

A study on availability of technological resources for Online Learning during the pandemic period, A'Sharqiyah University, Oman

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Abstract: Online education, proven very efficient in the recent years, has two main components, namely Online learning, and Online teaching, which, in order to be successful to the optimum level, require appropriate resources. The root source playing a vital role in online education is none other than Information Technology, having rapidly developed over the years with number of applications such as google class, WhatsApp, zoom, MS Teams and other information media, helping us lecturers to stay in touch with the students (Viner et al., 2020). It is obvious that Computer Hardware Configuration, Computer Operating System, Internet Browser, Software Applications, Internet connection and Internet speed take leading roles in online learning and teaching. At University, robust wired and wireless networks are available almost anywhere and computer labs have specialized software required for the students' majors. But when the students moving off from the traditional way of learning to online learning remotely appeared challenging as the access to technologies dropped significantly, especially for the ICT classes.

To access the success of online learning based on available technological resources, this study evaluated the (i) student's internet connection capability, (ii) the availability of learning devices and software, and (iii) the student's interest in online learning because of various online activities provided. Data is collected using a cross-sectional research methodology, mainly the online record survey method.

Keywords: Online Learning, Bandwidth, Learning Devices, A'Sharqiyah University, Oman.

1. INTRODUCTION

We are all aware of the vast world we live in, expeditiously evolving through decades. A major cause is our technology and its advanced features. In the case of online learning, its increased use such as computers, the Internet, Apps, EMS, Live meet etc is molding the current generation. Among them, broadband technology has had a huge impact on Online Education due to the drastic increase, availability, and use of platforms such as Microsoft Teams, Zoom, and Google Meet etc. Ever since 1970, the telecom sector has been in line with the National Development. Oman telecommunication has been achieved with its strategy and its pass-through different milestone like services improvement, number of choices to the consumer, and overall technology performance improvement. Minister of Transport and Communications, Oman, said that the Broadband National Strategy to allow high-speed- access to the Internet, which has recently been approved by the Cabinet of the Ministers, is considered both an ambitious and balanced strategy. Oman Digital Society and E-Government strategy has taken the range of initiatives to increase digital literacy to make use of broadband internet more relevant to the lives of many Omanis through social media and e-services.

As known, online classes have sound, video and graphics in their presentation on delivery. The inequality between bandwidth usages in students' method of accessing to the online class caused various consequences. For example, video-stuck, lagging voice, Blurred screen/poor quality of screen visuals, Poor net connection during exam or viva time. Such cases brought complexity in the educational system.

2. LITERATURE REVIEW

According to Telli, Yamamoto, and Altun (2020), education is the sector most affected by COVID-19 after the health sector. In general, online learning was always considered an alternative or complement to traditional learning. However, the tables turned when online learning played its role as a crucial element for the efficient functions of schools and universities worldwide during the global pandemic. Online learning comes along with its advantages. For example, its cheap, can be accessed from anywhere at any time, with, of course, the availability of the Internet. Not to mention that it is also universal, follows the latest developments and the user has complete liberty of choosing the needed teaching materials. (Hamid et al., 2020). The most challenging part of online learning is probably the integrity of online assessments. Despite the various solutions at hand, many universities were concerned for a fact as to how to evaluate and assess students' learning objectives with integrity and fairness (Hamid et al., 2020).

The number of students using other electronics apart from laptops and PCs for online learning gradually increased (Magda and Aslanian, 2018). Currently, mobile devices are otherwise the mini versions of actual PCs as they can function almost as exactly as a normal laptop (PC Magazine, 2020) is used for online learning. The term "mobile device," as defined for this study, refers to a smartphone or tablet device. This definition aligns with descriptions found in other recent studies as well (e.g., Ally & Wark, 2018; Gallegos et al., 2019). Online learning also set up a challenge for students who couldn't afford devices or reliable internet services, possibly hindering their engagement with certain learning content due to limited data (Krull & Duart, 2019).

The impact on a student's ability to use a mobile device for academic purposes depends on the device's physical and technological characteristics. The limitations in size of the screen and keyboard may make it challenging to use the device for common tasks such as submitting assignments, reading materials, or writing content (Ahmad, 2020; Pimmer et al., 2016; So, 2016; Vrana, 2015). Small screen size can increase time spent reading (Al Ghamdi et al., 2016) or contribute to students only feeling comfortable using mobile devices for low-stakes tasks (Hu et al., 2016). Readability issues related to screen size may make it difficult to see more robust displays of content and images (So, 2016; White, 2017), having an obvious influence on their learning outcomes. Similarly, a learner's level of understanding of the functionality of their device, particularly for learning, may be a challenge (El-Sofany & El-Haggar, 2020; FiguerasMaz et al., 2017).

Coming to the disadvantages of online learning, it is not a surprise that distractions are only just a quick tap away (Cross et al., 2019). It is otherwise a constant competition between the various distractions (i.e social media, web browsing, endless apps and games, notifications, etc) versus decent education to win the students' attention (Pedro et al., 2018). Multitasking with social media or answering text messages via a mobile device while engaging in a learning activity can negatively affect academic performance (Junco, 2012). In the traditional classroom, an instructor can help to mitigate the distractions by having students put away devices, but online students must regulate their own behavior (Cross et al., 2019). Any potential positive uses of a mobile device are limited because students struggle to concentrate.

Lokanath (et al., 2020) presented a case study in one of the universities at India to analyze the results in changes i.e adaptation of teaching-learning during the Covid-19 crisis. The research focused on the effective use of existing resources in educational institutions to effectively transform face-to-face education to online education by utilizing virtual classes and online tools. Muthuprasad (et al., 2021) conducted a survey to study the Agricultural Student's perception and preference towards the online learning. Authors were able to define the various attributes of students' preferences in online classes and the medium they much prefer to use, plus their perception online learning. Setting priorities for online classes based on the students' preferences also put us on track towards success. In another work (Paudel, 2021) surveyed the point of view of both teachers and students on the benefits and challenges of online education amid COVID-19 in

Nepal. The study identified several benefits of the situation such as promoting online research, connecting participants to the community worldwide and having more freedom.

It is confirmed that there is a steady relationship between speed and user performance according to the multiple studies performed in laboratory situations (Bergman, Brinkman, & Koelega, 1981; Dannenbring, 1984; Doherty & Kelisky, 1979; Grossberg & Yntema, 1969; Morfield, Wlesen, Goodman, & Spence, 1978; Martin & Corl, 1986; Thadhani, 1981). One of the highest rated problems in using the Web is the speed of the connection (Kehoe, Pitkow, Sutton, Aggarwal, & Rogers, 1998; Lightner, Bose, & Salvendy, 1996). Serious consequences both psychologically and economically are faced by the users due to slow system. Physical defects like stress and anxiety in users are explicitly noticeable because of the extended waiting. It is believed by Lazarus and Flokman (1984) that it is because of general sense of waste induced by idleness and by the uncertainty associated with the total waiting time these negative symptoms are caused. Studies also state that the educational experience is not necessarily affected of users living in bandwidth-constrained environments (Dennis & Kinney, 1998; Ghinea & Chen, 2003).

Moreover, user online activity studies concerning different bandwidth access in academic environment is scarce. Newman (2001) an ISP conducted a study and the results showed that the people using high-speed connections were usually online, anxious to keep their applications updated. Another study to detect the difference in time spent between broadband and narrowband users conducted by Berchtold and colleagues (2001) found that users spend 27% more time online than when they only had narrowband access. The moment they have access to broadband, usage of email, chats, music downloading, etc shot up. Visiting game sites had also become frequent. Broadband and dial-up users differ in behaviors, however these indications were not statistically significant (Rappoport, Kridel, & Taylor, 2002).

3. METHOD

Locale of the Study

This study was conducted at A'Sharqiyah University, Oman. A'Sharqiyah University (ASU) is a private institution of higher education located in the north of the A'Sharqiyah Governorate in the Sultanate of Oman. It is located in Ibra, 150 km away from the country's capital, Muscat. Established in 2009 by Ministerial Decision (78/2009) issued by the Ministry of Higher Education, ASU is fortunate to be a distinguished Higher Education Institution (HEI). The academic programs it offers and its various services is simply ecstatic. The University is evolving at a time of unprecedented change and developments in scientific discovery and new educational technology. ASU started operations in the Fall of 2010, initially with students in three colleges. It now has five colleges with over three grand students.

Data Gathering

The phenomenological approach was implemented in gathering data. Phenomenological approach in research focuses on the commonality of a live experience within a particular group. The records available in MS Teams classes, game reports through Quizzes and Kahoot, projects uploaded via Moodle are relied on for the data. The cross-sectional research design method was used here with datamining to abstract more information.

4. FINDINGS

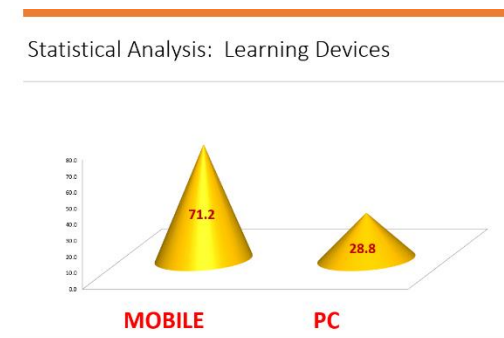
Learning Devices

Learning device has an impact on online learning in the aspect of screen size, technology, configurations, and distractions. Students use mobile devices for online education due to the convenience, portability, and overall ease of use with reasons ranging from taking notes and reading course materials, downloading those materials, communicating, socializing, and other purposes. Challenges when using these mobile devices often relate to access issues and overall limitations of the technology. Yet, despite these limitations, some reported that, depending on the task, even though using a mobile device often took longer compared to a laptop or PC (Personal Computer), the convenience of using it was a greater benefit. Table 1 shows the data about learning devices categorized as Mobiles and PCs. The survey says that 71% of students used mobile phones, which is 42% higher than PC users.

Table 1: Learning Devices used by the students

DEVICE				
DEVICE	DEVICE	Frequency	Percent	Cumulative Percent
	MOBILE	52	71.2	71.2
	PC	21	28.8	100.0
	Total	73	100.0	

Fig 1



Operating System

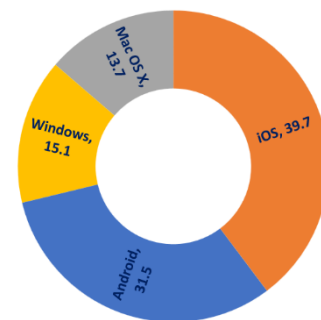
An operating system (OS) is the system software that manages computer hardware, software resources, and provides common services for computer programs. Operating System plays an important role in learning devices like Mobiles, Laptops, Tabs and Desktops. Android, iOS, Symbian, BlackBerry are examples of Mobile Operating System whereas Windows, Mac OS (Macintosh Operating System), Linus, Unix are for PCs. The Operating system updates need to be checked periodically to ensure that the latest version of the necessary plug-ins, drivers, bug fixes, security are done to the optimum level and need periodic maintenance to ensure that it is running effectively. By doing so, error messages or "missing plug-ins" will be troubleshoot when running the applications like e-learning, MS Office and other specific purpose software. Table 2 gives information about Operating Systems used by the students. The survey states that 14% of students used MacBook with the Mac OS, 15% of students used Windows Laptop with Windows Operating System, 40% of students used iPhone with iOS and 31% of students used Android phone with Android Operating System. Survey also states that the latest versions of Operating Systems were used by the students.

Table : 2: Operating System used by the students

OS				
OS	OS	Frequency	Percent	Cumulative Percent
	Android	23	31.5	31.5
	iOS	29	39.7	71.2
	Mac OS X	10	13.7	84.9
	Windows	11	15.1	100.0
	Total	73	100.0	

Fig 2

Statistical Analysis: Operating System



Students' Attraction towards iOS and Mac OS

The Students are free to use any kind of Operating System for their online education as long as it supports the updated versions Moodle, MS Teams and Student Management Software (LOGSIS). The research data says that 40% of students used iOS and 14% of students used Mac OS X which means 54% of the students used iPhones and MacBook for their Online Education.

Web Browsers:

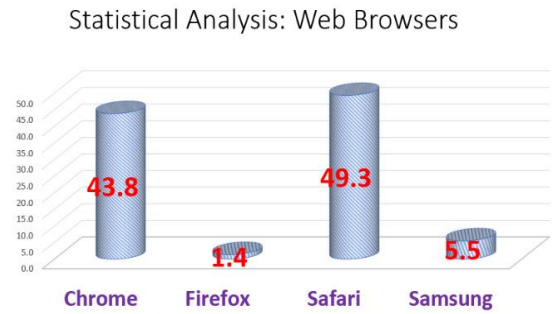
A Web browser is required to access web pages, web portals as well as online information and content such as images, videos, and documents. Since the browsers vary in terms of viewing compatibility, browsers need to be given attention for online learning and should be updated periodically to the latest version. Even though all Web Browsers have its own unique features to display the web contents, few browsers are problematic. In other words, they do not support the E-learning Software efficiently whereas some browsers are compatible and smoothly support the academic web related

software. The table below indicates the various kinds of web browsers used by the students. 44% of students used Chrome Browsers, 1% students used Firefox web browsers, 49% of students used Safari web browsers and 6% of students used Samsung web browsers.

Table 3: Web Browsers used by the students

Browser				
Browser	Browser	Frequency	Percent	Cumulative Percent
	Chrome	32	43.8	43.8
	Firefox	1	1.4	45.2
	Safari	36	49.3	94.5
	Samsung	4	5.5	100.0
	Total	73	100.0	

Fig 3



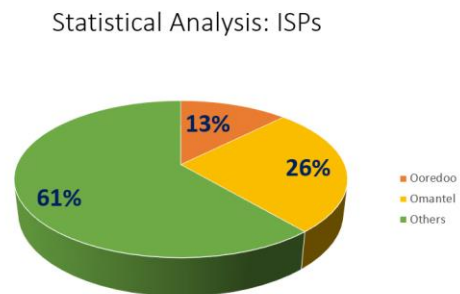
ISP Provider

Oman telecom market is one of the fast-growing sectors in supporting the Oman economic growth. The Oman telecommunication service contributes to society, the businesses, Government sector and Education. The performance improvement includes new job creation, country economic growth, and improvement of the life quality of citizens and residents of Oman towards health and education. OmanTel and Ooredoo are the two popular telecom sectors in Oman. Table 4 provides data about the Internet Service Providers list used by the students. 13% of students used Ooredoo, 26% of students used OmanTel, 61% students used other ISPs like Friendi, Renna, Awasr and Vodafone.

Table 4: ISP used by students

ISP - Data		
	Frequency	Percent
Ooredoo	10	12.5
OmanTel	21	26.25
Others	49	61.25
Total	80	100

Fig 4



Network Connection Mode

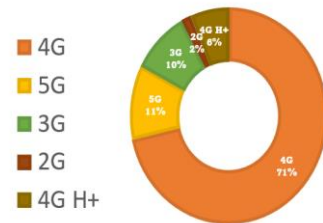
High speed Internet connection provided by the broadband technology does not only have a significant effect on students' learning but also more chances of synergy for knowledge construction by facilitating browsing, scanning, searching, transferring and makes as many online interactions as possible. Few students may not be able to pay for the higher cost of broadband or because this service is not freely available in their place where they live. The Table shows the different network connections used by students. 71% of students had 4G connections, 11% of students had 5G connections, 10% of students had 3G connections, 2% of students had 2G connections and 6% of students had 4G H+ connections. The survey says 88% of students got good network mode and 12% of students got 2G/3G connection. After analyzing the class activities too, i.e Kahoot and Quizzz scores, the performance score is less for the students who had poor network connections like 2G/3G.

Table 5: Network Connections used by the students

Network Connection	Frequency	Percentage
4G	45	71.4
5G	7	11.1
3G	6	9.5
2G	1	1.6
4G H+	4	6.3
Total	63	100.0

Fig 5

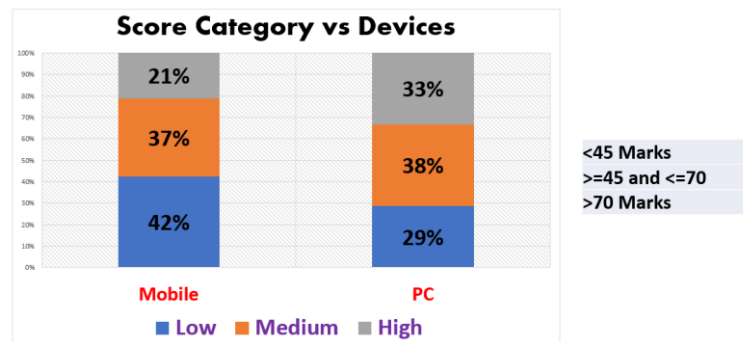
Statistical Analysis: Network Connections



5. DISCUSSION

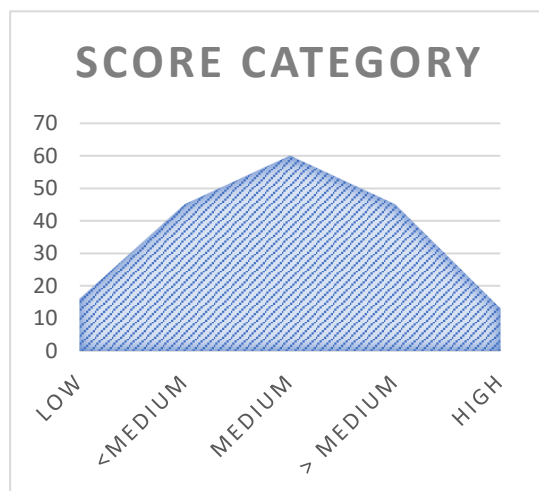
Students Score

At this point, when the data is analyzed, it is found that the students who used mobile phones have scored less than the students who used PCs. 33% of PC users scored high marks which is 12% higher than the mobile users. Only 29% of PC users scored lower which is 13% lesser than the mobile users.



Students Interest towards educational games like Kahoot and Quizzizz

Kahoot and Quizzizz are examples of digital learning platforms which uses quiz-style games to engage students and help them to learn with fun. The cloud-based service will work on most devices via a web browser. This survey also explored and confirms that students get motivated by gaming tools such as Kahoot and Quizzizz where 74% of students are found active learners. The gaming score falls on normal distribution bell shaped curve, which proves that the students utilized the gaming method effectively.



6. CONCLUSION

To conclude,

The students' cooperation in the short season was high as the young minds understand the uncertainty of COVID 19 Pandemic period. It is also evident that the sudden transition to online teaching did not affect their learnings in the aspect of availability of learning devices such as Smartphones, Tabs and Laptops and bandwidth connections for the academic year 20-21. Online gaming tools such as Kahoot and Quizizz boosted the young minds, encouraging them to learn more. Plus, the gaming score falls on normal distribution bell shaped curve which proves that the students utilized the gaming method effectively. Thus the research data reports that the students have had adequate technology and have pressed forward in their education track successfully.

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