handy as replacement to the software that was intended to be used if learning was conducted in person. Also it was apparent that a large number of students expressed they feel that the smart learning technology used
for online teaching and learning at BU was sufficiently adequate.

Moreover, we observed from the responses in the second part of the questionnaire on Smart Learning Strategies, the highest number of student responses rated the impact of smart learning tools and techniques in the learning and teaching process during COVID-19 period to be more to the high range in the scale (1 Low – 5 High) as appears in Figure 4 above. Similarly, the highest number of student responses rated the effect of Smart Learning on their desire and passion for learning sciences to be more to the high range in the scale (1 Low – 5 High).

Table 4: Survey questions on Students perception of online classes and online smart learning tools v/s classroom teaching mode

<table>
<thead>
<tr>
<th>Question</th>
<th>Sufficient</th>
<th>Not Sufficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online technology tools came in handy as replacement to the software that you intended to use in person. How do you evaluate your experience?</td>
<td>83% Tools were sufficient</td>
<td>17% Tools were not sufficient</td>
</tr>
<tr>
<td>How was your overall experience with online teaching?</td>
<td>74.5% Very Good</td>
<td>25.5% Poor</td>
</tr>
<tr>
<td>Did you feel that the smart learning technology used for online teaching and learning at BU was sufficiently adequate?</td>
<td>81.8% Sufficient</td>
<td>18.2% Not Sufficient</td>
</tr>
</tbody>
</table>

| Compared to before COVID-19, how do you feel in general about your performance. | 70.3% Better | 29.7% Worse |
| How do you rate the impact of smart learning tools and techniques (mobiles, tablets, laptops, video recordings ...etc.) in the learning and teaching process during COVID-19 period? | 87.3% high | 12.7% Low |
| Do you feel that online smart learning is a practical way of developing your Self-reliance and self-learning skills? | 69.1 Yes | 30.9 No |
| Do you think that smart learning tools and techniques should be adapted to a large extent in the teaching and learning process? | 81.8 Yes | 12.2 No |
| What is the effect of Smart Learning on you desire and passion for learning sciences? | 80% High | 20% Low |
TESTING HYPOTHESES

First hypothesis:

H0: There is no statistical significance differences at the level of significant $\alpha \leq 0.05$ in using technology and software in learning and their desired passion for learning sciences students’ perspective of level of beneficence.

To test this hypotheses, we will use Kruskal-Wallis Test to compare medians of students’ perspective of level of beneficence of using technology and software in learning with The students’ desired passion for learning sciences.

<table>
<thead>
<tr>
<th>Ranks</th>
<th>During the COVID-19 period, how do you express your experiences using technology and software in learning?</th>
<th>N</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>What is the effect of Smart Learning on you desire and passion for learning sciences?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non Beneficial</td>
<td>9</td>
<td>22.06</td>
</tr>
<tr>
<td></td>
<td>Beneficial</td>
<td>40</td>
<td>28.19</td>
</tr>
<tr>
<td></td>
<td>Much Beneficial</td>
<td>6</td>
<td>35.67</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>55</td>
<td></td>
</tr>
</tbody>
</table>

| Chi-Square | 2.902 |
| df         | 2     |
| Asymp. Sig. | .234  |

Since the p-value (0.234) is greater than our chosen significance level ($\alpha = 0.05$), we fail to reject the null hypothesis. We conclude that there is no enough evidence to support our claim that there is statistical significance differences at the rate of $\alpha \leq 0.05$ between students’ perspective of level of beneficence of using technology and software in learning and their desired passion for learning sciences.
Second hypothesis:

H0: There is no statistical significance difference at the rate of $\alpha \leq 0.05$ in students’ recommendation of adapting the teaching and learning process attributed to level of beneficence of using technology and software in learning.

Both variables are categorical variables, this is why I used Chi-square to test this hypothesis.

The results:

| During the COVID-19 period, how do you express your experiences using technology and software in learning? * Do you think that smart learning tools and techniques should be adapted to a large extent in the teaching and learning process? Cross tabulation |
|---|---|---|---|
| | Yes | No | Maybe |
| Non Beneficial | Count | 5 | 3 | 1 | 9 |
| % of Total | 9.1% | 5.5% | 1.8% | 16.4% |
| Beneficial | Count | 16 | 6 | 18 | 40 |
| % of Total | 29.1% | 10.9% | 32.7% | 72.7% |
| Much Beneficial | Count | 3 | 1 | 2 | 6 |
| % of Total | 5.5% | 1.8% | 3.6% | 10.9% |
| Total | Count | 24 | 10 | 21 | 55 |
| % of Total | 43.6% | 18.2% | 38.2% | 100.0% |

| Chi-Square Tests |
|---|---|---|
| Value | Df | Asymp. Sig. (2-sided) |
| Pearson Chi-Square | 4.088a | 4 | .394 |

Since the p-value (0.394) is greater than our chosen significance level ($\alpha = 0.05$), we fail to reject the null hypothesis. We conclude that there is no enough evidence to support our claim that there is difference of statistical significance at the rate of $\alpha = 0.05$ in students’ recommendation of adapting the teaching and learning process attributed to level of beneficence of using technology and software in learning, as shown in the graph hereunder.
Third hypothesis:

H0: There is no statistical significance differences at the rate of $\alpha \leq 0.05$ between students’ overall experience with online teaching and their performance before COVID – 19.

The results:

<table>
<thead>
<tr>
<th>q12record * Compared to before COVID-19, how do you feel in general about your performance.</th>
<th>Compared to before COVID-19, how do you feel in general about your performance.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Worse</td>
<td>Same as</td>
</tr>
<tr>
<td>Poor Count</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>% of Total</td>
<td>14.5%</td>
<td>5.5%</td>
</tr>
<tr>
<td>Fair Count</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>% of Total</td>
<td>5.5%</td>
<td>3.6%</td>
</tr>
</tbody>
</table>
### Table

<table>
<thead>
<tr>
<th></th>
<th>Count</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>4</td>
<td>7.3%</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>25.5%</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>9.1%</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1.8%</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>43.6%</td>
</tr>
<tr>
<td>Excellent</td>
<td>1</td>
<td>1.8%</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3.6%</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3.6%</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1.8%</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>10.9%</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>29.1%</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>38.2%</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>25.5%</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>7.3%</td>
</tr>
<tr>
<td></td>
<td>55</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

### Chi-Square Tests

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>14.021</td>
<td>9</td>
<td>.122</td>
</tr>
</tbody>
</table>

Since the p-value (0.122) is greater than our chosen significance level ($\alpha = 0.05$), we fail to reject the null hypothesis. We conclude that there is no enough evidence to support our claim that there is statistical significance differences at the rate of $\alpha = 0.05$ between students’ overall experience with online teaching and their performance before COVID – 19.
Discussion and Conclusions

The development of smart learning has reached during pandemic situation a milestone with all students using smart devices for learning in unusual environments, becoming a growing trend in education and highlighting its relevance as pointed in previous studies (Dneprovskaya, Komleva, & Urintsov 2020; Wang & Nunes 2019; Zhu, Sun, & Riezebos 2016).

From the survey questions on student’s perception of online classes and online smart learning tools vs classroom teaching mode, a high percentage 83% of students indicated that online technology tools were sufficient. The overall experience of students with online teaching showed a very good level of 75%. Furthermore 81.8% felt that the smart learning technology used for online teaching was sufficient. Moreover, the students rated the impact of smart learning tools and techniques in the learning and teaching process during COVID-19 period with a percentage 87% high.

From our above analysis and observations, we could conclude that Online Teaching Strategies using smart devices and tools constitute a valid and very adequate means in the teaching and learning process during unusual and unpredictable times such as the COVID-19 period as well as the ordinary in person process.

Furthermore, we also would encourage students and teachers to get more engaged in using smart learning tools in online and in person teaching and learning of natural sciences at universities and teaching institutions.
English References


4. Azzi-Huck, K., & Shmis, T. (2020). Managing the impact of COVID-19 on education systems around the world: How countries are preparing, coping, and planning for recovery. (2020)


Arabic References

1. جراح، يوسف مفلح سليم (2020): واقع استخدام أدوات نظام إدارة التعليم الإلكتروني Blackboard في إعداد التقارير التكنولوجية لدى طلبة جامعة طيبة للتعليم الإلكتروني في المرحلة الثانوية من اتجاه نظر المعلومات والممارسات التربوية. المجلة العربية السعودية: رسائل ماجستير، جامعة أم القرى.


3. السفياني، مهار بن عمر (2016) "أهمية واستخدام التعليم الإلكتروني في تنمية مهارات وتفعيل تفكيك التلاميذ". المجلة العلمية للتقنية والاتصالات الإلكترونية، العدد، الجزء الثاني.

4. عبد الحسين، نزار صالح (2020): واقع التعليم الإلكتروني وعوامل استخدامه في التعليم العالي من وجهة نظر كلية الإمام الأعظم "الحمد الله". الجامعة العمانية، مجلة العلوم الهندسية وتكنولوجيا المعلومات، المركز القومي للبحث، غ 3، فلسطين.

5. القاباني، نجاح حامد عبد الواحد (2015): "تأثير اختلاف استراتيجيات التعليم الإلكتروني المستخدمة في الويب كويست في تنمية بعض مهارات التفكير واتجاه نحو العلم الإلكتروني لدى طلاب تكنولوجيا التعليم كلية التربية جامعة السلطان قابوس". المؤتمر الدولي الرابع للتعليم الإلكتروني والتعليم عن بعد، الرياض.


APPENDIX A: Survey Questionnaire

I. Questionnaire on Online Teaching Strategies

1. Gender
   a) Male
   b) Female
   c) Other

2. What level of study are you currently pursuing?
   a) First Year
   b) Second Year
   c) Third Year
   d) Fourth Year

3. Has your institution closed its campus due to the COVID-19 crisis?
   a) Yes
   b) No

4. During what period did your institution close its campus?
   Short Answer

5. With respect to the decision to close campus and move to online education, do you feel your institution's decisions were made?
   a) Too Quickly
   b) Too Slowly
   c) In a timely and prudent manner

6. Has your institution moved to virtual instruction due to the COVID-19 crisis?
   a) Yes
   b) No

7. Ability to conduct your studies
   a) Same as before
   b) Worse than before
   c) Better than before

8. Ability to socialize (1. Poor – 5. High)

Personal Experience

10. Online technology tools came in handy as replacement to the software that you intended to use in person. How do you evaluate your experience?
   a) Tools were very sufficient
   b) Tools were quite sufficient
   c) Tools were not sufficient

11. Please help us understand the range and diversity of experiences by sharing any further information on your general situation here.

Long Answer

12. How was your overall experience with online teaching?
   a) Excellent
   b) Good
   c) Fair
   d) Poor

II. Smart Learning Strategies

13. What smart learning tools and software did your institute used to conduct teaching during COVID-19 period. (More than one choice)?
   a) Online educational platform such as Moodle.
   b) Online Video, Voice and Graphics software.
   c) Virtual Meeting Platforms such as Google Meet, Zoom and MS Teams.
14. Did you feel that the smart learning technology used for online teaching and learning at BU was sufficiently adequate? (1. Poor – 5. Excellent)

15. Compared to before COVID-19, how do you feel in general about your performance.
   a) Worse
   b) Same As
   c) Better
   d) Much Better

16. During the COVID-19 period, how do you express your experiences using technology and software in learning?
   a) Non Beneficial
   b) Beneficial
   c) Much Beneficial

17. How do you rate the impact of smart learning tools and techniques (mobiles, tablets, laptops, video recordings ...etc.) in the learning and teaching process during COVID-19 period? (1. Low – 5. High)

18. Do you feel that online smart learning is a practical way of developing your Self-reliance and self-learning skills?
   a) Yes
   b) No

19. Do you think that smart learning tools and techniques should be adapted to a large extent in the teaching and learning process?
   a) Yes
   b) No
   c) Maybe

20. What is the effect of Smart Learning on your desire and passion for learning sciences? (1. Low – 5. High)

  d) Google Apps
  e) Other