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LEARNING AUDIT SYSTEM

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ABSTRACT
More significantly, it is observed that the dependency on human capital inputs, on know-how and skill, competence, and expertise, is one of the distinguishing characteristics of the knowledge-based economy. While outcome-based learning and teaching places more emphasis on understanding concepts, skills, and competencies, content-based learning and teaching is centred on the rote memorising of factual knowledge, which necessitates adjustments in teaching, learning, and evaluation methodologies. Every stage of education in the twenty-first century is influenced by technology and innovation. Since technology and education are being utilised in tandem to close learning gaps created by the pandemic, outcome-based education (OBE) has the potential to replace or revolutionise existing educational models in a significant way. OBE also promotes higher learning results and is more adaptable to each child's particular learning styles. We provide the ROOTs (Result oriented optimizing technology) system as a means of addressing this issue. Our approach is built on the idea that when teachers and students are assisted through many channels, learning happens effectively. With innovative assessment and analysis tools to identify different trends in individual learning and to map out learning patterns to accelerate growth and design a distinctive method to provide students with outcome-based learning, Edubull seeks to shift the paradigm ahead from rote learning to capability building an outcome-based education in students.

Keywords: *Outcome-based learning (OBE), National education policy (NEP), Result oriented optimizing technology (ROOTs), Learning audit system, Pandemic, Education*

1. INTRODUCTION

Whether explicitly stated or not, the goal of any educational system is to create competent, self-assured people who can use the knowledge and skills they have learned to significantly improve their own lives as well as the development of society at large. The educational system must create people who can adapt to a changing reality. Employers and other stakeholders, however, have recently voiced concerns about our graduates' abilities to carry out their responsibilities in accordance with their educational backgrounds and grades. Employers, in particular, claim that while many graduates have high exam results, they lack the skills necessary for the workplace. When deciding who to hire, employers talk about the competencies they require rather than the candidate's academic background, [1]. More significantly, it is observed that the dependency on human capital inputs, on know-how and skill, competence, and expertise, is one of the distinguishing characteristics of the knowledge-based economy.While outcome-based learning and teaching places more emphasis on understanding concepts, skills, and competencies, content-based learning and teaching is centred on the rote memorising of factual knowledge, which necessitates adjustments in teaching, learning, and evaluation methodologies [2].

Any academic program's curriculum needs to have certain sections rewritten in light of societal changes and the current state of knowledge in the subject matter. Many previously learned concepts return at higher levels, which not only prolongs the monotony of repetition but also makes the outdate believable once more rather than allowing pupils to unlearn them. Higher levels receiving the same teachings without distinction hinder learning because it reduces everything to memorization. Understanding ends when memory takes precedence over it. Such anomalies should never take place in education, a highly important and delicate field of human endeavour [3]. It is rather irritating that this is the case despite technology advancements offering efficient methods of instructing how to learn by unlearning in a systematic manner. This is among the most significant issues that higher education around the world is facing as a result of techno-economic globalisation, which is shaking the foundation of knowledge production. It is true that the so-called knowledge creation has increased exponentially at an astounding rate, but much of this knowledge is only information. As a result, knowledge transmission has become even more mechanical and distancing. It goes without saying that instruction and learning are of abysmally low quality now. It is being severely questioned whether this type of improper information production and exchange even qualifies as education [4].

Reviving teaching learners how to learn and extending learning through methodical unlearning are essential components of quality assurance. Outcome-based Education (OBE) has become increasingly important in this environment as a way to achieve excellence. The foundation of OBE is an educational idea that unites all facets

of the schooling institutions with a predetermined set of results. Results are portrayed as things that every student must eventually obtain at the conclusion of their educational journey. OBE insists that determining the course's learning objectives come first. The outcomes that are chosen should result from the material, instructional methodologies, learning opportunities, evaluation techniques, and assessment. Each curriculum ought to have its own intended outcomes at various levels of higher education, which should be logically explained through a linked process that can be justified in terms of its capacity to create graduates with present outcomes. The justification of the course's goals, i.e., the outcomes, and how they will be attained through the various steps in the process, can be used to determine its worth or desirability before it is ever put into practise [5].

This is why there is an effort to move away from rote learning and toward developing students' capabilities. To do this, there are various tools for assessment and analysis that can be used to identify patterns in individual learning and to map out learning patterns that can be used to accelerate growth.

1.1 Objectives

The main objective of this research is to develop the application for student learning audit and the gap analyzing. The following goals are focused in this application development:

1.To study the shift paradigm from rote learning to outcome-based learning.

2. To study the effect of Pandemic on education.

3. To analyse the performance of students on the basis of skills not only grades.

2. LITERATURE REVIEW

2.1 Outcome-based Education (OBE)

Every stage of education in the twenty-first century is influenced by technology and innovation. Since technology and education are being utilised in tandem to close learning gaps created by the pandemic, outcome-based education (OBE) has the potential to replace or revolutionise existing educational models in a significant way. OBE also promotes higher learning results and is more adaptable to each child's particular learning styles [3].

The concept of outcome-based education (OBE) centres instruction on actions that produce predetermined results. It immediately contributes to the pupil becoming more proficient in a certain skill, knowledge, or behaviour. Outcome-based education is defined as "An OBE curriculum involves starting with a clear image of what is vital for students to be able to perform, then designing the curriculum, instruction, and evaluation to ensure this learning finally occurs," according to Spady (1994).

Spady (1994), a sociologist who pioneered outcome-based education, recommended against outlining the goals of this student-centered strategy instead, he provided the following foundational ideas for his outcome-based methodology, which are also worth reading [4].

- Student-centered learning is a strategy that demonstrates and assesses a learner's mastery of a particular skill.
- The learning outcome must be made clear to the learner even at the beginning of the learning process. This paradigm focuses on getting the learners to produce certain outputs.
- Design down; deliver up refers to the idea that the curriculum must be created with a clear definition that outlines the desired results. This will open up new possibilities for improving the student's performance.
- All pupils are capable of delivering the greatest level of performance, exceeding expectations. The only way to achieve lofty expectations is to give them the belief and encouragement they need.
- Expanded possibilities entail providing pupils with a myriad of chances and ways to demonstrate that they have achieved their goals. Every learner acquires knowledge differently, at a different pace, and in different ways. Extended opportunities, though, can aid in meeting high standards. They assist pupils in learning what is most important at that precise moment.

The objective of teaching and learning is made clear through carefully crafted defined outcomes. They serve as a continuous line of quality check for curriculum planning, choice of pedagogical approaches, choice of learning environment, and exam preparation. OBE allows for continual simultaneous self-assessment of learners to ensure that they are making progress toward achieving the outcome while also providing learners with advance notice of the outcome. It gives them the option to request brand-new educational opportunities that guarantee results. Since the results are mentioned, the teachers are also made aware of the progress and have the right to verify that the students have achieved the objective [3].

2.2 National Education Policy (NEP) of India

In India, the NEP increasingly promotes pupils having skills, as seen in the most recent policy framework announced in 2020. The development of every individual's imaginative potential is underscored vigorously in schooling strategy. It depends on the possibility that schooling should encourage the improvement of not just mental capacities — including "basic" capacities like education and numeracy as well as "higher-order" capacities like decisive reasoning and critical thinking — yet in addition of social, moral, and profound capacities and attitudes.

NEP - Aims to combine the skills that are the core of educational objectives, with a focus on communication, computational thinking, reasoning skills, socio-emotional learning, and logical and quantitative reasoning.
- Individualized learning approach: recognising, recognizing, and cultivating every understudy's remarkable assets by teaching guardians and educators to help every understudy's general development in both scholar and extracurricular areas [6].

The centre of the significant changes to the educational system must be the teacher. Because they actually mould our next generation of citizens, the new education strategy must assist in re-establishing teachers as the most revered and significant members of our society at all levels. It must take all necessary steps to empower educators and support them as they carry out their duties. The new education policy must ensure livelihood, respect, dignity, and autonomy for all teachers as well as implant in the system fundamental techniques for quality assurance and accountability in order to attract the best and the brightest individuals to the teaching profession at all levels.

The new education strategy must offer a quality education system to all kids, regardless of where they live, with a focus on historically underrepresented, underprivileged, and marginalised populations. The best means of attaining equality, inclusiveness, and economic and social mobility are through education since it levels the playing field. There must be programmes in place to guarantee that, despite insurmountable difficulties, all students from these groups have access to a range of focused opportunities to enrol in and succeed in the educational system [7].

The country's local and international demands, as well as its rich diversity and culture, must be respected and honoured while incorporating these components. For the sake of fostering a sense of pride in one's country, self-assurance, self-awareness, cooperation, and integration, it is thought essential to teach India's young people about the country's diverse social, cultural, and technological needs, as well as its unique artistic, linguistic, and intellectual traditions.

2.3 Data driven and Education trifecta

For effective instruction, teachers believe that having a solid understanding of their students is essential. In addition to annual test results are the types of information that matter to teachers. Rich information about students' academic, social, behavioural, and cultural experiences is included in data that matters because it can serve to improve the relationship between teachers and students and influence how learning happens. The digital technologies are the main focus of this survey of much more than 4,600 teachers accessible to aid educators in gathering and utilising data to customise and improve instruction tailored to each learner. It gives product usage advice. Using the opinions of users, developers could make those tools better. Our objective was to include educators' voices in identifying areas of unmet demand, in order to facilitate targeted product development help learning and teaching more efficiently. Currently, 93% of teachers consistently use some type of a computer programme to direct teaching. However, almost two-thirds of teachers in a huge variety of schools around the country, cite their lack of satisfaction with the usefulness of the data or the resources for handling data that they regularly have access to [8].

Data, which is becoming more and more important in the world, can be used to understand better learning patterns and spot holes for teaching and learning. A key aspect of customised learning is the utilisation of data, which guarantees that student learning experiences—what they learn and how, when, and where they acquire it—are matched to their unique requirements, talents, and degree of conceptual comprehension.

1. The study on data use in K–12 education done by the Bill and Melinda Gates Foundation [8].
2. Technology should be used to create tools that support teachers in their instruction by providing technical assistance and real-time data processing, in addition to reinventing the teaching style.
3. According to a McKinsey report, schools should embrace a hybrid approach to teaching and learning and take note of the lessons learned from of the Covid 19 pandemic regarding the importance of technology for both students and instructors [9].
4. Academics and institutes should be careful not to measure only what is convenient or not the most important thing to measure. Multiple-choice questions and fill-in-the-blank responses still dominate traditional examinations used in post-secondary institutions and schools today. A lot of evaluations take place after learning has taken place, and the findings are typically presented months after the program has concluded. When assessments provide prompt feedback, they are more beneficial for instruction [10].

2.4 Impact of Pandemic on Education

Parents, kids, schools, and the worldwide market will face new challenges as a result of the pandemic's widespread impact on education and significant learning gaps that have been created. The major transition to e-learning and edtech, which has accelerated the use and application of technology in education, is one of the positive effects of the epidemic. Education was among the sectors in India that developed slowly and resisted change even as the internet revolution began in the early 2000s. By incorporating edtech into the educational system and adapting numerous elearning resources, it was propelled to the fore of technological improvement after 2020.

To fill the void left by the pandemic, post-pandemic learning and edtech solutions are needed.

1. By 2040, pandemic-related learning delays might cost the global economy $1.6 trillion year, or 0.9 percent of the world's GDP. According to our model, kids worldwide may have lost eight months or more of learning in the first 23 months since the pandemic began, with notable differences across and within regions and nations. For instance, kids in South Asia, Caribbean, and Latin America may be more than a year off where they would have been without the pandemic. Students may be four months behind on average in Europe and North America [11].
2. ASER (Annual Status of Education Report) [13] releases a report on the nation's entire system of education and learning each year. The educational status of our nation over the last five years has been very well indicated by this study [12].

The following are some highlights from the report that was released in January 2020:

- Only 16% of the students in Class 1 were able to read the material at the required level out of the total children surveyed in 26 districts. 40% of the children were unable to even distinguish the letters.
- At least 25% of schoolchildren in the 4 to 8 age range lacked age-appropriate cognitive and numeracy abilities.
- Another crucial point to keep in mind is that we're talking about our country, where more than 60% of people live outside of urban areas in rural areas and small towns.
- Nearly 50% of the 5-year-olds and 25% of the 4-year-olds in the districts studied come from anganwadis, and these children are much less developed cognitively and academically than their peers [13].

3. PROPOSED METHODOLOGY

Our approach is built on the idea that when teachers and students are assisted through many channels, learning happens effectively. With innovative assessment and analysis tools to identify different trends in individual learning and to map out learning patterns to accelerate growth and design a distinctive method to provide students with outcome-based learning, Edubull seeks to shift the paradigm ahead from rote learning to capability building an outcome-based education in students.

3.1 Steps involved in Workflow

There are mainly five steps which can be following for transforming the traditional root learning method into the Outcome-based learning as shown in figure1.

1. **Assigning Task-**It gives students the chance to learn, practise, and show that they have mastered the learning objectives. It gives the teacher the proof that the learners have met their objectives.
2. **Student Performance-**Grade point average (GPA) and yearly standardised tests are used to calculate a student's performance based on their responses to in-class quizzes.
3. **Gap Analyser-**To evaluate the gap between the current state and a desired, future state. It can provide information about students' remedial classes needs and where they are facing problem for understanding concepts and fundamentals.
4. **Remedial-**Remedial sessions are available to students who have lagged behind in their academics or who require temporary learning support. It aids in overcoming learning gaps.
5. **Monitoring-**Monitoring tests depending on the curriculum. To help students perform better, teachers use standardised assessments that encompass all of the topics covered throughout the course of the year.

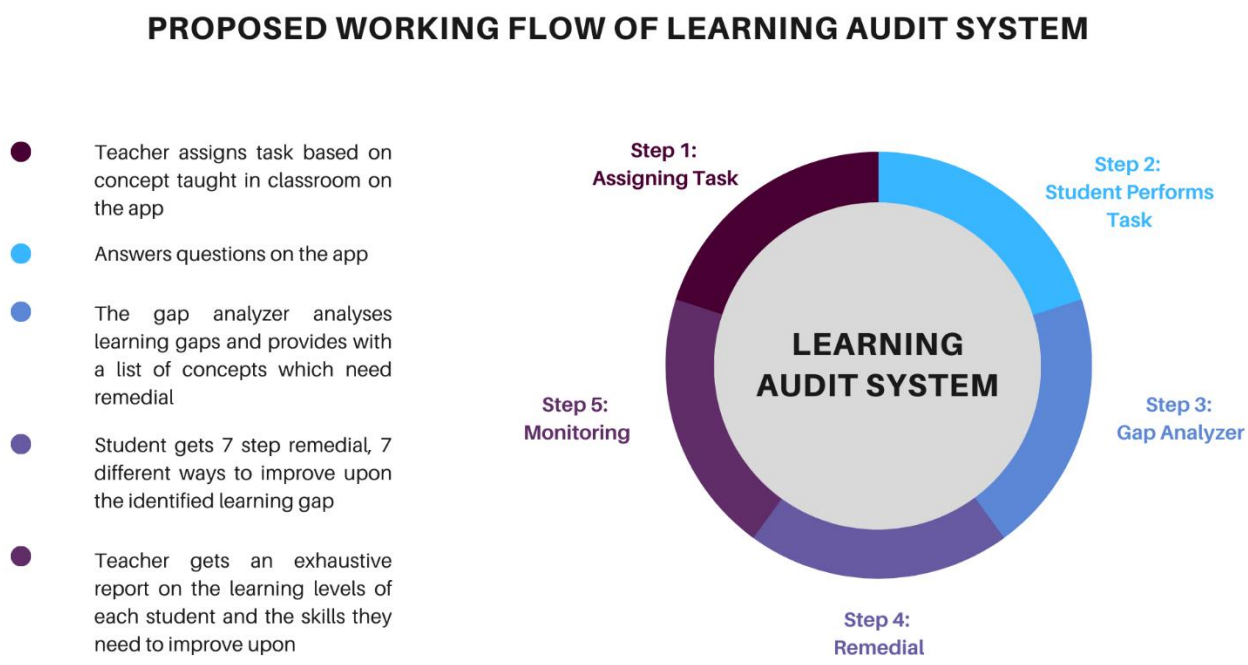

Figure1: Workflow conducted for this research work.

We provide the ROOTs system as a means of addressing this issue.

3.2 Result Oriented Optimizing Technology (ROOTS)

ROOTS is essentially a learning audit system that uses Gap Analyzer TM technology to evaluate each student's "learning gaps." Using a concept- and skill-based approach, the technology aids students in comprehending and identifying the "root" concept difficulty and provides personalised "remedial" that aid in helping them overcome their learning gap and rebuild their conceptual foundation, resulting to higher learning scores.

The vital tool Roots helps close the communication gap between students and teachers. ROOTs give teachers a robust monitoring system that they may use to keep track of both individual student success and overall classroom progress. With the help of dynamic graphics and charts that show each student's ability level, understanding level, and performance improvement, the teacher can gain a thorough picture of the students' strengths and limitations. Learning audit gives pupils a thorough overview (audit) of their present capacities and levels and equips them to advance their learning from a fundamental level. With the help of this technology, schools can operate more efficiently while providing students and instructors with the individualised instruction they need to succeed in the twenty-first century.

4 RESULTS AND DISCUSSIONS

We have discovered a number of unresolved and newly emergent issues affecting both students and educators as a result of our analysis of the shifting educational paradigms during the last five years. The distance between professors and pupils is growing despite the gradual evolution of instructional methods. Learning has been viewed by our educational system as a problem with a "one size fits all" solution. However, each kid has a special learning style that is challenging to accommodate in a classroom with a high student to teacher ratio, undermining classrooms and resulting in unrealized student potential.

4.1 Skill based education

In addition to passing the audit, the system successfully carries out one of the key goals of NEP 2020, which is to emphasise outcome- and skills-based education. We offer an unrivalled methodology that focuses on integrating cyber-physical learning to assess learning results. By putting an emphasis on outcome-based education (OBE), we hope to gauge student progress in light of their capabilities and skills. By dividing the curriculum into concepts rather than chapters, we promote individualised, goal-oriented learning. We can identify the fundamental or root causes of a child's learning gap by charting and understanding their entire learning pattern and the corresponding skills they need. We can then suggest personalised remedial through video explanations and tests at various levels to produce thorough results and improvements. The demands of the next generation should be evaluated and quantified using a new age technique that focuses on skills because the world is changing so quickly.

We evaluated essential skills using technology, including:

1. Remembering-To be able to recall something verbatim requires acquiring a competence. It is possible to get better at remembering things with practise.

2. Analytical skills-The capacity to tackle issues systematically permits you to go through information and data to think of unique, intelligent arrangements. A scientific person in the business focuses on deciphering the information and applying sensible reasoning procedures to track down an answer.
3. Application expertise- It is like a group of skills such as computer skills, leadership skills, Communications skills, problem solving skills and Customer service skills etc.
4. Effective communication-The demonstration of trading thoughts, suppositions, information, and realities to guarantee that the message is passed on and fathomed with clearness and object is known as successful correspondence. It should be finished, succinct, and clear.
5. Logical and mathematical abilities-A logical mathematical intelligence, individuals with high levels of numerical intelligence examine their data by using reasoning and looking at cause-and-effect linkages.

Table 1: Comparison between Rote learning and Outcome-based learning

ROOTs Terms	Student % in root learning	Student% in outcome-based learning
Remembering	42%	50%
Analytical Skills	48%	53%
Application Skills	40%	55%
Communication Skills	38%	48%
Logical and Quantitative Skills	35%	56%

4.2 Comparison between Rote learning and Outcome-based learning

We have taken 64 students of 12-15 years age group for our study from a normal public school and all the students were carried forward for both learning procedures, that are rote learning and outcome based ROOTs education system. Our Comparative analysis showed the significant results for both methods of learning as we mentioned in table1. A drastic difference we observed in Logical and Quantitative skills, as it was only 35% in case of rote learning method and it got increased up to 56% in outcome-based learning. Similarly, with the Application skills, students were less explored the various applications in the rote learning method and they couldn't show their talents of having many soft skills, but with the outcome-based learning, every student can exhibit their unique character and they also get various activities to explore many applications so, there we too got measurable growth from rote learning 40% and towards outcome-based learning it reached up to 55%.

Table 2: Student Assessment pattern in current education system

Assessment methods	Outcome %
Written exams	98%
Practical exams	45%
Assignments	86%
Projects	52%
Communication based exams	48%
Personality Test	40%
Reasoning test	35%
Self-evaluation	28%

4.3 Methods of Assessment Using by Teachers

Some teachers were taken for interrogative talk for student's performance and education system. As shown in Figure 2 and table2, which shows the level of assessment techniques currently used by lecturers to grade students, it appears that the trend is still toward traditional assessment techniques, such as written exams, and all respondents (98%) indicated that they use them as a tool for evaluating the cognitive, affective, and motor skills levels of their students. But teachers also value the use of assignments (86%) as a form of evaluation. Also used by the lecturers are projects (52%), practical exams (45%), communication-based exams (48%), reasoning tests (35%), self-evaluations (28%), and personality tests (40%), although when contrasted, they fall short and in some cases are at a low level.

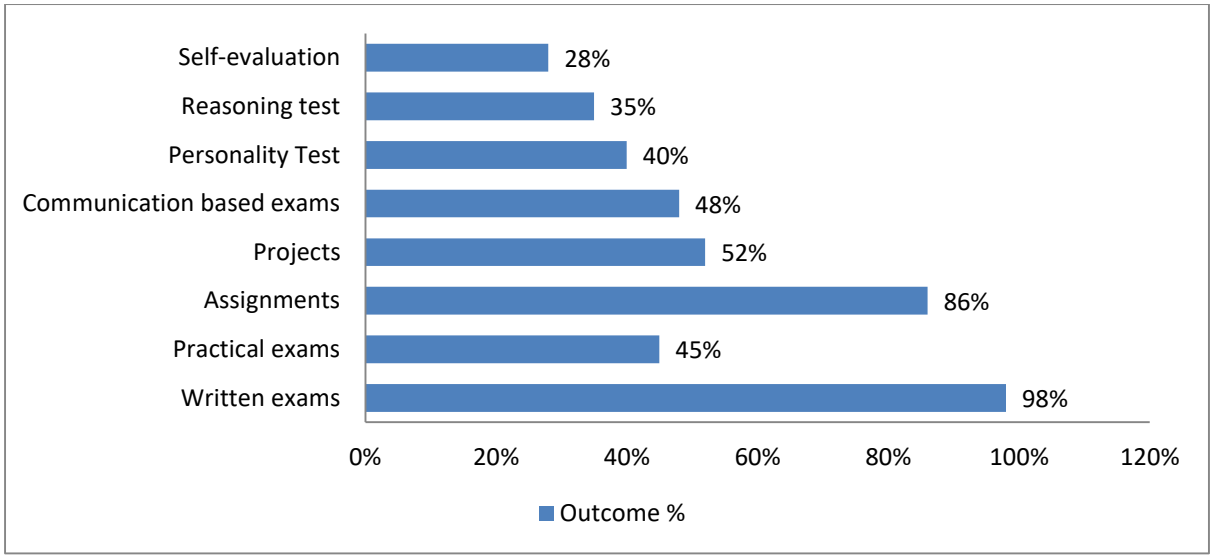

Figure2: Assessment methods used by teachers in current education system

5 CONCLUSION and RECOMENDATIONS

Grades, Scores or marks obtained have traditionally served as the benchmark for evaluating how much a person has learned. Instead, we redirect our attention to the unique cognitive abilities of the individual and evaluate learning using those abilities by challenging this strict binary of evaluation and concentrating on the causes of learning gaps. In order to attain concrete results, outcome-based education necessitates a pre-determined objective and devises a road to the goal. Concept-based education is justified. We are bridging the gap between educators and learners by recognising the abilities that need improvement and providing students with the means to do so, while also keeping the educator updated on the situation.

In order to convey the big picture of OBE-ROOTs and its professional growth with all of the faculty members, intensive training workshops should be designed by the institutions and other institutes with a strong commitment to improving the attitudes of the teachers. These types of training must be conducted by knowledgeable individuals, in particular, OBE-ROOTs trainers and master trainers, in order to discuss numerous methods for fully executing the strategy.

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Data Availability Statement

The database generated and /or analysed during the current study are not publicly available due to privacy, but are available from the corresponding author on reasonable request.

Declarations

Author declares that all works are original and this manuscript has not been published in any other journal.

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