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Virtual Monitoring as a Digital Delivery and Assessment Impact on Students' Learning*

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Abstract

In this paper, we identify the importance of certain measures for a smart, sustainable education and the assessment impact on student. By harnessing and harmonizing the creative, innovative potential of our students during COVID-19 as the peak of digitalization in history of education. Technological tools like ICT, IoTs, Big Data and Internet usage skills are specifically examine. In our today's world of Digital era that has generated new functions for our societies and most importantly on old theories that were built on non-digital platform standards. It has been observed that online studies really fit in to the smart productivity and consumption pattern of our today's era for students. This study identify areas that restructuring, should include in terms of tools like consumer-productivity need and effectiveness strategies. Sample questionnaires were run to ascertain student's desire for online studies. It has been observed that interpersonal relationships is getting wider and more interesting desire for continuous digitalize education found amongst various learners. With the important aim of the study which is to see more machines to man than more men to machine as a tool to enhance quality education and ease in assessment of skills, pattern and tools for measuring effectiveness and satisfaction of knowledge acquired. In this paper, new solutions are proposed to keep the inclusiveness and connectivity amongst students and teachers.

Keywords: Virtual delivery & assessment impact, Digital education, ReMarkable Prototype Notebook & ICT Tools

Introduction

Evolution of knowledge has been greatly observed in recent years. In the past, education of student was about the exchange of knowledge between students and teachers, seniors, agents or reading books. With the development of advanced technologies, new tools have emerged that help students to acquire knowledge faster. Nowadays, education is about the collaboration with students, enabling new type of interaction (Johnson et al., 1997). Online studies give students the opportunity to learn at any time. Assessment is possible with online classification of students into groups. Tables are easier to create and monitor students' performance (Amelung et al., 2010).

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Assessment is a very important element in learning process and all learning processes give support for assessment (Kundu & Bej, 2021). Following the growth and extended impact of Covid-19, learning have been observed and seen taking advance technical approach. Before Covid-19, technological activities have been largely seen within the business environment. With modern technology, it is possible to include ReMarkable Prototype Notebook device to the various platforms to help students. ReMarkable Prototype notebook can help both the pupils, secondary, higher education and people living with impairments and hearing challenges. ReMarkable Prototype Notebook is a suggested digital type electronic device that can be used to draw, write and paint using a pen-drive-type pen.

Digital education has come with a lot of changes in the academic discipline. There is an increase in digital finding, inquiries, quarries and interaction. Many students have found recognition in online articulation because it is convenient. With modern technology and pandemic impact, traditional system of learning is almost out of place. It is rare to find students registering for library during Covid-19 because of need for safety precautions associated with the virus. Also many universities moving remotely have convicted the need for digital reliance. In (Newman, 2022), it is shown that a lot of advantages associated with online learning has been observed amongst students and a lot of disadvantages also observed at the level of institutions.

Modern techniques and studies show that very few advantage of online learning support the needs of people living with special needs (Hartman-Caverly et al., 2023). The survey from this scholars indicated that little attention has been given to people living with special needs. It is very important to take into consideration the need of people living with visual impairment, no hands, communication challenges and inability to walk. With modern systems, there is little effort to secure and accommodate people with impairment challenges. According to a survey by (Pal, 2022), he said findings show that self-learning is more attractive to students than teacher-student classroom learning. The authors concluded by saying that there is need to developed systems to follow-up students self-learning than allow them on their own. Following the disruption of traditional learning system by Covid-19, more and more self-learning culture has been impose into many learners. According to (Kummitha et al., 2021), corona virus has greatly affected learning institutions. There is little spending to infrastructure but very huge spending on digital systems. Modern system batlle with how to hire skillful technicians, provide good internet access and protect students intellectual knowledge.

Objective of study

These objectives are carefully collected from the most common difficulties observed during online era. They are closely related to questionnaires sample to guarder real facts. These objectives are carefully drawn from various challenges observed by this study. These objectives are frame following finding from students about online studies. According to (Viitaharju et al., 2021), they make a comparative analysis that help to determine readiness of the world for online studies. I has been observe that not all are ready for online studies. Mostly the developed countries with advance technology are able to support online education. Following the challenges of Covid-19, very few developing countries have been able to cope with online studies. This studies assessed inclusiveness at the level of people suffering from disability like blindness.

1. Encourage inclusive education for all
2. To blend the traditional writing notebooks to digital standards
3. To create system that support effective learning for pupil of primary and secondary who can't use computer.
4. To closed the gap that technology is creating between teachers and students.
5. To suggest modern method of determining effectiveness amongst students
6. To create a method where mathematical formulas, drawings and other pure science formulas can be put to real live and in class sessions.

Research Questions

Online studies has come to stay. Even though with majority acceptance from both institution and students, there are still many wandering about. Therefore, there is a need to achieve at least 90% acceptance of online studies for the general benefit for all and not selected few. According to (Tang et al., 2021), said online studies widen gap between parents and children as it push students into confinement. They said too that digital studies promote inequality and infringement amongst students. This study uses questionnaires to find out if actually online study has widen gap amongst students and teachers. These questionnaires are able to help build a system that reflect the need of students.

1. Are online studies very convenient for you?

2. Has online studies widen the gap between you and your teachers?
3. Has there been possibilities to demonstrate understanding of lessons during online classes?
4. Can digital notebook Remarkable prototype help promote inclusive online learning for all?

Challenges of Present Day Virtual studies

Following the coming and growth of coronavirus, many learning instructions have been force to go virtually in order to keep functioning. Many institutions have acquire new techniques and new tools like zoom meeting, Microsoft team, skype, WhatsApp, Webinar and many others. Even though with available tools, it's still difficult to follow up students during class activities.
It has been observed that even though with available technology, students still can't be actively seen during studies. Following lack of effective mechanism to monitor and determine if exactly it is the student behind the screen or not.

There is been very little possibility to detect real present in classes. Following remote learning it's difficult to access if students actually write exams by themselves or they are being help by others. Modern systems are still following up new telecommunication techniques to adequately monitor students. It has been observed that event with the used of camera, it is not possible to ascertain real presence during the class.

It is difficult to manage students sleeping during classes. Even with availability of cameras and audio signals. Modern techniques like breakout rooms that allow students to discuss online on topics and assignments, are still not really effective. Microsoft Team has and Zoom meeting have come up with systems where students can be automatically divided into groups and place on different location.

Exhibitions of students in class has become more of homework or assignments. In old days when studies were carried out traditionally, students used to demonstrate their understanding of subjects on the black board like where I come from. Today it is not easier as it is.

Students writing skills are still far from being monitor because with ability to type. It is hard to determine if students can write well or not. Even though modern technology in making it possible to operate paperless.

Predominant speaking. With online studies, speaking is more observed than writing. Writing is observed mostly during test or exams since books are limited. Even with availability of storage system, it is obvious students need to write. Writing help students to easily memorize.

Motivation has been imbalance during online studies. Students who are active in communication earn more bonus marks than students who know only how to write. Non speaking students have experience very low rating during online classes. In education system, there is open equal access to all students. Following the coming of covid-19, learning has been predominantly of communication than writing. With nowadays modern system you can copy and paste, share, screenshot, scan, upload or download.

Non inclusiveness of studies. Following the coming of online studies, blind people who used cardboards to write and study have been left out. With online studies it not possible for people with impairment to study. Many other persons with hearing difficulties have not been able to cope with online studies.

Education is predominantly becoming more of theoretical. Following online studies, there is no or little classroom activities. Most physical and practical activities were done on classroom or field. Today, more of theory is observed due to social and remote education.

Method And Material Applicability

This study apply the recruitment criteria of (inclusion & exclusion criteria).The study make use of both primary and secondary data. Data was collected from published audited annual reports, articles, journals, press briefings, which were published on the website. Also an ArcGIS Online Survey was conducted and sample respond collect and analyzed. Study procedure (sample size, sampling techniques). Data from ArcGIS Online Survey was collected and management. Data was analysis statistically with techniques from ArcGIS Survey Software, published and answers evaluated and subsequent interpreted. The collected data was then sorted and verified for accuracy. Both quantitative primary and secondary data using descriptive statistics to show measures of tendencies such as mean, tables, and percentages were exported to the paper.

Virtual monitoring system device for online classroom

Following the advance development of technology to help virtual class room to become a reality, there are still limitation. The figure below is a propose system to help teacher access effectiveness of students during online studies. With Remarkable, it is possible for student to write using modern pens with modern Remarkable tablets. E-assessment start from motivation to design activities to creativity to testing, delivering, outcome of testing and evaluation (Zheng et al., 2020). Digital education is more convenient and cheaper. Learning institutions are able to save a lot of money from employment and taking care of student's safety. According to (García-Peñalvo et al., 2021), more secure approach has been put ahead before real classroom. That this has really help to reduce the amount of hazard during physical experience.

Advantage of ReMarkable Prototype Writing books

There are many coming to be opportunities for a system that can help promote inclusive learning for all. Technology is giving equal opportunities for each and every one of us. It is up to the users and developers to think on how possible it can be that equal benefit is put to the public for everyone. Following the emergence of covid-19, many educational systems have gone digital. Many who can assess and make used of it at the comfort zones are very happy but those whom cant are very disappointed. Kind attention is given to people suffering from impairment. This type of people have been the most affected due to social distancing measures. The following advantages are there to exposed some lapses during covid-19 assessment of students and present a way forward

Ability to detect student's handwriting. There has been a lot of cheating during covid-19 both at the examinations and class effectiveness. ReMarkable Prototype digital writing book can help monitor students by capturing their handwriting. This prototype digital notebook will be like the normal book that scripts are not type but uses a pen. This system will be connected to the internet and access given to the teacher that can quickly differentiate his or her student's handwriting like during in person classes. This prototype notebook will have a memory that records student's performance. If during exams if changes are observe or writing style changes. It is easier to detect. With the present system where students type in or copy and paste, it is difficult to detect cheating during exams.

Ability to Prevent Cheating during examples. The ReMarkable prototype notebook can be designed in a way that doesn't allow copy and paste. With the inability to copy and paste, students are force to study. Teachers are able to differentiate students writing. It is good to build such a system that help reduce cheated as it now common during online studies.

Prevention of Copy and paste Answers. This suggested system will not accept copy and paste from different devices. The system will be able detect copies information from others using handwriting detective memory. The system will be programmable that can be control from central system. The system can give access to parents to monitor their children and help them.

Possibility to write mathematical, technical drawing, artistically, and many other technical examples. It has been observe that modern online system have not been able to solve the problem of mathematical needs. With the development of a notebook prototype system, it possible to use the traditional pen to solve solutions just like with the normal books.

Possibility of Persons living with impairment to actively participated during studies. From many year, people living with vision challenges have face a lot of problems. Following a long research efforts, special books where develop for them. Following the coming of covid-19, most of this blind people with future plans and dreams have been limited. A ReMarkable prototype notebook can greatly help integrated the learning of such people.

To create a new digital book that students primary schools who don't know how to write can learn. Traditional education was a center where pupils' especially primary school children learn how to write. Most of this children learn how to hold a pen, spell, and draw. This system was a place where some of this children developed great opportunities to become artist. Following the coming of Covid-19, paper work is fast disappearing. With ReMarkable prototype notebook, it is possible to still help this children write and copy notes, draw, paint, solves mathematical solutions.

Description of ReMarkable Prototype Notebook

ReMarkable Prototype digital writing book can help monitor students by capturing their handwriting. This prototype digital notebook will be like the normal book that scripts are type using a digital pen. This system will be connected to the internet and access given to the teacher that can quickly differentiate his or her student's handwriting like during in person classes. This prototype notebook will have a memory that records student's performance. The prototype notebook will have a sheet that allow drawing, painting, ability to erase and a memory. The prototype will have a battery that can last for some time. The prototype note book will have a screen and sheet numbers are equivalent to memory size. If during exams if changes are observe or writing style changes. It is easier to detect. With the present system where students type in or copy and paste, it is difficult to detect cheating during exams

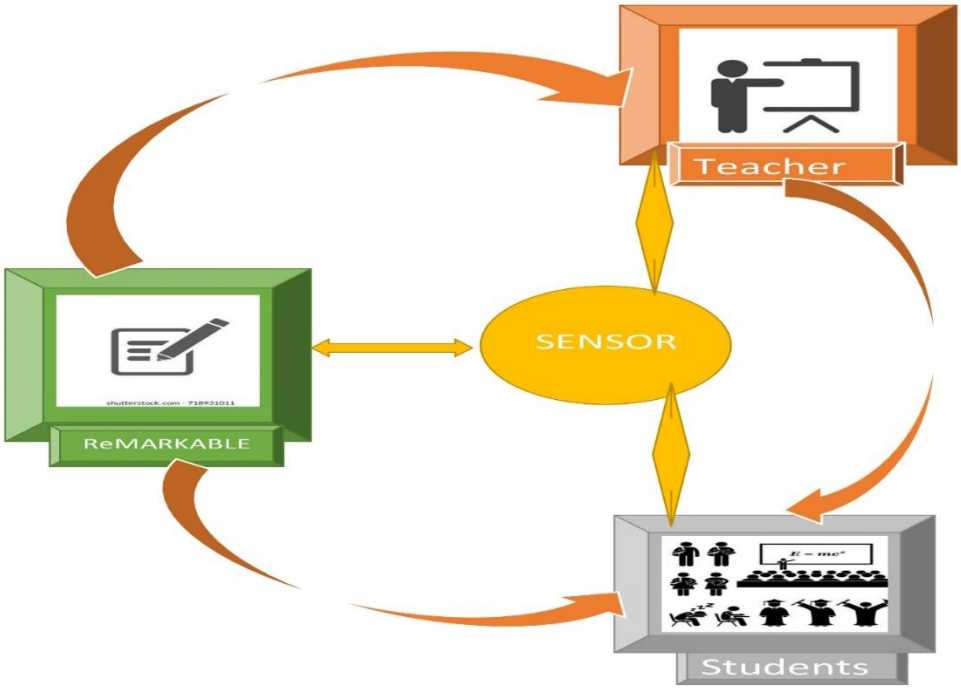


Figure 1: ReMarkable prototype device for online classroom, source, (Mah 2021)

From the above (fig 1), there is a device class ReMarkable that is like a notebook, It permit students to write with a pen like the normal traditional writing notebook. This suggested system is connected to the internet that allow students to draw, make short notes, save, and solved equations with the local traditional system like with normal notebooks.

The suggestion above allow the teacher to monitor all students, see their activeness in classroom, and monitor their participation both in writing, speaking and recordings. The suggestion above have a sensor that communicate with teacher if a student is writing or active or not. This system will help both primary, secondary and higher education. Studies of students is not only monitor during examination but during class activities. Blind persons can also use the system to write and study online or people with hearing challenges. Online studies is like a mirror that help the teacher to monitor and determine who is able and not with help of modern tools with students' efficacy on various platforms (Ullah et al., 2021). According to (Khlaif et al., 2021), online studies is a cross-sectional studies that include students' observation samples or the entire study population. Many educational institutions have face a lot during pandemic that has affected the face to face classroom activities. Many universities are fighting to meet up with this challenging situation (Khlaif et al., 2021). Covid-19 has created a lot of changes that are still huge steps for learning institutions to handle. Technology is on the other hand promising the various learning systems on new technologies.

Assessment and evaluation Possibility Proposed System

The system give possible ways to monitor reword and assessed students. Studies have been really challenging during online era. There is need to look for solutions to help cope with such a surprised system and way of life introduce

by covid-19. According to (Summers et al., 2022), the biggest challenge during Covid-19 has been the online assessment of the learning process. Many institutions have allow studies now in the hands of available online platforms. There has been difficulties in even evaluating the teachers. With the propose system it is possible to make assessment of teachers and lecturers at the same time.

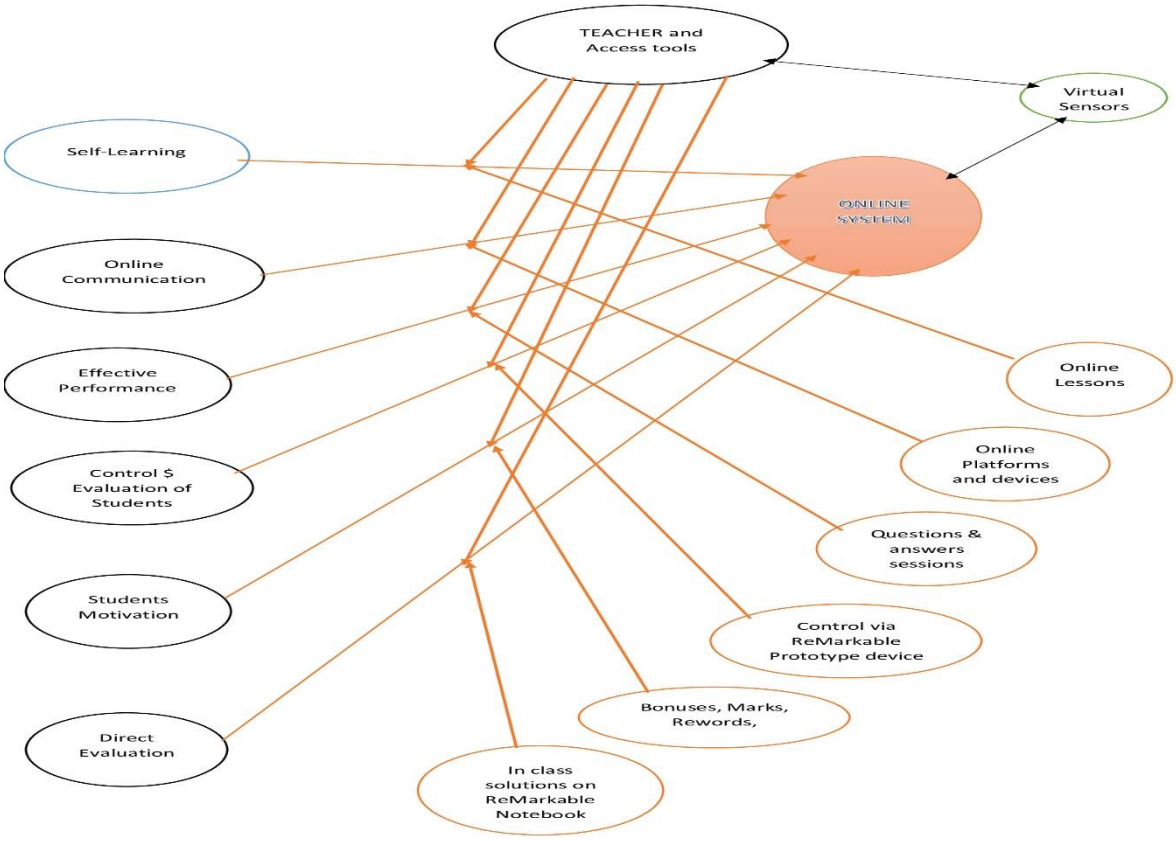


Figure 2: assessment and evaluation proposed system, source: (Mah 2021)

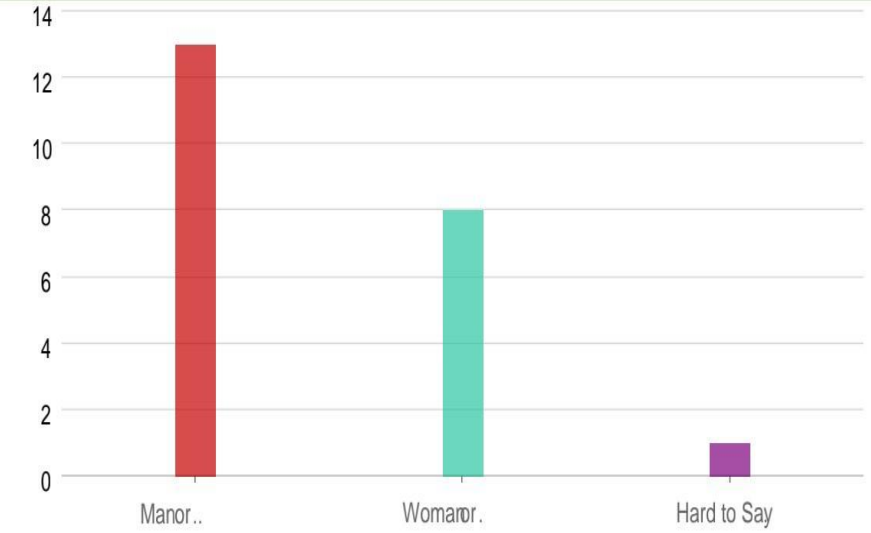
From the suggested system above, the teacher has direct access to students' platforms and camera view of the student's notebook prototypes. At any point in time the teacher can know whether a student is active or is participating in classes. The system allows teachers to send questions to students at any point in time.

Survey of Determinant of Virtual monitoring as digital delivery of Online Studies

This section of the study analyze and interpret findings from field survey to ascertain the objectives of the study. This section helps the study determine the hypothesis of study. Many challenges were observed and sample questions were put together to find out the real situation from the present situation. The following data were collected using ArcGIS online survey. The self-explanatory survey deeply explains the need and desires of public. The need for more research on this domain.

A Survey to Determine "Virtual monitoring as a digital delivery and assessment impact on students' learning"

Gender



Answers	Count	Percentage
Man or Mężczyzna	13	59.09%
Woman or Kobieta	8	36.36%
Hard to Say or Ciężko powiedzieć	1	4.55%

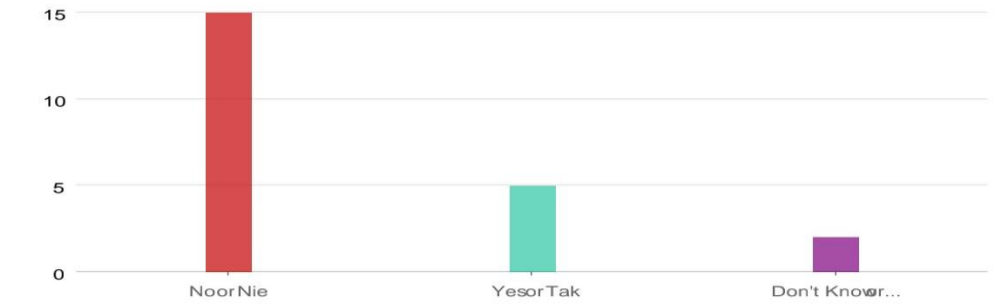
Answered: 22 Skipped: 0

1) **Are online studies very convenient for you?**

Answers	Count	Percentage
Yesor Tak	21	95.45%
No or Nie	1	4.55%

Answered: 22 Skipped: 0

2) Has there been possibilities to demonstrate understanding of lessons during online studies?



Answers	Count	Percentage
No or Nie	15	68.18%
Yes or Tak	5	22.73%
Don't Know or Nie wiem	2	9.09%

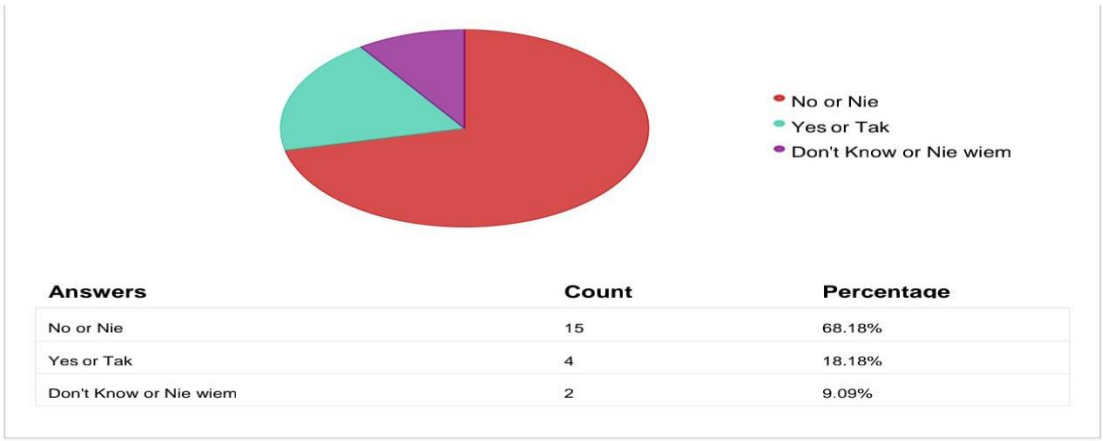
Answered: 22 Skipped: 0

3) Can digital notebook Remarkable prototype help promote inclusive online studies for everyone?

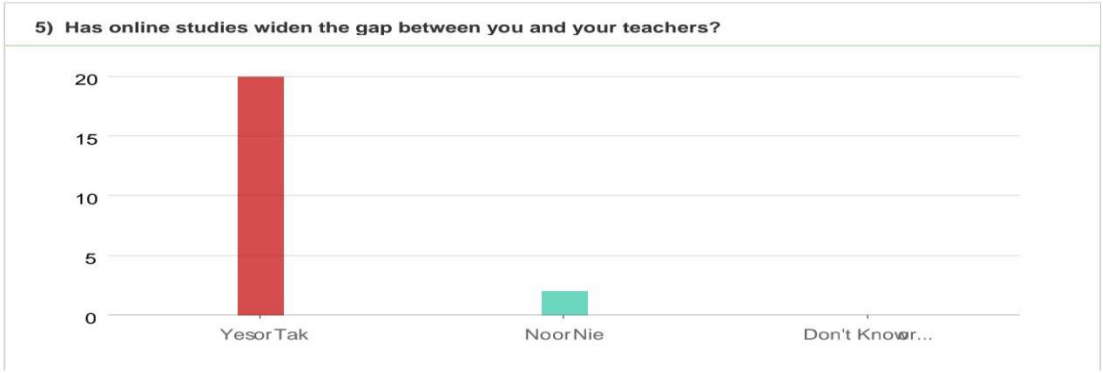
Answers	Count	Percentage
Yes or Tak	19	86.36%
No or Nie	1	4.55%
Don't Know or Nie wiem	2	9.09%

Answered: 22 Skipped: 0

4) Is there an Online Learning platform that Support technical skills like mathematical solutions?



Answers	Count	Percentage
No or Nie	15	68.18%
Yes or Tak	4	18.18%
Don't Know or Nie wiem	2	9.09%



Yes or Tak	20	90.91%
No or Nie	2	9.09%
Don't Know or Nie wiem	0	0%

Answered: 22 Skipped: 0

Figure 3: Survey ArcGIS online education by (Mah 2021)

According to self-explanatory survey to determine virtual monitoring as a digital delivery and assessment impact on Students learning. Five questions where put out to the general public using ArcGIS online survey. With the first question" are online studies very convenient for you? Out of 25 respondent, 21 respond yes online studies are convenient while 1 person said no, online studies are not convenient**.**

When the second question was posted, "has there been possibilities to demonstrate understanding of lessons during online studies? .Out of the participants, 15 said no, there has not be possibilities to demonstrate understanding of lessons learned during online studies while 5 persons said yes and 2 people said they don't know.

The third question was posted, "can digital notebook ReMarkable prototype help promote inclusive online studies for everyone?. 19 person said yes, 1 person said no and 2 people said they don't know. When fourth question was sample, "is there an online learning platform that support technical skills like mathematical solutions?". 15 person said no, 4 people said yes and 2 people said they don't know. When another question was sample" has online studies widen the gap between you and your teachers?. From the question 20 people said yes and 2 people said no.

The sample questionnaire were to demonstrate positive response or negative response. Following a positive response in favor of all design questions. This made the author of the study to determine that a need for modern system is required. There's high demand for online studies. There's need to connect the students with the lecturers or teachers.

Conclusion

Virtual classroom that is very common during coronavirus, is becoming more convenient, cheaper, accurate to a certain extend and globally accepted by most of the student and learning institution of developed world. Following

the growth and extensive used, many less developed countries still find it difficult due to low level of technology. Today, many lapses still exist that require gradual process and promising success no matter the prevailing challenges. Most developing countries access online class rooms with the used of WhatsApp, Facebook as communication channels and less of emailing. Following finding, ReMarkable is a suggested modern device that will help the developing countries integrate studies for all the different level of students from pupils, to secondary and higher education. This modern device can help both the blind and people suffering with hearing problems to actively participate in an online classroom. With the over warming majority in favor of digital learning, there is need for more research to developed more tools to enhance a global and inclusive education for everyone.

Declaration Conflict of Interest

We certify that we have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript. We have no financial or proprietary interests in any material discussed in this article.

Declaration of Material Used

All data underlying the results are available as part of the article and no additional source data are required or reserved somewhere.
Repository and identifier data link below indicates and ensures that dataset continues to be available to both humans and machines in a useable form today, tomorrow and in the future link: https://zenodo.org/record/5967969#.YfylAlWZPIU.

DOI: `10.5281/zenodo.5967969`
`Link: https://zenodo.org/badge/DOI/10.5281/zenodo.5967969.svg`

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