International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 10 | October - 2023 SJIF Rating: 8.176 ISSN: 2582-3930

The Impact of Predicting Academic Success in Higher Education: A Review

Shreya Sharma, Vikash Singh Rajput
Computer Science & Engg Department, Shriram College of Engg. & management, Bamor, Madhya Pradesh 476444

ABSTRACT: ***This review presents the issues pertaining to higher education as well as in-depth schooling, in particular the connections between the two, it is essential to take into consideration the possibility of predicting the academic success of students since this is a crucial component that must be taken into consideration at all times. With the help of the capability to forecast their level of success, students are given the opportunity to select the courses with subsequent study plans that will be of the greatest benefit to them personally. Because of the availability of this talent, this can now be accomplished. It provides educators and school administrators the chance to keep an eye on students, which, in turn, enables them to offer increased assistance to pupils, combine educational initiatives to produce the best possible outcomes, and forecast the extent to which kids will be able to successfully complete their schooling. Student forecasting has numerous advantages, one of which is that it leads to a reduction in the number of official warning signals for school expulsions that are brought on by inefficiency. This is only one of the many advantages of student forecasting. This is but one of the several advantages that may be gained from student forecasting. Students are able to see what their future holds if they take the time to choose their classes carefully and devise study strategies that make the most of their individual skill sets, areas of interest, and areas of expertise. The Support Vector Classifier proved to be the most useful instrument in the course of this investigation due to the fact that it had values of 0.888 for accuracy, precision, recall, and f1 respectively for each of those categories. This was because it had the capability of accurately classifying the data. These results are evidence that the data were categorized with a high degree of precision, and they are presented here for your consideration. Throughout the entirety of this investigation, a number of distinct approaches to machine learning, including ensemble, logistic regression, random forest, AdaBoost, and XG Boost, were utilized. These approaches were used to classify the data.***

KEYWORDS: ***school administrators, educational initiatives, student forecasting, ensemble, logistic regression, random forest, AdaBoost, and XG Boost.***

I INTRODUCTION:

Students in grades K–12 are collectively referred to as "students." (There is an exception to this rule, though, and that is when the phrase "graduate students" is used to denote in-service instructors and librarians who enrolled in the class that comes after it as adults.) More details are provided in the graduate course Planning, Execution, and/or Assessment of a Graduate Education Program in Order to Get Ready To Guide Students in Grades K-12 Toward Computational Thinking, Educators and Educational Librarians Are Needed. A person is considered to be a student if they are actively enrolled in some form of educational programming. More details may be found in the article titled "Increasing Student Professionalization Via Business Simulation Games." People who have enrolled in educational institutions such as universities and colleges and are therefore formally acknowledged as learners are referred to as "students." The goal of these people's education and training is to better themselves professionally and personally. The term "students" is used to characterize these individuals. Only the term "students" was used throughout this analysis to refer to people who were currently enrolled in higher education programs[1]. Services of Digital Mental Health Care for Students Enrolled in Nigeria's Higher Educational Institutions All via Pandemics offers additional details and facts. According to the Cambridge Advanced Learner's Dictionary, a student is somebody enrolled in a postsecondary educational institution (college, university, or even high school). For the purposes of this study, "university student" refers to an individual enrolled in either a public or private institution in Kenya for the pursuit of a higher education degree [2]. Blended and hybrid courses supplement their content with information via Active Learning with Tools. We call those who are pursuing their education at colleges and universities "higher education students." Using WhatsApp to Keep in Touch with Students: The Case of Zimbabwe's Mashonaland West Campus" offers further insight into the topic. When trying to juggle their academic and extracurricular commitments, many students give up and drop out. The amount of time spent studying, doing assignments, taking examinations, and attending lectures is excessive. Because attending college is a commitment that spans multiple years, a significant proportion of students drop out before finishing their degrees for the straightforward reason that they do not have enough time.

Figure 1 Dropout student

- **Financial issues:**

It is concerning to learn that 89% of students coming from families with poor incomes do not continue their education over the first year of college. In addition to the fact that the expense of attending college has increased over the past few years, a significant percentage of students are now expected to maintain full-time employment in order to provide financial support for both themselves and their families. Finding the necessary funding and taking on sizeable student debts are both potential major roadblocks on the path to completing a degree. In addition, It can be difficult and time-consuming to apply for substantial amounts of money, such as student loans. Accelerated Pathways helps students from low-income backgrounds graduate faster [3]. Our tuition rates are 36% less than the national average for similar institutions, and we also give students the option to pay for their classes as they go. That requires not applying for large student loans in advance if you don't want to end up with a debt load that will follow you around for the rest of your life. We are able to work within the financial constraints of any student and even provide subsidized course package choices. Training from Accelerated Routes is accredited at the regional level and is therefore universally transferable, so you may put your money toward your degree without worrying about whether or not it will count. This is in contrast to the training offered by many of our competitors[4].

- **They don't have time**

Many students drop out of college because they are unable to strike a satisfactory balance between their professional, academic, and personal responsibilities. The amount of time spent studying, doing assignments, taking examinations, and attending lectures is excessive. Many students drop out of school before completing their degrees because they cannot commit to the ten years that are necessary to earn their degrees. There are moments when life requires that you pay a price. There are always roadblocks to overcome at work. The inability to progress due to health issues. The issue of distance is another one that faces students who are enrolled in traditional college campuses. It's a little-known fact, but about 4% of all college dropouts are students who live a long way from their schools[5]. With Accelerated Pathways, students are not restricted in when or where they want to engage in academic pursuits. When you enroll in one of our online courses, you may work at your own speed without worrying about deadlines, semesters, or set class times. The beginning of classes can occur whenever the student chooses, even on the weekends. Learn whenever it is most practical for you to do so. A laptop computer and connection to the internet are all that are need. In addition, we are experts in the process of discovering degree programs that are willing to grant credit for prior learning experiences. Before enrolling in college, it is beneficial if students have already finished some of their required coursework, This will help them save both time and money [6].

- **Sociability in college**

Did you know that social dynamics are responsible for 13% of students dropping out of university? Student life can put a significant burden on a student's ability to successfully adjust to unfamiliar cultural norms. It's possible that this will remind some people of the drama they experienced in high school, or even worse, that it will make it impossible for them to stay up academically with their contemporaries. Returning students are those who have taken time off after starting college but intend to complete their degrees are typically older than the other students in their classes. It's possible that this will lead you to believe that, as a non-native student, you don't have a place in the social scene at the university. We provide a different choice if you'd like! At Accelerated Pathways, sociocultural contact takes place online and according to your own schedule and preferences. You will have the opportunity to collaborate with professors, students, and academic advisors in ways that are tailored to the social and educational interests of each participant. Because of this, you are able to prioritize education over the dynamics of social interaction[7]. You won't ever be put in a position where you are forced to feel uncomfortable about what you are learning or frustrated with your research, frightened to inquire about something, or socially awkward. This is something that will never happen to you.

- **A lack of backing**

Attending college is a significant commitment that calls for a significant amount of self-dedication & self-determination. When it comes to growing your own drive & motivation, having the support of others, be they friends or family, is just as vital. When academic expectations get overwhelming, even the most intelligent person in the world will feel the want to give up. Regrettably, not everyone receives the help that is necessary to meet their needs. Inadequate assistance from family members is the cause of nine percent of high school dropouts. If you don't have the support of other people, it will likely be much more difficult for you to achieve your goals. You will have the assistance of each and every one of the Accelerated Processes. Even while our team can't entirely take the place of a family, we still provide every student with the coaching of the highest caliber[8]. Our academic counselors are experts at maintaining your interest even when things become difficult, preparing you for the next steps, and supporting you all the way through the process. We identify solutions for users' mental health breaks and even help them celebrate their triumphs when they reach their goals. Our students adore us, and we feel the same way

about them. You only need to read the reviews written by our students to see what I mean.

Exclusion from academics

Many students might not be adequately prepared for the needs of study motivation due to the challenging nature of the education system in colleges and universities. In point of fact, not even close to the minimum academic requirements are met by 28% of college students. The misery of learning new concepts on top of the pressure that already exists to complete the assigned work and homework by the due date just serves to serve as a means to make this pressure even more intense. Students may get the impression that the material is moving at a pace that is difficult for them to keep up with, particularly in more advanced and technical levels of instruction. You might experience feelings of annoyance and unease as a result of this. We despise those feelings very much! As a result of this, we provide students with the opportunity to learn at their own pace, despite the limits of time[9]. You will be able to truly grasp the information if you are able to progress through the course at your own pace, as opposed to the pace of an instructor or more advanced pupils. Students who are beginning their college careers for the first time, coming back to school after a lengthy leave, or tackling difficult subject matter will find this to be a huge relief. It is no longer the case that anybody has the impression that things are moving too quickly or that you are unable to raise the significant questions. In addition, our counseling staff is available around the clock to provide assistance and ensure that users always have access to the resources they require. According to Imed Bouchrika, Research.com's Chief Data Scientist, "Completing a college degree is a verified, first step towards a bright and successful future." Statistics usually reveal a strong correlation between higher education and job security.

II LITERATURE REVIEW:

Terziyan 2023 et al [10]were included if they had lateral menisci with discs. Preprocessing and measurement are the two sections of our software implementation. The entire radiograph image was analysed in the first phase to obtain basic data on the patient. had discs and lateral menisci. Our software implementation is divided into two sections: preprocessing and measurement. In order to construct a knee joint model and quantify its characteristics, a unique technique was devised. In a test, 99.65% of photos were correctly segmented. Furthermore, 97.5% of the photos that were put through the test achieved successful segmentation or parameter measurements. The size increases and the influence clusters measured manually and automatically yielded identical results (P = 0.28). The ratio of lateral joint distance to tibial and fibular spine height was compared to the standard & mean deviations of these measurements after being measured manually. The software's results on raw radiographs were excellent, with a high success rate and solid reliability. Therefore, radiographs with eosinophilic lateral refer can be recognized with the help of AI and radiograph-image analysis software (BM3D, for example) (YOLOv3). The findings of this research may help in the creation of a centralized patient database for the discoid lateral syndrome.

Duquesnoy 2023 et al.[11] For automotive applications in particular. The process of creating LIB electrodes is one that involves many different steps and variables. In earlier research, we showed that 3D-resolved subatomic models are excellent tools for identifying significant electrodes and learning about the timbral effects of manufacturing processing parameters. The high computing costs of these models limit the scope of high-throughput algorithms meant to optimize electrode assets or inversely determine production settings. Here, we introduce a fresh, yet easily transferable, strategy for optimizing both the quality of LIB electrodes and the process by which they are produced through the use of a deep learning (ML)-assisted channel. To start, The pipeline generates fresh data from low discrepancy sequences to quantum theory simulations, enabling it to accurately represent the output parameter space. The generated data set is then used to train quantifiable ML models for quick multi-objective optimization, which identifies the best electrode to use as well as the production parameters to make it. This electrode has finally been satisfactorily experimentally fabricated, proving the physical relevance of our modelling pipeline forecasting. Our pipeline's goal of simultaneously lowering the electrode's tortuosity factor while simultaneously increasing its effective Li+ (de-)intercalation adsorption kinetics, ionic or electronic transport qualities of an electrode are all affected by its conductivity, active surface area, and density.

Asish 2022 et. al [12] has been shown to be more effective than other forms of media in keeping students interested and helping them remember what they've learned. There are several potential sources of stress, mental wandering, distracting noise, and external warnings that might cause a student to lose focus and disengage from their work. Eye tracking data from kids could help identify these daydreaming classmates. It has been suggested that a teacher could use visualizations based on gaze data to keep an eye on students who are getting distracted. A teacher, however, cannot reasonably keep track of several different student indicators at once. We propose a machine-learning-based automated approach to categorize students according to their distraction level, which might be used to help filter pupils. Our primary contributions are (1) the creation of a tagged eye gaze dataset from a VR classroom, examination of several classifiers and the suggestion of an automatic method for detecting a student's attention level using gaze data. To help students focus, we've assigned a distraction level of "low," "medium," or "high" to each section of this learning activity. The Random Forest (RF) classifier outperformed the other models we tried by a wide margin (98.88%). Classification accuracy was shown to be much enhanced by using custom machine learning models based on the RF, kNN, or Extreme Gradient Boosting (XGBoost) model.

Kaspersen 2022 et. al [13] procedure for developing ML models, with some thought given to its consequences. Since most existing learning tools focus on the first two, we discuss

how students can take advantage of opportunities to learn about and reflect on ML in their everyday lives. Using a Constructive Design Research methodology, we created VotestratesML, an ethics-first learning tool that helps students to investigate how ML might impact democratic elections. With VotestratesML, we created a safe space for students to reflect on and form opinions about ML's use in two high school social studies classrooms, where they benefited from iterative exploration through collaboration and competition and were motivated to explore by an emphasis on ethics.

Rajendran 2022 et. al [14] depends on a wide variety of factors, including but not limited to age, gender, family make-up, parental involvement, school environment, student demographics, student stress levels, and student lifestyle. Since it is a measure of academic achievement, the GPA is the model's final result. The five MLAs are used to identify and rank the elements that have the greatest impact on students' academic achievement. These include multinomial logistic regression, artificial neural network, random forest, gradient boosting, and stacking approaches. Accuracy is used to assess the MLAs' performance, recall, and F1-score. Gradient boosting was found to be superior to random forest in terms of accuracy. According to the model study, maintaining a healthy lifestyle increases the likelihood of academic success whereas stress decreases it. Academic success is not significantly correlated with a student's gender.

TABLE NO. 1 OBJECTIVES OF THE RESEARCH:

Author/ year	Methodology used	Gap/ problem definition	Dataset used	Parameter measured
Sheth 2022 et. al [15]	Extensive use of Naive Bayesian, K-nearest neighbor, Support Vector Machines, and Decision Trees	classification issues (both binary and multi-class) and provides stochastic suggestions	When the data set is noisy, the SVM's accuracy drops. SVM does not provide any sort of probability estimations.	Accuracy
Meena 2022 et. al [16]	Data gathering, then topic extraction, then sentiment analysis, then study of moderating	Future research should also look into how public opinion affects the stock price performance variables, and finally, interpretation of results.	Twitter, a social networking platform where billions of users share their thoughts and experience	--
Rujuan 2022 et. al [17]	model for at-risk learners and their behavioural needs. Overall, the model test accuracy is consistent with.	timely difficulties in the learning and teaching processes, answers to those problems, and teacher feedback.	categorization model to assign each data element in the dataset to a predetermined group.	Precision 91.816 %, FPrate 1.445, Accuracy 92.14%, Recall 91.7%.
Hasenbein 2022 et. al [18]	tChanging "traditional" classrooms into IVR settings has great potential as a research and practice methodology in the field of education.	student exclusion was due primarily to hardware issues encountered during data gathering (for example,	network analysis applied to eye-tracking data from an interactive voice response (IVR) learning environment.	accuracy
Roegiers 2022 et. al [19]	It discloses a novel analyzation method for psychological research by utilizing machine learning	classification is a learning problem that tries to predict the category to which a new observation sample belongs from a predefined set of categories	the behavior classification model to achieve a high accuracy for the four behavior types on not only the current dataset of interviews	Accuracy

TABLE NO. 2 RESEARCH GAP

Sr. no.	Author	Year	Research gap
1.	Mokhtar [20]	2022	The results are in line with previous studies showing that users' performance and effort expectations play a major role in shaping their behavioral intentions to use eLearning.
2.	Shanbehzadeh [21]	2022	This investigation was financially supported by the North Khor-asan University of Medical Sciences, and its research deputy was
3.	Gupta [22]	2022	Tuning the settings with two distinct sets of cases was used in this study.
4.	Gorriz [23]	2022	grouping subjects evenly with the intention of decreasing the weight given to predictors that are irrelevant to the study topic at hand is a process that can prove challenging at times.
5.	Atlam [24]	2022	Researchers look at whether or not students' increased usage of online learning tools during the COVID-19 epidemic is related to the spread of the virus.

III STUDENT PERFORMANCE:

Students in a case methods course might be graded on their participation in class, the quality of their written and oral presentations, and their ability to work in groups to solve problems. Here, we'll focus on classwork because it's crucial to the case study but also frequently accounts for a significant portion of a student's letter grade. An experienced specific instance instructor evaluates learner engagement by considering each student's charitable donation to the class's learning during class discussions. It can be challenging to develop objective evaluations of these contributions. The quality of individual contributions is influenced by both the content and the manner in which they are presented within the setting of the class discussion. Increasing participation is often beneficial, but making too many comments might result in poorer contributions and show a preference for speaking over listening[13].

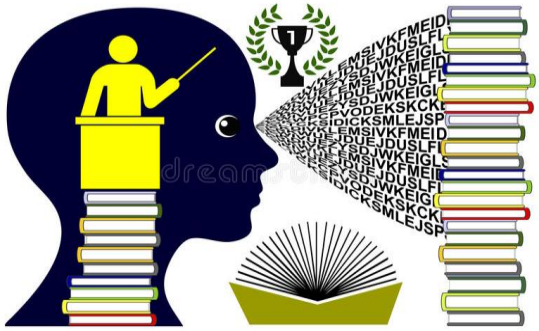

Figure 2 Student's performance

When conducting an evaluation of student involvement, teachers need to be aware of the significant impact that the patterns of questions and follow-ups they ask, as well as the kind of questions they ask specific students, had on the academic success of the kid. How well the instructor's chosen technique for recording students' names and attendance works of individual students is another factor that may have a sizeable bearing on the precision of the overall evaluation. The participant-centered case study methodology creates higher expectations and chances for feedback in compared to lecture-based pedagogies[14]. When students contribute to class discussions, they often hear immediate criticism of their views from both the instructor and their peers. The ambiguity or indirectness of this type of feedback leaves students wondering how their contributions will be received and how they might improve their effectiveness. Since it pushes students to develop their own abilities for self-reflection and evaluation, this isn't necessarily a positive thing. It's not uncommon for students to approach their instructors and peers for more comments in informal settings. In addition, each area of study has its own set of learning standards, which both identify the academic requirements to be met and describe the level of competence required to meet those requirements successfully[14]. The following are some examples of performance-based activities that can include two or more themes and, whenever it is practicable, should comply to the norms of the twenty-first century:

- Originality and inventiveness
- Capacity for creative problem-solving and analytical reasoning
- Coordination and open lines of communication

In addition, there are requirements for performance-based learning that are incorporated into the standards for media literacy as well as information literacy. It's possible that students will struggle to finish exercises based on their performances. They need to begin with a clear understanding of what is expected of them and how their performance will be judged. Although providing models and examples can be helpful, it is much more important to outline the particular criteria that will be used to evaluate the performance-based

assessment. A grading rubric needs to take into account all of the criteria. The utilization of observations as an essential component that can continue to provide feedback to learners in order to enhance their overall performance is one way to achieve this goal. Both the instructors and the students can benefit from using observations[15]. Evaluation of students by other students is a viable option. A checklist or tally might be used to monitor the level of achievement attained by students. A performance-based education should not simply consist of making pupils recollect facts; rather, it should attempt to improve what they have already learned. When it comes to constructing assessments for results-based learning, a wonderful place to begin is by selecting one or more of the six different kinds of activities that are detailed below.

ASSESSMENT AND EVALUATION OF STUDENT ACHIEVEMENT

The primary purpose of any form of assessment or evaluation should be to better students' learning opportunities. Teachers can better identify students' needs and pinpoint areas where the curriculum is lacking thanks to the data they collect through assessments & evaluations. The purpose of assessments and evaluations is twofold: first, to determine the strengths and weaknesses of a certain program and set of teaching methods; and second, to better meet the unique needs of each student. Assessment is the process of collecting data from multiple sources (such as homework, class projects, & a midterm exam) that accurately reflects how well students are following the requirements established in the curriculum. As a component of the grading process, teachers provide students detailed feedback that directs their attention and energy toward areas in which they might improve. Please take note that the following will be the breakdown of the final mark for every course that you take: Assessments taken during the course account for 70% of the final mark, with more weight being given to more recent evaluations and more consistent examples of student success [16]. The remaining 30% of your grade will come from a final evaluation that you design based on the topics you've studied. A complete breakdown of the marks may be found below. The information that is acquired through an evaluation helps teachers analyze not only the strengths and weaknesses of their pupils but also their overall level of comprehension of the subject matter. Further, with the aid of an assessment, teachers can modify their approaches to instruction to tailor their lessons to the needs of individual students. Assessment is the method of gathering data about a learner's progress toward meeting course objectives through the use of a variety of outputs, observations, and conversations. This information is used to determine whether or not the student has passed the assessment. As a component of the grading process, teachers provide students with detailed feedback that directs their attention and energy toward areas in which they might improve. Evaluation is the procedure through which the quality of a pupil's work is judged according to established criteria and a numerical value is assigned to represent that quality. The value is communicated to students in secondary schools in the province of Ontario through the use of an overall grade. Teachers are required to use evaluation and evaluation procedures that are valid, reliable, and contribute to the enhancement of student learning in order to fulfill their responsibility of ensuring the validity and dependability of assessment and evaluation practices address not only not only how much and how well pupils learn; both academic performance and other indicators, such as the achievement chart, play a role [17]. Descriptions in Ministry are varied, given over time, and made to give students opportunities to demonstrate their learning across a wide spectrum; they are suitable for the learning activities employed, the goals of instruction, and the requirements of the students, and they are administered in a fair and transparent manner to all students; Increase students' ability to evaluate their own instruction and set specific goals; are explained clearly to students and their parents when they start the course as well as at others appropriate moments throughout the course.

FINDINGS OF ASSESSMENT OF STUDENT PERFORMANCE

Alignment: the first requirement for tests to just be able to accomplish all the lofty goals outlined by reformers is the alignment of exams and standards. The Title I statute requires that state evaluations "be aligned with the Country's challenging material & performance standards" because the theory of standard for women reform requires alignment. The tests must match the standards-based educational objectives for alignment to take place. Aligned assessments also give the general public a way to assess how well students are doing in relation to the standards. Alignment may be difficult to accomplish, according to research commissioned by the committee. The research analyzed starting-reading requirements and assessments in four states' primary schools. The researchers estimated the degree to which the evaluation directly tested the standards by analysing the dimension of both the norms or the assessment items using a methodology by Webb (1997).

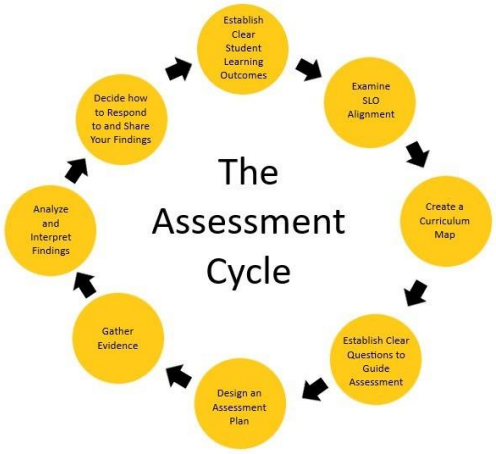

Figure 4 Student assessment cycle

According to the study, three out of the four nations had a high degree of alignment, one had a low alignment level,

while the other had a modest degree of alignment. State A, one of the two commonly oriented states, achieved its cohesiveness, at least in part, by relying on the commercial specific test it used to develop its standards and by making sure that those standards remained the least cerebrally sophisticated of all the states analysed[18]. The level of coherence was lowest in State B, where the state-created exam only measured 30% of the stated goals. despite having standards with the greatest level of cognitive complexity. In each of the other two states, there were two reading tests administered. The national comprehension significant process roughly the same cognitive and content levels as the State C rule test, demonstrating a high level of alignment. However, orientation in State D was affected by a second oral reading test attempt. However, overall, there was a modest alignment of standards and assessments in that nation.

There are several plausible causes for why arrangement is difficult to achieve, according to the Wixson study. One has to do with the method states employed to produce their assessments. Unless a state specifically develops a test that evaluates its benchmarks features of the new to complement the exam, as Govt A did in the study—it is unlikely that the test and the standards will be in line[19]. This is particularly valid if the state makes use of another off test. It is possible to design commercial tests for off-the-shelf use with the intention of selling them in different states, but it is unlikely that every one state's benchmarks will be met by these tests due to the wide variation in state standards. States that use commercial tests will therefore probably discover discrepancies between the tests as well as their standards. However, states are likely to discover gaps even when they set out to create an exam to gauge their standards. This is largely because a medical test is improbable to cover all of a government's requirements, especially given the lengthy lists of requirements some states are using. The limitations placed on tests, such as checking time and cost, may also limit their capacity to tap standards. Due to time restrictions, some states can only offer tests that last a few hours, which makes it difficult for them to have enough items to accurately measure each standard. States now heavily rely on items that are machine scored than hand scored items due to financial constraints.

However at point, many skill tasks that assess competencies like writing ability and the capacity for mathematical communication demand more expensive manual scoring. Similar to this, test technical specifications—especially when outcomes carry consequences—have prompted the use of measurements made may be restricted in some states. Researchers found that the technical quality of some performance items may not have been adequate for use in elevated situations[20].

Figure 5 Research analysis of student

An approach to developing performance assessments has been developed by scientists from National Institute for Studies on Analysis, Standards, and Student Testing (CRESST). With this strategy, the tasks on the appraisal are meant to be directly connected to the educational expectations that are ingrained in core subjects. Model-based efficiency assessment is a method that combines a way for districts and states to assess student achievement in comparison to standards with a manner for teaching staff to get precise guidelines for instructional direction.

Validity of Inference: The validity of the deductions that can be derived from assessment data will determine how well tests satisfy the reformers' goals of reporting educators' mastery of requirements and informing teaching. You can only learn so much about a student's knowledge as well as skills in a particular subject from a one- or two-hour test, and you can learn even less from a test that only includes performance items (but the quality of the details is significantly different). Prospective students' scattered data can be aggregated [21], in addition, independent measurements will nullify each other, increasing the amount of data that these tests may offer classrooms, schools, and school districts. However, there is still a lack of data on the outcomes of schools as well as school districts that can be gleaned from large-scale tests. One rationale for this is that overall averages, which may be deceptive, hide the efficiency of groups within in the total. This is particularly problematic because variations within schools are typically smaller than variations between schools. Think about two schools as an illustration. Even though Education A has a large percentage of high achievers, its low achievers consistently perform below average. Compared to School A, School B has a lot fewer high achievers, but its lower achievers outperform those at School A by a significant margin. Even though some students in School A conduct below averagely, a district policy maker may reach the conclusion purely on the basis of average scores, that School One is significantly more effective than School B. On the other hand, School B's success in raising the performance of its underperformers would go unnoticed[22].

It is hard to say whether a school's superlative achievement is the result of superior classroom methods because school achievement depends on many factors, only some of which

the school can control. Test results by themselves don't necessarily indicate "school effects," or how attending a different school affects a student's performance, due to differences in student makeup. However, it was shown that using statistical methods to take into account student background factors made it possible to calculate at least the highest and lowest boundaries of school effects. Separately, Sanders has created a statistical technique to determine the impact of individual teachers within one school on student performance. Numerous districts have employed Sanders' method to assess the "value added" that teachers bring[23].

- Tests' level of sensitivity to and response to instruction influence teaching practise varies. Many tests, especially those that are meant to measure a variety of standards, are not very sensitive to the way students were taught; therefore, changing teaching methods better test outcomes for such evaluations. However, even tests that do document the results of instructional improvement may not be as instructive as they could be because of the way results are graded and presented, which offers little understanding of the factors that made a significant contribution to pupils' success or failure.to better reflect standards don't always

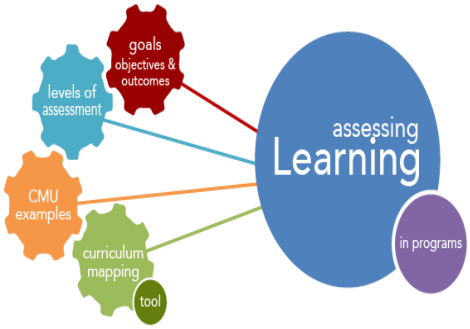

Figure 6 Academic performance assessment learning

IV MACHINE LEARNING

Machine learning is a cutting-edge technique that allows computers to rapidly gain insights from data archives. Machine learning is the process of developing mathematical models and making predictions based on past data and information using a variety of methods. Recommender systems, email filters, Facebook cars, picture recognition, and speech recognition are just few of the many contemporary applications. In the actual world, we interact with humans who can learn from their mistakes, and we also have computer systems and other computers that carry out our orders. Is it possible for a machine to acquire knowledge through observation and experience as effectively as a human? The value of deep learning has been demonstrated.

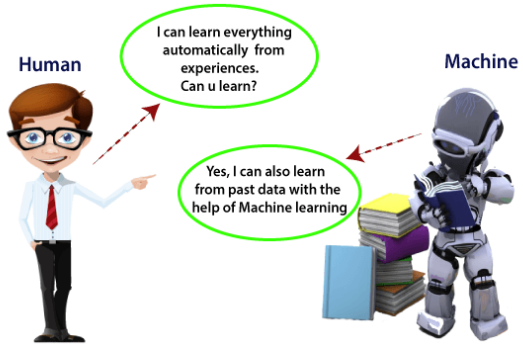

Figure 8 Machine learning

Machine learning, according to its proponents, is a subfield of artificial intelligence (AI) that primarily concerns itself with the creation of algorithms that permit a computer to learn independently from data and experience. In a nutshell, we can say that "With the aid of machine learning, a machine can forecast outcomes without being autonomous and automatically learn from data" Machine learning algorithms are able to learn from examples in the past, often known as "training data," and use this information to make predictions and judgments without being explicitly instructed to do so by humans. Machine learning combines the fields of statistics & computer science to generate prediction models. Machine learning either develops its own algorithms or uses ones that do so. The more details we provide, the better the performance. When presented with new data, a system with computational intelligence can make predictions based on the past predictions it has made. It is easier to construct a model that accurately predicts the outcome when working with a larger data collection, so the amount of information used helps determine how accurately the outcome is predicted. Imagine that we are faced with a challenging situation that calls for some predictions. We can just feed the data to generic algorithms instead of writing the code for it, or the machine will create the logic and predict the results based on the data. The use of machine learning has altered our viewpoint on the problem[25]. The graphical representation below explains how the data augmentation algorithm works:

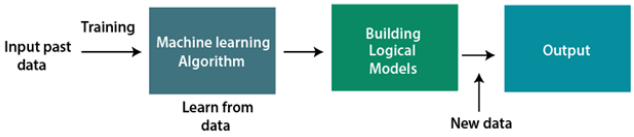

Figure 9 Machine learning flow chart

The significance of machine learning is growing. Machine learning is indispensable because it can handle jobs that would be impossible for a human to handle alone. Because of our inherent limitations as humans, computer systems & machine learning are indispensable tools. Machine learning algorithms can be trained to sift through data sets, create models, as well as predict the required outcome automatically by providing them with enormous amounts of

data. The cost function can be used to specify how well a machine-guided learning system has to perform in relation to the available data. We can save costs and speed up processes with the help of data mining. Thanks to these examples of applications, the value of machine learning may easily be grasped [26]. Self-driving cars, malware detection, facial recognition, & Facebook friend suggestions are just some of the current uses for machine learning. Several leading corporations, including Netflix and Amazon, have built machine-learning models that utilize vast amounts of data to analyze customer fascination and make product recommendations.

- **Supervised Learning**

In supervised learning, a computer learns by observing examples of labeled data and making predictions based on those examples. The system builds a model to comprehend and acquire knowledge from the datasets using the labeled data[27]. The model is evaluated using data samples to see if it successfully predicts the desired result after training and processing.

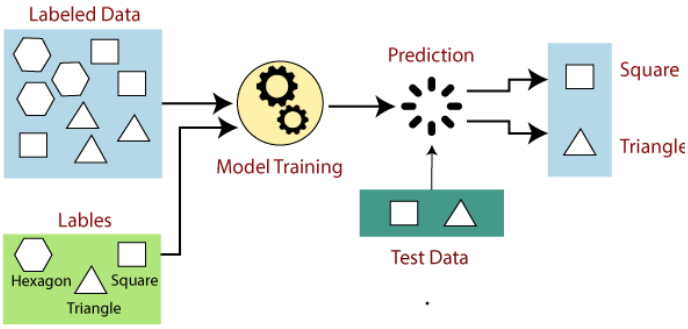

Figure 10 shows supervised learning

In supervised learning, The main goal is to map the data from input and output. Similar to when a pupil is learning below a teacher's supervision, supervision is the cornerstone of supervised learning. One of the best applications of supervised learning is spam filtering.

- **Unsupervised Learning**

Unsupervised learning is a kind of education where a computer learns without any assistance from a human. The algorithm must act independently on the collection of unidentified, unclassified, as well as uncategorized data used to train the machine. The purpose of unsupervised learning is to convert data into previously unseen features or a set of objects that have common characteristics.

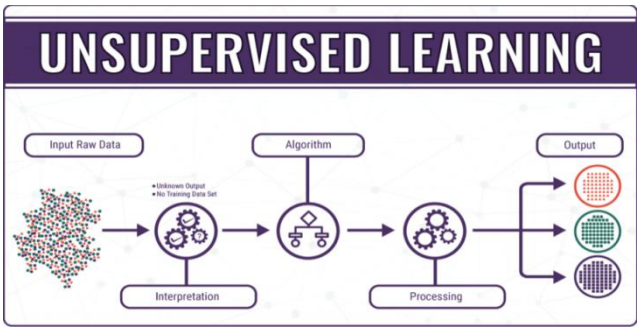

Figure 11 Unsupervised Learning

Unsupervised learning has no predetermined result. The computer looks through the enormous amount of data in search of insightful information. Additionally, Algorithmically, it can be broken down into two distinct types.

- **Reinforcement Learning**

In this type of reinforcement learning, a learning agent receives a reward for every successful decision it makes and a punishment for every mistake. The agent gains immediate insight and performance enhancement thanks to the remarks. During the process of reinforcement learning, an actor explores and engages with its environment. A better agent will perform because its goal is to collect the most loyalty points.

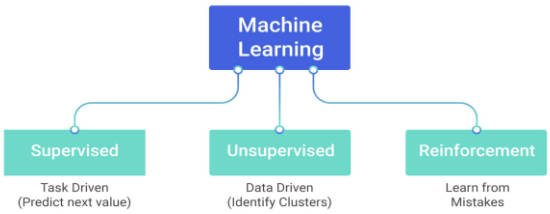

Figure 12 Type of Machine Learning

The robotic dog's arms were taught to move using a combination of two learning approaches; this is an example of reinforcement learning. Machine learning (ML) is a branch of AI that aims to create self-improving machines by teaching them new skills using existing data. Machines and computer systems that can "think" like humans are commonly referred to as having artificial intelligence. Although they are frequently used synonymously and in the same discussions, There are important distinctions between machine learning (ML) and artificial intelligence (AI). Despite the fact that machine learning has always been a part of AI, not all AI involves learning, which makes a crucial distinction. Nowadays, machine learning is applied everywhere[28]. Our relationships with banks, online merchants, as well as social media platforms are streamlined, secure, and efficient thanks to machine learning algorithms. Due to the rapid advancement of the technology that underpins machine learning, we have only begun to get to the bottom of its potential.

There is no magic formula for obtaining secrecy in machine learning. The level of privacy offered by the methods described in this article depends on the machine learning algorithm used, the resources and abilities of the adversary, & counting. Therefore, in order to achieve higher levels of privacy, it might be necessary to combine or combine a number of privacy-preserving ML techniques[29].

CONCLUSION:

It is crucial to have the ability to effectively estimate student achievement whether talking about higher education, schooling that is more in-depth, or even relationships. Students are able to select classes that provide them with the most advantageous learning approaches thanks to the use of predictive analytics into the process. It enables educators to monitor students and provide additional support, combine several training packages to get the greatest results, and forecast how well students will do in their coursework. Student forecasting has a number of advantages, one of which is that it reduces the impact that inadequate early warning signals have on the necessity to expel students. Students can have a better idea of what their lives will be like in the future if they choose courses and modes of study that are tailored to their unique sets of strengths and passions. Throughout the course of this inquiry, the Support Vector Classifier distinguished itself as the most useful tool by virtue of its scores of 0.888 relative to f1, recall, precision, and accuracy. These values represent the precision of the data classification. Throughout the course of this research, the following statistical approaches—Ensemble, logistic regression, random forest, AdaBoost, and XG Boost—were applied.

REFERENCES:

[1] M. C. Sáiz-Manzanares, R. Marticorena-Sánchez, L. J. Martín-Antón, I. González Díez, and L. Almeida, “Perceived satisfaction of university students with the use of chatbots as a tool for self-regulated learning,” *Heliyon*, vol. 9, no. 1, p. e12843, 2023, doi: 10.1016/j.heliyon.2023.e12843.

[2] M. Nasser Alsubaie, “Predicting student performance using machine learning to enhance the quality assurance of online training via Maharat platform,” *Alexandria Eng. J.*, vol. 69, pp. 323–339, 2023, doi: 10.1016/j.aej.2023.02.004.

[3] F. Ortin, G. Facundo, and M. Garcia, “Analyzing syntactic constructs of Java programs with machine learning,” *Expert Syst. Appl.*, vol. 215, no. October 2022, p. 119398, 2023, doi: 10.1016/j.eswa.2022.119398.

[4] B. Gencoglu, M. Helms-Lorenz, R. Maulana, E. P. W. A. Jansen, and O. Gencoglu, “Machine and expert judgments of student perceptions of teaching behavior in secondary education: Added value of topic modeling with big data,” *Comput. Educ.*, vol. 193, no. September 2022, p. 104682, 2023, doi: 10.1016/j.compedu.2022.104682.

[5] J. L. Martín-Núñez, A. Y. Ar, R. P. Fernández, A. Abbas, and D. Radovanović, “Does intrinsic motivation mediate perceived artificial intelligence (AI) learning and computational thinking of students during the COVID-19 pandemic?,” *Comput. Educ. Artif. Intell.*, vol. 4, no. January, p. 100128, 2023, doi: 10.1016/j.caeai.2023.100128.

[6] M. Z. Iqbal and A. G. Campbell, “Telematics and Informatics Reports AGILEST approach : Using machine learning agents to facilitate kinesthetic learning in STEM education through real-time touchless hand interaction,” *Telemat. Informatics Reports*, vol. 9, no. December 2022, p. 100034, 2023, doi: 10.1016/j.teler.2022.100034.

[7] N. R. Beckham, L. J. Akeh, G. N. P. Mitaart, and J. V Moniaga, “Determining factors that affect student performance using various machine learning methods,” *Procedia Comput. Sci.*, vol. 216, no. 2022, pp. 597–603, 2023, doi: 10.1016/j.procs.2022.12.174.

[8] J. Agarwal and J. Agarwal, “ScienceDirect ScienceDirect Detection and classification of anxiety students through the application of machine learning Detection and classification of anxiety in university students through the application of , machine learning,” *Procedia Comput. Sci.*, vol. 218, no. 2022, pp. 1542–1550, 2023, doi: 10.1016/j.procs.2023.01.132.

[9] J. Kunhoth, S. Al Maadeed, M. Saleh, and Y. Akbari, “Exploration and analysis of On-Surface and In-Air handwriting attributes to improve dysgraphia disorder diagnosis in children based on machine learning methods,” *Biomed. Signal Process. Control*, vol. 83, no. February, p. 104715, 2023, doi: 10.1016/j.bspc.2023.104715.

[10] V. Terziyan, D. Malyk, M. Golovianko, and V. Branytskyi, “Encryption and Generation of Images for Privacy-Preserving Machine Learning in Smart Manufacturing,” *Procedia Comput. Sci.*, vol. 217, no. 2022, pp. 91–101, 2023, doi: 10.1016/j.procs.2022.12.205.

[11] M. Duquesnoy, C. Liu, D. Zapata, V. Kumar, E. Ayerbe, and A. A. Franco, “Machine learning-assisted multi-objective optimization of battery manufacturing from synthetic data generated by physics-based simulations,” *Energy Storage Mater.*, vol. 56, no. December 2022, pp. 50–61, 2023, doi: 10.1016/j.ensm.2022.12.040.

[12] S. M. Asish, A. K. Kulshreshth, and C. W. Borst, "Detecting distracted students in educational VR environments using machine learning on eye gaze data," *Comput. Graph.*, vol. 109, pp. 75–87, 2022, doi: 10.1016/j.cag.2022.10.007.

[13] M. H. Kaspersen, K.-E. K. Bilstrup, M. Van Mechelen, A. Hjort, N. O. Bouvin, and M. G. Petersen, "High school students exploring machine learning and its societal implications: Opportunities and challenges," *Int. J. Child-Computer Interact.*, vol. 34, p. 100539, 2022, doi: 10.1016/j.ijcci.2022.100539.

[14] S. Rajendran, S. Chamundeswari, and A. A. Sinha, "Predicting the academic performance of middle- and high-school students using machine learning algorithms," *Soc. Sci. Humanit. Open*, vol. 6, no. 1, p. 100357, 2022, doi: 10.1016/j.ssaho.2022.100357.

[15] V. Sheth, U. Tripathi, and A. Sharma, "A Comparative Analysis of Machine Learning Algorithms for Classification Purpose," *Procedia Comput. Sci.*, vol. 215, pp. 422–431, 2022, doi: 10.1016/j.procs.2022.12.044.

[16] P. Meena and G. Kumar, "Online food delivery companies' performance and consumers expectations during Covid-19: An investigation using machine learning approach," *J. Retail. Consum. Serv.*, vol. 68, no. May, p. 103052, 2022, doi: 10.1016/j.jretconser.2022.103052.

[17] W. Rujuan and W. Lei, "Research on E-learning Behavior Evaluation of Students Based on Three-way Decisions Classification Algorithm," *Procedia Comput. Sci.*, vol. 208, pp. 367–373, 2022, doi: 10.1016/j.procs.2022.10.052.

[18] L. Hasenbein *et al.*, "Learning with simulated virtual classmates: Effects of social-related configurations on students' visual attention and learning experiences in an immersive virtual reality classroom," *Comput. Human Behav.*, vol. 133, no. October 2021, 2022, doi: 10.1016/j.chb.2022.107282.

[19] S. Roegiers, E. Corneillie, F. Lievens, F. Anseel, P. Veelaert, and W. Philips, "Distinctive features of nonverbal behavior and mimicry in application interviews through data analysis and machine learning," *Mach. Learn. with Appl.*, vol. 9, no. May, p. 100318, 2022, doi: 10.1016/j.mlwa.2022.100318.

[20] M. 202, M. Habes, E. Youssef, S. A. Salloum, R. Alfaisal, and A. Ziani, "SEM-ANN-based approach to understanding students' academic-performance adoption of YouTube for learning during Covid," *Heliyon*, vol. 8, no. 4, p. e09236, 2022, doi: 10.1016/j.heliyon.2022.e09236.

[21] M. Shanbehzadeh, H. Kazemi-Arpanahi, M. Bolbolian Ghalibaf, and A. Orooji, "Performance evaluation of machine learning for breast cancer diagnosis: A case study," *Informatics Med. Unlocked*, vol. 31, no. June, p. 101009, 2022, doi: 10.1016/j.imu.2022.101009.

[22] S. Gupta, K. Saluja, A. Goyal, A. Vajpayee, and V. Tiwari, "Comparing the performance of machine learning algorithms using estimated accuracy," *Meas. Sensors*, vol. 24, no. September, p. 100432, 2022, doi: 10.1016/j.measen.2022.100432.

[23] J. M. Gorriz *et al.*, "A hypothesis-driven method based on machine learning for neuroimaging data analysis," *Neurocomputing*, vol. 510, pp. 159–171, 2022, doi: 10.1016/j.neucom.2022.09.001.

[24] E. S. Atlam, A. Ewis, M. M. A. El-Raouf, O. Ghoneim, and I. Gad, "A new approach in identifying the psychological impact of COVID-19 on university student's academic performance," *Alexandria Eng. J.*, vol. 61, no. 7, pp. 5223–5233, 2022, doi: 10.1016/j.aej.2021.10.046.

[25] M. Ryo, "Explainable artificial intelligence and interpretable machine learning for agricultural data analysis," *Artif. Intell. Agric.*, vol. 6, pp. 257–265, 2022, doi: 10.1016/j.aiia.2022.11.003.

[26] R. Lamb, K. Neumann, and K. A. Linder, "Real-time prediction of science student learning outcomes using machine learning classification of hemodynamics during virtual reality and online learning sessions," *Comput. Educ. Artif. Intell.*, vol. 3, no. May, p. 100078, 2022, doi: 10.1016/j.caeai.2022.100078.

[27] J. P. Bernius, S. Krusche, and B. Bruegge, "Machine learning based feedback on textual student answers in large courses," *Comput. Educ. Artif. Intell.*, vol. 3, no. May, p. 100081, 2022, doi: 10.1016/j.caeai.2022.100081.

[28] M. Goyal, C. Gupta, and V. Gupta, "Heliyon A meta-analysis approach to measure the impact of project-based learning outcome with program attainment on student learning using fuzzy inference systems," *Heliyon*, vol. 8, no. April, p. e10248, 2022, doi: 10.1016/j.heliyon.2022.e10248.

[29] B. Nita *et al.*, "Machine learning in the enrolment management process: a case study of using GANs in postgraduate students' structure prediction," *Procedia Comput. Sci.*, vol. 207, no. Kes, pp. 1350–1359, 2022, doi: 10.1016/j.procs.2022.09.191.