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## Application of Learning Analytics to understand learner behavior in an Online course

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**Abstract** - The Coronavirus (Covid-19) outbreak has pushed institutions all around the world to use online classrooms instead of traditional classrooms. During the Covid-19 epidemic, many schools and colleges implemented online learning. The primary goal is to examine and anticipate student achievement while also assisting teachers in comprehending student performance. It also investigates and analyses alternate learning settings in an attempt to improve student performance. A visualization study is used to track and monitor student performance, as well as the performance of the entire class, to help teachers better comprehend the students' performance. An online survey was used to collect data for the analysis, which was then explored using a visualization tool. The students' perspectives on the issues they faced and the benefits they gained from using online learning were documented. The findings show that employing online learning has various advantages and is the most effective method during the Covid-19 epidemic. Students, on the other hand, acknowledge that they had a variety of challenges, including power outages, Internet issues, and trouble conversing with lecturers. It is hoped that the outcomes of this study will spark more discussion about how to solve challenges with online learning.

**Key Terms** - learning analytics, environments, online learning, offline learning, learning.

### I INTRODUCTION

Technology has evolved into a critical tool for both students and instructors to create more effective educational experiences in recent times. In this context, the spread of online learning environments (e.g., learning management systems, student diaries, library systems, digital repositories, and academic systems) has increased significantly, resulting in a significant increase in the amount of data generated about the educational process. These digital footprints can help teachers and students achieve higher levels of accomplishment through assisting teaching and learning methods.

Many colleges and universities now provide online courses or a mixed approach to learning the lectures organized by institutional lecturers, especially in light of the Covid-19 pandemic. The abrupt transition to online learning, however, has raised several concerns and questions. First, while several studies have examined students' online learning satisfaction during the pandemic, mixed results have been reported.

The survey studies currently have been conducted to examine typically the effectiveness of using online learning. These scientific studies motivated the existing study to check out the perception

involving online mastering. This study centers on identifying typically the problems faced in addition to the positive aspects produced from adopting online learning. Moreover, typically the study provides students' opinions on carrying on with online mastering.

### II. WHAT IS LEARNING ANALYTICS IN THE EDUCATIONAL CONTEXT?

Learning analytics refers to the collection and analysis of information about learners and the environments for understanding and increasing learning outcomes.

In the field of education, learning analytics is where big data meets traditional quantitative methodologies. Data about learners and how they learn is being collected by universities, organizations, and online course providers. However, until the relatively recent discovery of the methods and instruments to do so, most of that data was mostly untapped.

Most of the data at present available would not come in neat, well-organized, and collected forms. It exists in varied forms across systems and locations. Analysts today need the skills to reach and transform this data, so we can better understand not only what students know, but that they know it. Learning analytics and educational data exploration are the tools to remodel this data into knowledge and lead, in the end, to improved education.

For a long time, people have been studying learning and teaching, keeping track of student development, analyzing school or university data, creating exams, and relying on evidence to improve teaching and learning. Learning Analytics draws on these well-established disciplines, but it aims to make use of new opportunities created by capturing new types of digital data from students' learning activities and applying data science and AI computational analytical approaches.

### III. RELATED WORK

The authors Robert Bodily and Katrien Verbert [1] speak in "Review of Research on Student-Facing Learning Analytics Dashboards and Educational Recommender Systems". This article is a comprehensive literature review on learning analytics reporting systems that track student click-level data and report that data directly to students. In this analysis, we have discussed the types of student-facing learning analytics reporting systems based on system functionality and data sources collected, the methods used to increase the rigor of reporting

systems, and the current findings of the effect of these systems on student behavior, achievement, and skills

Nabila Sghir, Amina Adadi, Mohammed Lahmer, and Zakariyaa Ait El Mouden[2] speak about “Using Learning Analytics to Improve Students’ Enrollments in Higher Education” Within this paper, the authors shed light on one of the primary goals of learning analytics, that is prediction. Our method aims to predict students’ enrollments in the first year of DUT in Meknes based on a given set of attributes.

Laécio Araujo Costa, Marlo Vieira das Santos e Souza, Laís do Nascimento Salvador, Ricardo José Rocha Amorim[3] authors speak about “Monitoring Students Performance in E-learning based on Learning Analytics and Learning Educational Objectives”. This proposal aims to assemble items of evidence, mainly from the college student behavior in the LMS, about the learning objectives which have been achieved by him/her.

The authors Kew Si Na, and Zaidatun Tasir[4] speak about “A Systematic Review of Learning Analytics Intervention Contributing to Student Success in Online Learning “. The systematic review presented here is one of the efforts being made to understand how the use of LA Interventions might impact students’ success in their learning.

Adnan Rafique, Muhammad Salman Khan, Muhammad Hasan Jamal, Mamoon Tasadduq, Furqan Rustam, Ernesto Lee, Patrick Bernard Washington, And Imran Ashraf [5] speak about “Integrating Learning Analytics and Collaborative Learning for Improving Student’s Academic Performance”. An extensive literature review is performed to find the appropriate factors for predicting students’ performance.

Rasha Shakir Abdulwahhab, Shaqran Shakir Abdulwahhab[6] Speak About “Integrating Learning Analytics To Predict Student Performance Behavior “. This work aims to automatically create a model for helping the Information Technology Department student at CAS to predict their performance on a specific group of courses. The predicted information assists advisors and students to predict which student is at risk.

Hamzah Alaidaros, Ahmed Kherd, and Hussein Ali Al-Aidroos [7] speak about “Students’ Perception of Online Learning during Covid-19 Pandemic at Al-Ahgaff University, Yemen: A Survey” This paper presented and discussed the survey results conducted to investigate the perception of Al-Ahgaff students in the alternative online learning mode. In the current study, 119 students have been involved in expressing their opinion on online learning. Students’ perceptions have been collected according to the problems faced and advantages of adopting online learning during the Covid-19 pandemic.

The Author H S Guruprasad[8] speaks about “Learning Analytics: A Survey”. The survey covers several studies revolving around learning analytics - some proposing a general framework to be used for learning analytics, one that presents a course management system and its use-cases, and several of them that apply and implement different mining algorithms to establish associations and predictions of student performance.

Olasile Babatunde Adedoyin and Emrah Soykan [9] speak about “Covid-19 pandemic and online learning: the challenges and opportunities”. The sudden migration of instructional delivery to online platforms by universities and other citadels of learning during this pandemic, provided the challenges experienced by faculty and students are well explored and transformed into opportunities, it is evident that online learning will be sustained and education will become more hybrid.

Manuel Fernández-Delgado, Manuel Mucientes; Borja Vázquez-Barreiros, and Manuel Lama[10] speak about “Learning analytics for the prediction of the achievement of the educational objectives” Authors presented an approach for predicting the degree of fulfillment of the educational objectives of a subject through Support Vector Machines. Our proposal uses as inputs the marks of the

assignments of each learning activity and provides as outputs whether the educational objective was fulfilled or not.

#### IV. METHODOLOGY

There are various teaching methods like offline teaching, online teaching, and blended teaching. Each method has plus and minus points when we consider offline teaching subjects which include numerical and more practical explanations that are better to learn as compared to online learning. But whereas subjects which have visualization and presentation are good to be learned and understood in online learning.

Online learning brings versatility and can assist students to learn autonomously, plus students may manage their period to accomplish the particular assignment anywhere plus anytime. Nevertheless, on the internet learning is just not as effective as standard learning in creating desired outcomes within underdeveloped countries, exactly where a vast majority of students are not able to access the Web due to specialized and monetary problems.

The primary objective of this study is to find the viewpoints of students regarding online learning during the Covid-19 pandemic. The subsequent research questions are developed to achieve the given goal.

An internet survey technique is used to gather data using Google Forms. The form helps in increasing the rate and reducing data manipulation mistakes.

This study used the random sample approach to online data from Students who went to classes online during the Covid-19 outbreak. The study data were online collected with the guarantee that the gathered data would be kept confidential in support of being used for research purposes.

#### V. RESULTS AND DISCUSSION

This section reports and discusses the results of this study. It starts by presenting students’ demographic profiles and answering the research questions outlined in the previous section. It ends by highlighting the student’s suggestions and comments.

##### A. Descriptive analysis and Interpretation

As per the survey Figure 1, depicts the identity of the students in which 54.8% of them were male and 45.2% of them were female.

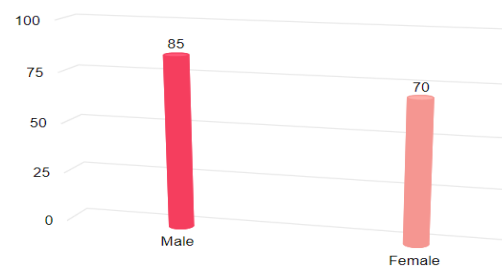


Figure 1

As per the survey conducted Figure 2, explains to us about the class in which 31% of students were from the 4th semester 54.2% were from the 6th and 14.8% were other students.

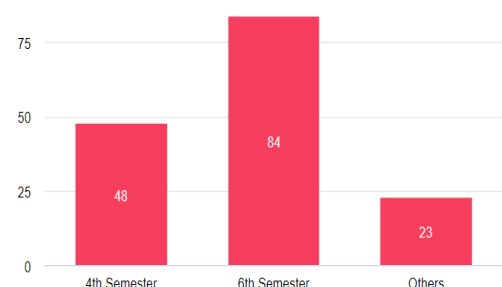


Figure 2

According to the data collected Figure 3 shows us that 67.7% of students were from Urban places and 32.5% of students were from

rural areas. Students in rural areas faced more problems compared to urban ones.

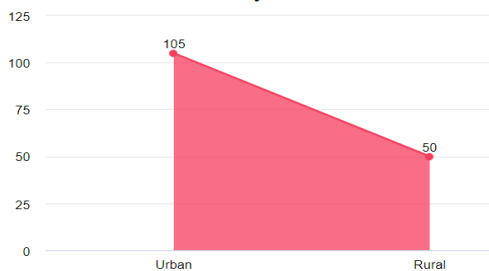


Figure 3

**B. The students' opinion of online learning**

In this study, postgraduate students have expressed their perspectives on online learning during the Covid-19 pandemic.

As shown in Figure 4, 47.8% of the students needed to be trained before undergoing online learning classes and activities.

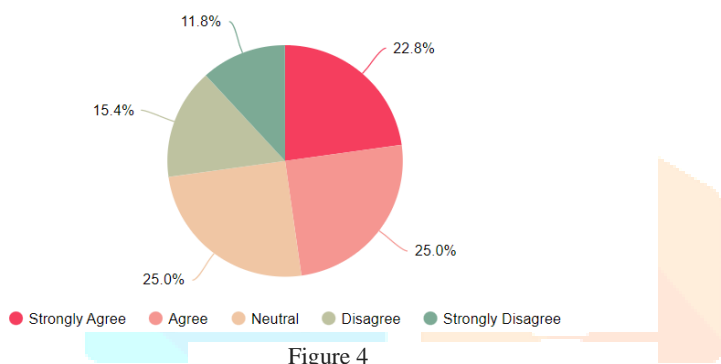


Figure 4

According to Figure 5, 41.5% of students, Online learning is considered less effective and the interaction level is also less. Students feel face-to-face interaction is more effective and they can clear their doubts easily whereas in online learning they fail to express themselves which might result in failing to understand the concepts.

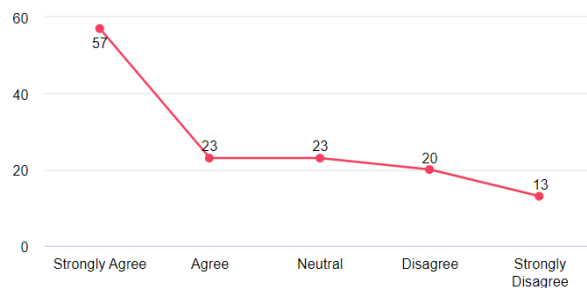


Figure 5

As shown in Figure 6, 58.8% of students feel online learning does not improve written and oral communication skills. As it was online learning there was less interaction between teachers and students so proper communication was established and it lacked student's communication skills

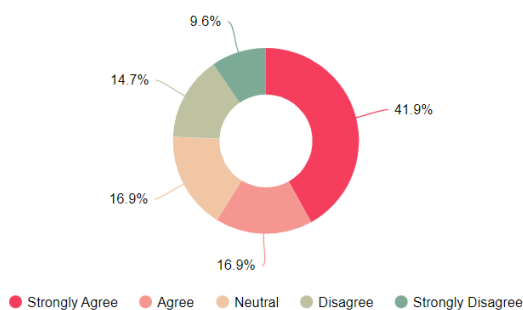


Figure 6

According to Figure 7, 65.9% of the students were not comfortable with lab and project-related activities during online learning. IoT and Networks-related labs need a kit and equipment to implement and understand the concepts, but students didn't have the proper tools to implement the lab during online learning.

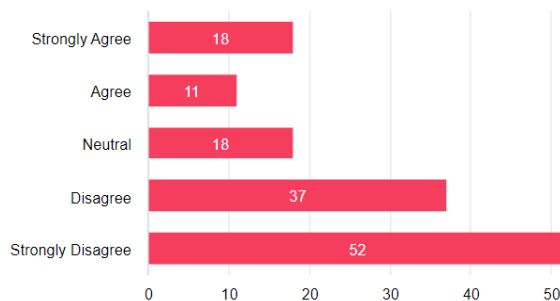


Figure 7

**C. The problems faced by students in the implementation of online learning during the Covid-19 pandemic**

As shown in Figure 8, 51.1% of the students experienced technical problems when trying to access the online platform considering the electricity and Internet disconnections. Some online tools were unable to install due to storage problems and even people living in villages faced too many problems during online learning.

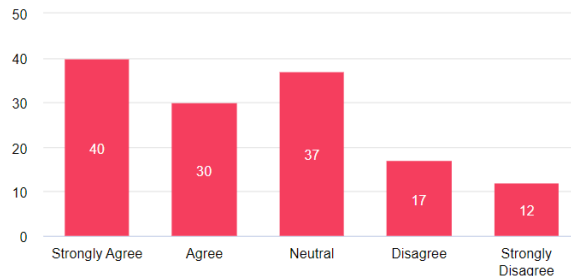


Figure 8

Moreover, some students of which some courses are generally not too problematic using learning via typically the Internet; yet, many other courses should be carried out using face-to-face mode. They also suggested carrying on online learning throughout the secondary (or elective) subjects but are not in primary themes. Some students mentioned that the continuity of online mastering is usually an option, face-to-face learning is nonetheless a choice. Besides this, some students believed that the online learning process has to be adjusted to students' interests; thus, fun communication would arise between students and even lecturers. They included, "Lecturers should include more skills throughout using the technological innovation which in concert may help throughout developing students' observations."

**VI. CONCLUSION**

This particular paper presented and discussed the study results conducted to check into the perception of students in the choice of online learning mode. In the current study, many students have already been involved in conveying their viewpoints on online learning. Students' perceptions have already been collected based on the problems faced and benefits of adopting online learning throughout the Covid-19 outbreak. In the beginning, students felt it difficult to adapt to online learning but as time passes students slowly adapted to the online learning environment. The findings established that using online learning has several benefits for young students as it is the best approach that would be used during the Covid-19 pandemic. Subjects which had more concepts of visualization were easy for understanding during online learning due to the presence of more software.

Nevertheless, students confirmed that several issues need to be settled to possess a strong infrastructure for online learning. The important problems students face include electric disconnecting,

some weaknesses of the web, and difficulty in conversation with lecturers. This particular study recommends setting up good collaboration between students, and lecturers. Therefore, it might help in solving the issues related to online learning. Future works would concentrate on exploring more about online learning and how to make this kind of learning in the pandemic period achieved well and maximal.

#### VII. FUTURE WORK.

By making use of a Regression Algorithm we can certainly assess the data and analyze the status or future outcomes. These studies can be wearisome and hard except if the reader has a thorough understanding of the processes used in the research. This feature attempts to “simplify” the regression analysis for prediction to help viewers appreciate this type of study more readily. Cases of the use of this statistical approach are offered to facilitate better understanding for viewers.

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