**Task 1:**

Research Problem: Investigating the Impact of Transforming to Online Learning and Adaptivity Levels Among IT Students after the transformation to online learning.

Description:

Slow adaptability, a common occurrence between all people, poses significant challenges to various aspects of daily life, including education. This research aims to explore the effect of transformation on the adaptivity levels of IT students in online learning environments.

Slow adaptation is when you try something new and have a hard time to adapt to that new concept, typically due to a new concept or environment.

The study will examine how gender, age, education level, institution type, and location, intersect with the adaptability of students and their impact on online learning engagement and adaptivity levels. It will also investigate how students' financial conditions, internet type, network type, availability of self-learning management systems (LMS), and device accessibility influence their ability to cope with disruptions during online classes.

Furthermore, the research will explore potential strategies and technological interventions that could mitigate the negative effects of slow adaptation on IT students' learning experiences.

By addressing these research questions, the study aims to provide insights into the challenges faced by IT students in different regions prone to slow adaptation and contribute to the development of effective strategies to enhance their online learning experiences and adaptivity levels amidst disruptions.

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| --- | --- | --- |
| **Feature** | **Type** | **Description** |
| **Gender** | Categorical | Gender type of student |
| **Age** | Numerical | Age range of the student |
| **Education Level** | Categorical | Education institution level |
| **Institution Type** | Categorical | Education institution type |
| **IT Student** | Binary Categorical | Studying as IT student or not |
| **Location** | Categorical | Is student location in town |
| **Load-shedding** | Categorical | Level of load shedding |
| **Financial Condition** | Categorical | Financial condition of family |
| **Internet Type** | Categorical | Internet type used mostly in device |
| **Network Type** | Categorical | Network connectivity type |
| **Class Duration** | Numerical | Daily class duration |
| **Self Lms** | Binary Categorical | Institution’s own Learning Management Systems availability |
| **Device** | Categorical | Device used mostly in class |
| **Adaptivity level** | Categorical | Adaptability level of the student |

**Research questions:**

1. What does influence the adaptivity of IT students when learning online?
2. How the adaptivity in online learning can be affected by characteristics such as gender, age, and education level?
3. What role does the availability of self-learning management systems (LMS) play in fostering adaptivity among IT students in online learning?
4. How the adaptivity in online learning can be affected by different types of internet and network connections?
5. What is the most accurate prediction models that predicted student adaptability after transforming to online learning?

**Objectives:**

1. Identifying the key factors that influenced the adaptivity of IT students when learning online.
2. Examining the level of influence by characteristics such as gender, age, and education level, etc. on the adaptivity of IT students in online learning.
3. Assessing the impact of LMS availability on the adaptivity of IT students in online learning.
4. Analyzing the effects of adaptivity in online learning through different types of internet and network connections.
5. Identifying the most accurate prediction models for student adaptability in online learning.

Data set link: \*\*https://www.kaggle.com/code/qusaybtoush1990/students-adaptability-accuracy-91-4/notebook\*\*

**Task 2:**

**Selected papers:**

1. Students’ online learning adaptability and their continuous usage intention across different disciplines.



1. Estimation of Learners' Levels of Adaptability in Online Education Using Imbalanced Dataset.



1. Intelligent Methods and Models for Assessing Level of Student Adaptation to Online Learning



**Paper names:**

1. Assessment of Online Learning Effectiveness by Students of Engineering and IT Degree Programs.
2. Students’ online learning adaptability and their continuous usage intention across different disciplines.
3. Estimation of Learners' Levels of Adaptability in Online Education Using Imbalanced Dataset.
4. Intelligent Methods and Models for Assessing Level of Student Adaptation to Online Learning.
5. Online Students’ Learning Behaviors and Academic Success: An Analysis of LMS Log Data From Flipped Classrooms via Regularization.
6. Predicting Student Performance from LMS Data: A Comparison of 17 Blended Courses Using Moodle LMS.
7. The Rise and Challenges of Postpandemic Online Education.
8. Forecasting students’ adaptability in online entrepreneurship education using modified ensemble machine learning model.
9. Adaptability to Online Teaching during Covid-19 Pandemic: A Multiple Mediation Analysis Based on Kolb’s Theory.
10. Comparison between on- and off- campus behaviour and adaptability in online learning: a case from China.
11. Students' Adaptability Level Prediction in Online Education using Machine Learning Approaches.
12. Comparison of Predictive Machine Learning Models to Predict the Level of Adaptability of Students in Online Education.
13. The impact of loadshedding on student academic performance: A data analytics approach.
14. Random Sample Partition: A Distributed Data Model for Big Data Analysis

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**Literature review:**

The situation that we in right now especially after the COVID -19 pandemic requires and demonstrates the need for online education system. the rapid advancement of technology shows us ways to utilize online education systems like remote or virtual learning, after the tragic pandemic there were a lot of changes and many of them will remain changed in current circumstances, as a result of this transformation students will have to adapt to different challenges in online education. I will discuss several points from different papers that analyzed some learnings about online education.

Through rigorous analysis, big data technologies reveal complex patterns and relationships among variables such as study time, online connectivity, and availability of self-learning management systems (LMS). These insights shed light on the nuanced relationship between technology, socioeconomic factors such as financial status, and the levels of adaptability exhibited by students navigating e-learning environments. Analysis of big data not only enables the identification of barriers to adaptation, but also empowers the development of targeted interventions and personalized learning approaches to individual needs. In essence, the use of big data in the study of student adaptation in online learning environments represents a significant step towards achieving better learning outcomes and promoting more inclusive, equitable learning environments.

In [2], [1], [5], and [6] the researchers studied and analyzed studied and analyzed online education across different courses, disciplines, and majors. In [2] the study showed a positive impact on online learning adaptability on users' intention to continue using the platform, as well as the positive impact of satisfaction towards online teaching on users' intention to continue using the platform. Furthermore, it confirms that student satisfaction and adaptability lies within their intention to continue using the platform, the study suggests the need for a tailored approaches in online learning platforms and courses across various academic disciplines, Additionally, the study emphasizes the need to create adaptive learning environments based on the different characteristics of learners and accelerate the construction of adaptive learning systems for college students with different learning methods in different subjects. It highlights the need for personalized design and distinctive implementation of online learning platforms and courses, offering practical implications for educators and policymakers in the field of online education. In [6] the study analyzes 17 blended courses with 4,989 students at Eindhoven University of Technology using Moodle LMS, this study indicates that prediction models across different courses should personalized per course because the same prediction models may not be applicable to different courses, and shows that LMS data does not provide value for early intervention, and shows the need for theoretical approach and more data sources beyond LMS data. Furthermore, the paper delves deep into the learning analytics in theory, the study suggests the need for further research to expand the data base of the issue of portability of prediction models. The paper [1] dives in and focuses on the effectiveness of online learning specifically for students in engineering and IT degree programs, this study showed that there is disparity in satisfaction levels between junior and senior students, the former were less satisfied with online learning, this research also sheds light on some limitations or challenges such as technical issues, equipment availability, and the lack of direct contact between teachers and students. Only 12% of junior students zare completely satisfied with remote learning, while 30% of senior students are satisfied.

In [7], [9], and [10] these discuss differences between on and off campus online learning and their effects and the adaptability of students during the COVID-19 pandemic shift using klobs theory and the rise of challenges faced during the shift. In [7] it talks mainly about the COVID-19 pandemic, it demonstrates the need for online educational systems, it also talks about problems faced during this change such as changes in instructional practices, the need for effective e-learning content, and understanding students' perceptions of e-learning. Moreover, it presents the findings of a questionnaire to university students in Taiwan The findings suggest that students' perceptions of online education's usefulness and their intention to continue using it are influenced by factors such as interaction during online courses, technical competency, and user interface friendliness. To address the challenges posed, the researchers recommends continuous training for teachers and students, creating a comprehensive technical environment, and designing high-quality online education. In [9] this document explores the challenges faced by teachers in online education while transitioning during the pandemic, furthermore, It emphasized the role of teachers in facilitating the adaptability of the online learning experience. The study found that emotional intelligence, general self-efficacy, the teacher's facilitator role, and concrete experience learning mode significantly predicted adaptability to online teaching among preschool and primary school teachers. The study's findings provide a foundation for developing instructional strategies to improve the quality of online teaching amidst the challenges brought about by the pandemic and beyond. Overall this paper shows that in-order to enhance the adaptability of online teaching you should integrate psychological traits, innovative strategies, and teacher training. In [10], this papers the researchers explores the differences in behavior and adaptability of on-campus and off-campus students in online learning, . The study aims to improve effective instruction by understanding the differences between these two student groups. This study showed us that there were a couple of differences between on and off campus like the preference for real name or alias in online intercommunications, the approach to seeking help, the feeling of learning stress, and the level of activity in online learning. On-campus students were found to be more active, less stressed, and inclined towards interaction with fellow students, creating a lively and interactive learning community. On the other hand, off campus students approach was more official climate in online learning, students were found to be with a higher tendency to seek help from other tutors and less interactions with other fellow students. The result of these findings suggests that a tailored teaching strategies should be implemented for enhancing their experience. We can use the study insights to better inform the design of online learning environments and the management of instructional processes to better support the diverse needs of on-campus and off-campus students in online education.

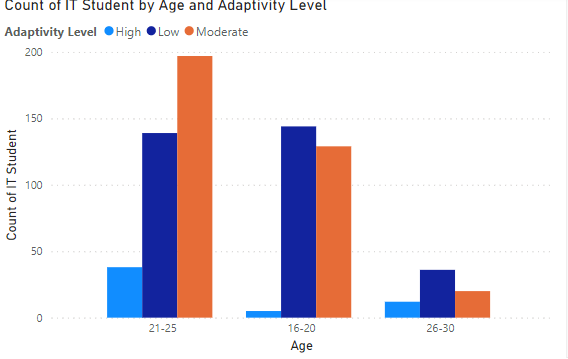
Paper [13] discusses the problem that is faced by students in online learning which is load shedding, this study was focused on South Africa where they suffered from load shedding. This issue didn’t only affect the country from an academic approach but also affected the economic growth of the country. Loadshedding can be a threat to education as well as it effects academic performance of students. To manage this problem the researcher suggests that emphasizing the significance of effective coping strategies and the need for support systems to assist students in managing power outages and related challenges. The researcher also demonstrates that Applications of data analytics in education like LMS and others should be applied to improve student outcomes, enhance the learning experience, optimize resources, and make data-driven decisions to enhance overall educational effectiveness. But as we read in [6] LMS models should be personalized per course and provide no value if used too early. Bearing in mind to ensure the data privacy and security of the students.

[4], [8], [11], [3], and [12] These documents discusses mainly methods and prediction models in machine learning to advance the adaptability of students in online learning. Paper [4] main objective was to assess the effectiveness of student adaptation to online learning using machine learning tools, including classification techniques and neural networks. In this study machine learning algorithms such as Decision Trees, Random Forest, Gradient Boosting, and more were implemented. All these algorithms were compared and they found that Sequential Neural Network was with 91% accuracy and Random Forest with 88% accuracy being identified as the most effective providing a high quality and accuracy with only a few questions. Paper [8] suggests the use of machine learning algorithms such as random forest and neural networks and others which we found that in paper [4] that these algorithms were the most accurate and effective. These machine learning models aim to provide reliable and efficient predictions of students' adaptability. In [8] this study proposes a modified ensemble machine learning model aims to assist educators and administrators in identifying students in need of additional support, tailoring instructional strategies, and designing targeted interventions to enhance their adaptability and overall learning experience in online entrepreneurship education. This modified model has some benefits such as the allowance of scalability and efficiency in predicting students' adaptability, and the model can serve as an early warning system, identifying students at risk of low adaptability before they experience significant difficulties. Furthermore, paper [11] used a wide range of machine learning algorithms and the most accurate was the random forest model with an accuracy of 89.63%. as well as in paper [12] different machine learning algorithms were tested and the test results were found to be that random forest and XGBClassifier were the most accurate with an accuracy of 92% for predicting students' adaptability level in online education.

Gap:

This research will explore what affects the adaptability levels of students in online learning based on various factors such as age, gender, education level, internet type, location and the impact of the availability of self-LMS. Moreover, determining what is the most accurate prediction model that could be used.

**Data analysis:**



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A graph of a bar chart

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A screenshot of a computer screen

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A graph with blue and orange bars

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