Application of MS Excel Software in The Teaching and Learning of Anova Topic through Google Meet

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ARTICLE INFO	ABSTRACT
	Covid-19 pandemic has disrupted the face-to-face learning process of Malaysian students including the Gifted and Talented (GT) students. Since then, many applications have been used for online learning and one of the most popular is Google Meet. This study aimed to measure the level of understanding of GT students on the application of Microsoft Excel software in the online teaching of ANOVA topic. In addition, the study also examined the perception of GT students towards the application of MS Excel software in the teaching and learning of ANOVA topic through Google Meet. At Pusat GENIUS@Pintar Negara, UKM, the topic of ANOVA is taught to form 4 students (aged 15 and 16) who have high level of intelligence and are identified as gifted. This study used a survey design based on an observation checklist. A total of 71 GT students were selected through a simple random sampling technique. This ANOVA topic is taught for two months through the Google Meet application. At the initial stage, students were given explanations related to the concept of the ANOVA topic and students had to complete a mini-research using MS Excel software. At the end of the study, students had to produce a poster and present all the mini research findings to the lecturer. The level of students' understanding was measured through observation checklists for the research mini-presentation. Findings show that 60% of students have an excellent level of understanding, followed by 25% in the good category, 11% in the average category and 4% in the satisfactory category. The responses to the student perception questionnaire on the application of MS Excel software proved that 95% of students agreed with the application of MS Excel in learning improved students' understanding of concepts, motivation and achievement. Further research could be carried out on the application of MS Excel software to at an early stage so that students can apply these skills in the working world later.

1. Introduction

Face-to-face teaching and learning have shifted to online. This transformation occurred when school institutions had to be shut down and educators had to turn to other alternatives, which is to

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use Google Meet as an online learning medium. The Google Meet application has become an important application for educators in ensuring understanding of concepts to students.

The Malaysian Ministry of Health Statistics Report (2021) showed a total of 512,091 positive cases and a total of 2,248 people died due to COVID-19 in Malaysia. The spread of the Covid-19 epidemic had an impact on socioeconomics as well as changes in the education system around the world [11,19].

The effects of the Movement Control Order (MCO) implemented by the government since March 2020 had caused students to undergo teaching and learning process online at home. Although teaching and learning activities need to be conducted online, educators need to apply various interesting teaching methods to ensure that students understand a topic well. Therefore, educators need to be prepared to accept changes so that the teaching and learning process becomes more fun and able to meet the needs of students. Teaching strategies that involve creative and interactive teaching, the use of software or teaching aids, and group or student-centered discussions need to be implemented to increase student motivation, understanding and achievement. The method of using the latest technology such as WhatsApp application which is generally easy to use is also very beneficial and facilitates learning which is more effective despite some constraints [5].

However, studies related to student understanding and perception in the context of Gifted and Talented students (GT) are still not widely conducted, especially involving the topic of Analysis of Variance (ANOVA). Therefore, this study aims to measure the level of understanding of GT students on the application of Microsoft Excel software in the teaching of ANOVA topic online. In addition, the study also examined the perception of GT students towards the application of MS Excel software in the teaching and learning of ANOVA topic through Google Meet. Hence, the first objective of this study is to measure the level of GT students' understanding of the application of MS Excel software in learning ANOVA topic through students' mini research assignments. The next objective of this study is to examine the perception of GT students towards the application of MS Excel software in learning ANOVA topic through Google Meet.

2. Literature Review

Technology is one of the most important elements that needs to be integrated in the education in this country. The development of technology has given space to a variety of teaching aids such as software that are increasingly used to help the online teaching and learning process. Technology integration skills in teaching and learning process can help educators perform their duties more creatively, innovatively and effectively in improving the quality of teaching and learning process and students' understanding.

The use of software in teaching and learning process is an innovation from the conventional way of teaching. The use of technology such as applying certain software in teaching and learning process can improve students' excellence if used in the right way due to its ability to provide students with broader access to knowledge and information. The use of software in teaching and learning process of Statistics helps lecturers to provide easy understanding to students. MS Excel software is a free software developed by Microsoft and students do not need to use the internet when using this software. The use of advanced equipment that is suitable for 21st century learning and student interests should be given priority.

Jokić and Takǎci [8] argue that teaching and learning methods that use software benefit students compared to traditional teaching methods. Traditional teaching methods will hinder students' understanding of the concepts learned because they focus more on theoretical aspects [6,13].

Statistics is one of the branches of science in the world of Mathematics. Most students consider it to be very abstract [20] because they cannot see its applications in solving daily life problems [9]. Traditional teaching is more geared towards memorizing formulas, memorizing each step with a set of correct answers, training students to answer routine questions according to the exam format and teacher-centered teaching and learning [10,21]. The result of this teaching method has caused students to become passive recipients of Mathematics, easily bored and unable to concentrate fully during the learning process [7,13]. This makes Mathematics a difficult subject for students [17]. Faced with the negative perspective of students towards the subject of Mathematics, educators as facilitators should consider a paradigm shift in the context of teaching and learning. The application of MS Excel software in teaching and learning process can overcome students complaining that mathematics is difficult to understand and boring [14].

3. Methodology
3.1 Observation Checklist

This study uses a quantitative research approach in the form of a survey and observation checklist. Data on observation were collected throughout the teaching and learning of ANOVA topic. The lecturer observed the poster presentation of the student mini-research results using a checklist. Student perception on the application of MS Excel software was collected using questionnaire. The questionnaire was used to obtain information on students' perception and satisfaction of the application of MS Excel software in the teaching and learning process at home. This study involved 71 Form 4 students (aged 15 and 16 years) with high level of intelligence and have been classified as GT. The data obtained were analyzed based on descriptive analysis using SPSS Version 26 software to obtain the mean, side score and also the frequency for the distribution of respondents and see the level of understanding and perception of students.

Table 1
Phases and Implementation of Student Mini Research

Phase	Students' activity	Lecturer	Assessment
Before learning	Students find information on ANOVA topics on the website.	Students were briefed on the concept of ANOVA topics and how to analyze data using MS Excel software through the Google Meet medium.	Lecturers evaluate students through the learning process of students analyzing raw data.
While learning	Perform concept discussions analyzing data through tutorial training by using MS Excel software with students and lecturers through Google Meet.	Lecturers provide tutorial training and guide students to analyze raw data using MS Excel software.	Lecturers evaluate students through tutorial training when students analyze raw data using MS Excel software.
After learning	Students need to conduct a mini-research using MS Excel software. At the end of the study, students need to produce posters and present the findings to the lecturer.	Measure students' level of understanding of the concept of ANOVA according to the observation checklist during the mini-research presentation.	Lecturers evaluate students through mini-research presentations and poster.

3.1 Student Perception Questionnaire Instrument

The study used a survey design. Non-probability sampling technique was used in this study because the purpose of the study was not to generalize the findings to other population. This study is a descriptive study aimed at providing an insight into the perception on the use of MS Excel software through Google Meet among students. Study respondents consists of 71 GT students at GENIUS@Pintar Negara Center, UKM who are 15 and 16 years old. This questionnaire was adapted from the items in the Student Perception Questionnaire Instrument on web-based Mathematics solution learning with a constructivist approach by Leong [12]. The total number of items used in this questionnaire is 38 items. The value of reliability coefficient (Cronbach's Alpha) was high and more than 0.7 which is 0.887, to consider the items has a good internal consistency based on Hair [4].

4. Results

The first research objective is to measure the level of GT students' understanding of the application of MS Excel software in students' mini research assignments. Students' achievements were analyzed based on the score records recorded in the observation checklist of the students' mini-presentation presentation. The findings showed that 60% of the students showed an excellent level of understanding in applying MS Excel software in learning ANOVA topic, followed by 25% recording the good category, 11% the average category and 4% the satisfactory category as shown in Figure 1.
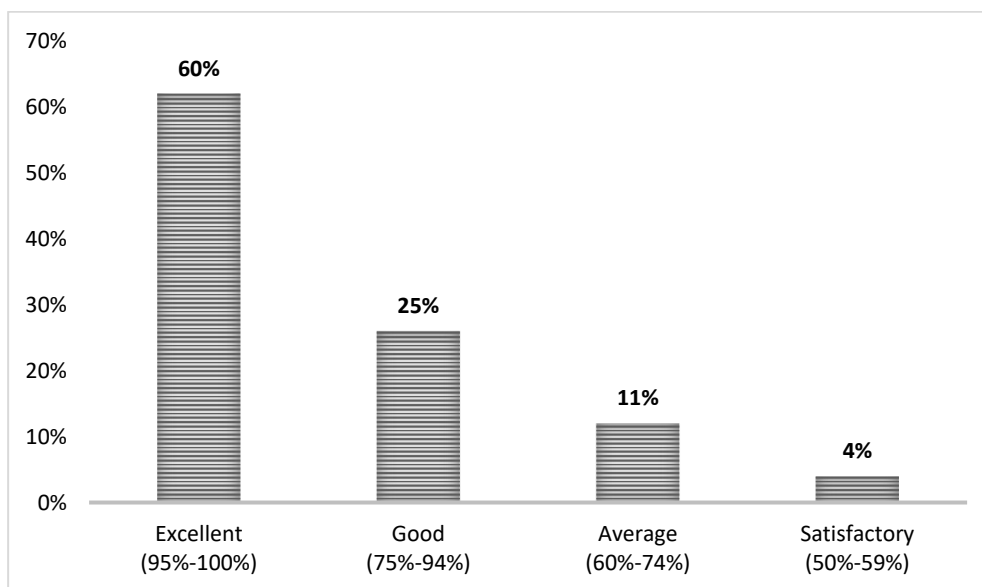
Fig. 1. Level of student understanding of MS Excel software application

Findings for the second objective show that students have a positive perception towards the application of MS Excel, where 97% of the students believe that the application of MS Excel helped them to solve Statistics questions easily. Consequently, 95% of the students believe that the application of MS Excel creates an interesting learning environment, 94% think that the application of MS Excel is an effective method for interactive learning, and increases students' interest in the Statistics course, while 93% of students say that using the software makes them more active in class and improves their understanding of the ANOVA topic.
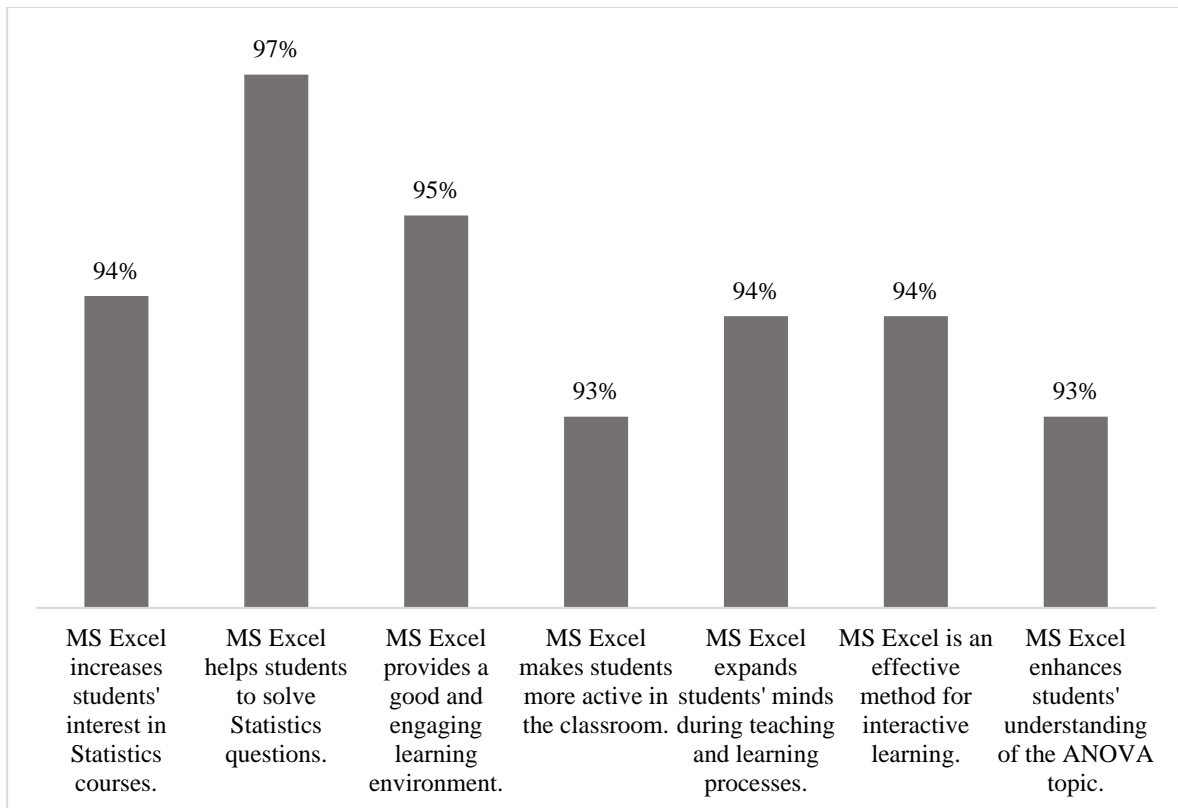
Fig. 2. Student perception on the application of MS Excel Software in learning statistics

The open responses of the students' opinions also show compatibility with the student perception where the students gave positive response of the application of MS Excel software in the mini-research assignment. However, the students also suggested that the application of MS Excel software should not be focused on the topic of ANOVA but could be used in every assignment on the topic of Statistics so that students' understanding could be improved. Students also suggest that lecturers prepare brief notes related to data analysis procedures using MS Excel software.

Table 2
Open response of students' opinions in the application of MS Excel software for research mini assignments

No.	Excerpts
1.	I am quite satisfied with learning MS Excel in the Statistics course.
2.	I want more applications of MS excel in life other than the use of ANOVA to be revealed
3.	Thank you Miss Su I can learn a lot because of miss.
4.	The use of MS Excel in statistics is very interesting and has increased my interest and understanding of the topics studied.
5.	MS Excel makes my tasks easier and I feel satisfied when I get the work done quickly and in an organized manner
6.	MS Excel makes my learning of statistics 10 times easier
7.	I like this topic and for me the use of MS Excel in the subject of Statistics is very helpful and easy
8.	Provide more tricks or shortcuts that can be used in excel.
9.	Statistics made me interested in becoming a data analyst
10.	The teacher can prepare a step or work path to use Excel in pdf form. Because there are some students who will not focus during class. The pdf can help them to learn on their own.
11.	I feel very satisfied to be able to increase my knowledge about MS Excel and hope to be able to explore more of MS Excel to be applied in daily life
12.	I want to learn more about statistics in MS excel
13.	I think that exposure to MS Excel is very important to be used in general and not only in Statistics. This is a good initiative especially in equipping students with digital skill which is useful in the work environment.
14.	I like to use excel
15.	ANOVA project is very interesting and more can be done
16.	Maybe for some students, they need the lecturer to explain in more detail and slowly
17.	Among the most interesting things in the Statistics course!
18.	Give more projects that we can apply the use of excel to improve our understanding.
19.	More real-life applications
20.	I wish I had more time to study statistics because I really like this field and want to become a data analyst
21.	I like to use MS Excel in the Statistics course. I always feel enthusiastic when I want to do a task through MS Excel.
22.	Learning MS Excel in the Statistics course is satisfactory. This is because learning about MS Excel revealed to me how to handle a lot of data. My suggestion is that teachers can divide students in small groups and hold many more projects or mini researches that apply MS Excel knowledge. Students will explore further while enjoying the learning process.
23	Learning ANOVA using MS Excel is very interesting and fun.

4. Discussion

4.1 The level of GT Students' Understanding of the Application of MS Excel Software in Student Mini Research

Before the start of the lesson, students were given a task to get information related to the topic of ANOVA on the website. Then, the lecturer explained the concepts and topic of ANOVA and how to analyze data using MS Excel software through the medium of Google Meet. The lecturer had the opportunity to assess students through the learning process of students analyzing raw data. During learning, students were given tasks to analyze data through tutorial exercises using MS Excel software with the lecturer through Google Meet. Lecturers evaluated students through tutorial exercises where students analyzed raw data using MS Excel software.

After learning, students were given the task to complete mini research using MS Excel software. Students also had to produce a poster and present the findings to the lecturer. The level of students' understanding was measured through observation checklists in the mini research presentation and poster construction. The student's presentation clearly illustrates the mastery of the application of MS Excel in learning the ANOVA topic. The poster presentation in this mini research task gives each

student the opportunity to undergo face-to-face teaching and learning despite of being conducted online as suggested by Bergmann and Sams [2]. It enhanced mastery and motivation the use of technology makes it easier [16]. The integration of technology also brings the field closer to students and thus allows all students to understand important concepts according to their own phases [1]. Students' comprehension of courses like statistics in secondary school math can be improved by using Microsoft Excel as a teaching tool [3]. One of MS Excel's advantages over other products is its accessibility and ease of use.

Overall, almost 96% of GT students can understand the concept of ANOVA and are able to analyze data using MS Excel software very well. The application of MS Excel can improve students' visualization skills. Students do not face problems in analyzing the data and feel that learning the topic of ANOVA becomes easier by using MS Excel software. Understanding in applying MS Excel software can also help improve students' understanding in analyzing data and then completing mini-research tasks with excellence.

4.2 Student Perception of the Application of MS Excel Software in Teaching and Learning the Topic of Analysis of Variance (ANOVA) through Google Meet.

Analysis of the data from the questionnaire show that students have positive perception and attitude towards the application of MS Excel as one of the student-centred teaching and learning strategies. This shows, through the application of MS Excel software, the teaching and learning process becomes more interesting and encourages students to explore the concept of ANOVA in more depth. If more exposure is given to students related to the application of MS Excel software, students will better understand the concept of Statistics which students found to be quite abstract and difficult. Based on Warner *et al.,* [18] believe that Excel is a useful tool for teaching elementary statistics course.

Overall, this study proves that students have a high interest in applying MS Excel software in teaching and learning sessions even online. Students also think that MS Excel software has advantages such as making teaching and learning sessions more active, responsive and also creating collaborative sessions between students and lecturers. However, the findings of the study also show that 25% of students cannot master the application of MS Excel well because this MS Excel software is not widely used by all lecturers as one of the teaching strategies. Therefore, an effort to introduce the application of this MS Excel software to give exposure to students at an early stage so that students can apply these skills in the working world later.

5. Conclusion

In conclusion, the exposure of the latest learning technology such as MS Excel software really needs to be emphasized in parallel with aspects of teaching and learning that change according to the new norm. With the availability of various technological skills that are applied in this teaching and learning session, it allows educators to diversify appropriate and interesting approaches and methods to be applied in the classroom even virtually. Therefore, all interested parties such as the ministry and also the institutions involved need to take the initiative by providing various facilities such as facilities to access the internet in the best possible way so that the students and educators involved can apply the latest methods in line with teaching in the 21st century. Teaching using MS Excel software is an innovative method in line with the world's technological progress.

There is no doubt that the generation of this era is closer to gadgets & technology making conventional learning irrelevant. Educators need to work hard to ensure that the teaching and

learning process is in line with the pace of technology so as to attract students' interest and increase student motivation. MS Excel is a software that attracts students' attention to be explored in solving statistical problems.

In general, it can be concluded that the application of MS Excel software can be used as one of the alternatives in teaching mathematics to improve students' understanding and achievement. Through the findings of this study, it is hoped that this study can help educators to improve the standard and quality of systematic and proactive educational practices and become a reference for mathematics educators who are interested in using MS Excel software in the process of teaching and learning mathematics even online.

Acknowledgement

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