



LITERARY FINDINGS

A Peer Reviewed International Journal of Multidisciplinary Research - ISSN: 2278-2311

லிடெரி ஃபைண்டிங்ஸ்

பல்துறை ஆய்வுக்கான பன்னாட்டு ஆய்விதழ்

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Widening Participation in Indian Mooc ‘Swayam’ – Strategies to Influence Students

Mrs.J.P.Ananthi

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Abstract

Massive Open Online Courses (MOOCs) like SWAYAM have emerged as a transformative force in India’s education landscape by offering quality learning resources to a diverse audience. Launched in 2017 by the Ministry of Education, SWAYAM seeks to democratize education through flexible and affordable online courses created by top Indian institutions like IITs, IIMs, and NPTEL. This platform aligns with the objectives of the National Education Policy (NEP) 2020, emphasizing inclusive access to learning for underserved communities. With a focus on bridging educational inequalities, enhancing digital literacy, and creating a comprehensive ecosystem for lifelong learning, SWAYAM has significantly impacted the Indian education system. The continuous development and expansion of SWAYAM, through initiatives like SWAYAM 2.0 and partnerships with educational institutions, make it a pivotal tool for achieving educational equity and preparing learners for a knowledge-driven economy.

Key Words: MOOCs, SWAYAM, Inclusive Education, Digital Learning.

I Introduction

Massive Open Online Courses (MOOCs) have revolutionized the global education landscape by making quality learning accessible to diverse learners. In India, the Ministry of Education launched the ‘SWAYAM’ platform to democratize education and provide free or low-cost online courses to learners from various backgrounds. An acronym for "Study Webs of Active-Learning for Young Aspiring Minds," SWAYAM serves as a gateway for inclusive and flexible learning opportunities across disciplines, catering to a broad spectrum of students, professionals, and lifelong learners.

Since its inception, SWAYAM has played a pivotal role in bridging educational inequalities by offering courses developed by top-notch Indian institutions such as the IITs, IIMs, and NPTEL. The platform aligns with the objectives of India’s National Education Policy (NEP) 2020, which emphasizes universal access to quality education and the use of technology to enhance teaching and learning experiences.

Widening participation in SWAYAM involves ensuring that the benefits of this innovative educational initiative reach not just urban and privileged learners, but also those from rural, underserved, and marginalized communities. This includes addressing barriers such as digital literacy, internet connectivity, and awareness of such platforms. By leveraging local languages, promoting inclusive course content, and collaborating with stakeholders, SWAYAM aims to uplift diverse learners and contribute to the vision of an empowered and educated nation.

II SWAYAM

Early Stages

- **Launch:** SWAYAM was launched in 2017 with the aim of providing high-quality educational content to learners.
- **Initial Courses:** The platform started with a limited number of courses offered by various universities and institutions.

Expansion and Growth

- **Increased Course Offerings:** Over the years, SWAYAM has expanded its course offerings to include a wide range of subjects across different disciplines.
- **Partnerships:** The platform has partnered with numerous universities, institutions, and subject matter experts to develop and deliver quality courses.
- **Technological Advancements:** SWAYAM has continuously adopted new technologies to enhance the learning experience, such as interactive content, assessments, and discussion forums.

Key Milestones and Achievements

- **Massive Reach:** SWAYAM has reached millions of learners across India, providing them with access to quality education.
- **Recognition:** The platform has received recognition and awards for its contribution to education.
- **Impact:** SWAYAM has played a crucial role in bridging the digital divide and providing opportunities for learners in remote areas.

Ongoing Development

- **SWAYAM 2.0:** The platform is continuously evolving, with SWAYAM 2.0 being launched to further enhance its capabilities and reach.
- **Integration with Other Initiatives:** SWAYAM is being integrated with other national education initiatives to create a comprehensive ecosystem for learners.
- **Focus on Quality and Accessibility:** The platform remains committed to providing high-quality education that is accessible to all learners.

III Why MOOCs like SWAYAM?

Massive Open Online Courses (MOOCs) like SWAYAM have become pivotal in transforming the Indian education system and expanding learning opportunities for millions. The key reasons for promoting and adopting MOOCs such as SWAYAM include:

1. **Democratizing Education:** SWAYAM addresses the need to make quality education accessible to all, irrespective of socio-economic background, geographical location, or age. By offering a vast array of courses from India's premier institutions for free or at nominal costs, it reduces barriers to education and promotes equity.
2. **Flexibility and Convenience:** Learners can access SWAYAM courses anytime and from anywhere, enabling working professionals, school students, college-goers, and

lifelong learners to pursue knowledge without disrupting their regular schedules. This flexibility supports continuous learning and skill development.

3. **Diverse Course Offerings:** With a curriculum that spans fields such as engineering, humanities, science, management, and technology, SWAYAM caters to a wide range of interests and academic requirements. Learners can choose from various courses, certificate programs, and credit-bearing courses that contribute to their educational goals.
4. **Quality Content from Top Institutions:** Courses on SWAYAM are created by reputed Indian institutions like IITs, IIMs, and NPTEL. This ensures that learners have access to high-quality content that meets the standards of national and international education systems.
5. **Alignment with National Policies:** SWAYAM aligns with India's National Education Policy (NEP) 2020, which emphasizes technology in education, blended learning models, and lifelong learning. By integrating MOOCs into mainstream education, the government aims to enhance the reach and effectiveness of education.
6. **Skill Enhancement and Employability:** SWAYAM offers courses that focus on skill development, employability, and career growth, which is crucial in today's competitive job market. Learners can gain industry-relevant skills and certifications that enhance their job prospects.
7. **Bridging the Digital Divide:** Through initiatives like SWAYAM PRABHA (a group of 34 DTH channels broadcasting educational content), SWAYAM aims to reach learners who have limited access to the internet. This multi-modal approach ensures that MOOCs can serve a diverse audience.

MOOCs like SWAYAM, thus, play a transformative role in promoting inclusive, flexible, and quality education, contributing to the larger goal of an educated and skilled workforce.

IV The Future of SWAYAM: A Bright Outlook

Massive Open Online Courses (MOOCs) like SWAYAM have revolutionized education, offering accessible and affordable learning opportunities to millions worldwide. As technology continues to advance, the future of MOOCs looks promising with several key trends emerging:

1. Enhanced Personalization:

- **Adaptive Learning:** MOOCs will increasingly leverage AI to tailor content and pacing to individual learners' needs and preferences.
- **Personalized Learning Paths:** Learners will be able to create customized paths based on their goals, interests, and prior knowledge.

2. Integration with Traditional Education:

- **Credential Recognition:** MOOCs will play a more significant role in formal education, with institutions offering credit or certification for completing MOOC courses.
- **Hybrid Learning Models:** MOOCs will complement traditional classroom instruction, providing additional resources and flexibility.

3. Expanded Course Offerings:

- **Micro-Credentials:** MOOCs will offer a wider range of short-term courses focused on specific skills or topics, allowing learners to acquire specialized knowledge.
- **Industry-Specific Training:** Partnerships between MOOC platforms and industries will ensure that courses align with current market demands and provide relevant skills.

4. Improved Accessibility:

- **Language Localization:** MOOCs will be available in multiple languages to reach a global audience.
- **Accessibility Features:** Platforms will incorporate features to accommodate learners with disabilities, such as closed captioning, screen readers, and alternative input methods.

5. Social and Collaborative Learning:

- **Virtual Communities:** MOOCs will foster online communities where learners can connect, collaborate, and support each other.
- **Gamification:** Incorporating game-like elements can enhance engagement and motivation.

6. Blockchain Technology:

- **Verifiable Credentials:** Blockchain can be used to issue tamper-proof certificates and credentials, ensuring the authenticity and security of MOOC completions.

While MOOCs face challenges like high dropout rates and limited interaction, their potential to democratize education and provide lifelong learning opportunities is immense. As technology continues to evolve, we can expect MOOCs to play an increasingly important role in shaping the future of education.

V Strategies to influence students

Some strategies to influence students and encourage them to enroll in SWAYAM courses:

1. Targeted Outreach and Marketing:

- **Social Media Campaigns:** Utilize popular platforms like Facebook, Instagram, and Twitter to reach a wider audience and promote SWAYAM's benefits.
- **Educational Institutions:** Collaborate with schools, colleges, and universities to integrate SWAYAM courses into their curriculum or recommend them to students.
- **Community Outreach:** Engage with local communities through events, workshops, and awareness programs to highlight the advantages of SWAYAM.

2. Personalized Recommendations and Guidance:

- **AI-Powered Recommendations:** Use artificial intelligence to suggest courses based on students' interests, career goals, and previous academic performance.
- **Personalized Learning Paths:** Create customized learning paths to cater to students with different learning styles and paces.
- **Mentorship Programs:** Connect students with mentors who can provide guidance, support, and motivation.

3. Financial Incentives and Scholarships:

- **Government Subsidies:** Advocate for government subsidies or financial aid to make SWAYAM courses more affordable for students from disadvantaged backgrounds.
- **Corporate Sponsorships:** Partner with corporations to offer scholarships or discounts for their employees or their children.
- **Student Loan Programs:** Explore the possibility of including SWAYAM courses in student loan programs.

4. Quality Assurance and Accreditation:

- **Rigorous Evaluation:** Ensure the quality of SWAYAM courses through regular evaluations and feedback from learners.

- **Accreditation:** Work towards obtaining accreditation for SWAYAM courses from recognized educational bodies.
- **Certificate Recognition:** Promote the recognition of SWAYAM certificates by employers and educational institutions.

5. Gamification and Interactive Elements:

- **Badges and Rewards:** Implement a gamification system with badges, rewards, and leaderboards to motivate students and encourage engagement.
- **Interactive Content:** Use multimedia resources, simulations, and quizzes to make learning more engaging and effective.
- **Collaborative Projects:** Foster a sense of community and collaboration through group projects and discussions.

6. Language Accessibility and Localization:

- **Multilingual Courses:** Offer courses in multiple languages to cater to a diverse student population.
- **Regional Content:** Develop courses that are relevant to specific regions and cultures.

By implementing these strategies, SWAYAM can effectively widen its reach and attract a diverse range of students, making it a valuable resource for education and lifelong learning.

VI Conclusion

SWAYAM has successfully leveraged technology to provide inclusive, accessible, and high-quality education to millions of learners across India. By expanding its reach, offering a wide range of courses, and addressing key barriers such as digital literacy and language diversity, SWAYAM plays a crucial role in widening participation and fostering lifelong learning. The platform's alignment with national educational goals, integration with other initiatives, and continuous innovation underscore its potential to shape the future of education in India. With sustained efforts and strategic partnerships, SWAYAM can further enhance its impact, ensuring that every learner, irrespective of background or location, has the opportunity to benefit from quality education and skills development.

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Effect of Life Skill Education on Higher Secondary Students Respect in Academic Achievement

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Abstract

A nation's pillars are its students. They need to have the academic and life skills they need to deal with the many challenges that life throws at them. Schooling is not simply a data granting or a thing to be learned, however a method for making a social climate which is to outfit a source for unconstrained sentiments so that man, as an individual and as a cognizant citizen, is allowed to create, or one can likewise say with the goal that he, as a person furthermore, an individual from the general public, is allowed to develop." "Life and Society demands not only the mastery of intellectual capabilities ourselves," states the Indian School Education Commission. The holistic development of one's personality, mind, moral character, and love and respect for all that is good and valuable in life and society ought to be the primary objective of education. Education is an important tool for equipping people with the skills they need to thrive in a complex society, work productively, and be active, responsible citizens.

Keywords: *Life Skill Education, Higher Secondary Students, Skill Development.*

Introduction

In addition to physical and sexual development, adolescence is also a time of emotional, intellectual, and social growth. This is the stage when competitors and sportspeople arise. Life skill education addresses children's and young people's educational needs to better prepare them to live safely in the modern world. It will probably make them less likely to engage in various risky behaviors. The capacity for adaptable and constructive behavior that enables individuals to effectively deal with the demands and difficulties of everyday life are referred to as life skills. Life skills are specifically prioritized in schools with a focus on social and emotional development for children and young people. These abilities likewise empower young people to interpret mindfulness, information, and values into uplifting outlooks, activities, and ways of behaving.

The school is a formal and well-organized institution that has a significant impact on how students grow and develop as individuals. Many social, ethnic, and interregional problems can be solved through education. Education's role extends beyond individuality to include the growth of personalities as well. This can happen when one tunes in, attempts, lastly secures information. Fundamental abilities allude to the capacities for adjusting to the requesting elements of day to day existence, and likewise to take care of issues really and think fundamentally. It includes having a high self-esteem, making decisions, thinking critically and analytically, using words well, being able to negotiate, being assertive and building relationships. Present personalities must be nurtured so that they can protect themselves as global leaders in the future. It should be taught from an early age.

How to define life skills using a method

There are a few steps involved in creating a research design to find out how life skills education affects how well students do in school. The research strategy and design are summarized as follows:

❖ The Background and Introduction

Problem of the Study: Research what fundamental abilities training means for the scholastic exhibition of higher auxiliary understudies. Purpose: to determine whether life skills instruction improves academic performance.

Research Questions:

- Do teaching students life skills improve their academic performance?
- Which explicit fundamental abilities contribute most to scholarly achievement?
- How do students think life skills training affect their academic performance?

❖ Literature Review

Examine the existing research on the relationship between academic performance and life skills education. Find where the literature is lacking. Think about how life skills (like better study habits, better time management, and less stress) might affect academic performance.

❖ Research Design

Type of Research: Blended strategies approach consolidating quantitative and subjective information. Participants: Students from various schools' higher secondary schools. Method of sampling: stratified random sampling to ensure that a variety of demographics are represented.

❖ Quantitative Methodology

Hypothesis: Compared to students who do not receive life skills instruction, those who do will perform better academically.

Variables

Individually Variable: Course on life skills education. Variable with Dependence: Scholastic execution (estimated by grades, test scores, and so on.)

Collection of Data

Measures of academic performance before and after the test. assessments of students' life skills prior to and following the program.

Analysis

Compare academic performance before and after the test. To determine significance, employ statistical techniques like t-tests and ANOVA.

❖ Qualitative Approach

Purpose of the Qualitative Approach: to learn more about the experiences and perceptions of students.

Information Assortment:

Participants in the life skills program from focus groups in-depth interviews with administrators and teachers.

Analysis:

To locate recurring themes and patterns in the data, thematic analysis is used.

❖ Implementation of Life Skills Education

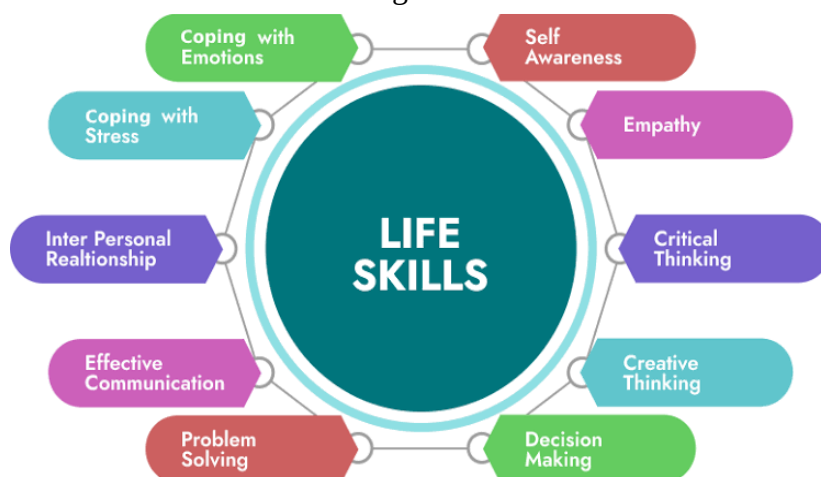
Create a curriculum that teaches fundamental life skills like problem-solving, time management, and communication. Train educators to convey the program. Set a time frame for the program, such as a semester.

❖ Information Investigation and Translation

Quantitative information: testing hypotheses with statistical analysis. The qualitative data: utilizing coding and thematic analysis to comprehend the experiences of students. Triangulation: Integrate quantitative and qualitative data findings to arrive at comprehensive conclusions.

Relationship between's Fundamental ability Training and Scholarly Execution

Abilities that empower people to oversee and control their physical and profound state actually are named fundamental abilities. Fundamental abilities, for example, thought, independent direction, decisive reasoning, confidence, adapting to pressure, adapting to feelings, and relational abilities, play a significant job in different social conditions in which the present person's should live in a sound and blissful way. The fact that the difficult period between childhood and adulthood known as adolescence is referred to as the time when adolescents bring about rank changes in every aspect of their lives. Due to the changes that adolescents experience in their environments, the idea that life skills education should be implemented on an individual level has emerged.



Fundamental ability schooling is instructed to young people when they notice the risk they have figured out how to forestall and the debacles they have played it safe against in light of the fact that the juvenile is noticed in a roundabout way to assimilate the schooling of new occasions that he doesn't make for himself. The person begins to demonstrate leadership qualities. People in society are able to collaborate and share knowledge in this way. Simultaneously, people with fundamental abilities forestall crime percentages or other hurtful ways of behaving in the general public.

Methodology and Design of the Study:

Life skill education has expanded in many different directions, and the goals have changed and grown over time. Life skill education has received attention, approval, and emphasis for its inclusion in the school curriculum at various stages as a result of increased student transition to higher education and the work domain. The current Education Commission (from 1966 to 1966) also emphasized the importance of education in preparing workers for the workplace. It is essential that schooling beats the test of a "imposing hole" existing todaybetween what the understudies realize in school and what the general public requirements for "greatness". Participation in social services, environmental education, and inclusive education by college and school students will significantly halt the decline in educational standards. The liberal arts concept (Bachelor's Degree), communication skills, interpersonal relationships, office management, and activities related to the workplace are all part of this education. The purpose of this study was to determine the issues that students in higher secondary schools face with life skills and the solutions to those issues.

The Study's History

Adolescents, especially those in higher secondary education, are a unique group going through a period of transition in their growth, development, identity formation, gender role formation, development of reproductive sexuality, and awareness of various health and health-related issues. If hostile or negative conditions are a part of their daily lives, adolescents become vulnerable and face life-threatening consequences. While providing these adolescents with an individually tailored, up-to-date program can enhance their confidence, health, and general well-being, the communication gap tends to undermine the effectiveness of the school health educational resource centers as a source of assistance.



The life skills are the personal and social skills that help people make good decisions and act responsibly. These skills are essential for people who want to make good decisions, avoid being influenced by negative peer pressure, become dependent on drugs and alcohol, ignore their schoolwork, and let foolish thinking about random risk subjects get in the way of doing their jobs, like answering the question about joining a terrorist organization. As a result, there is a growing body of evidence to suggest that making investments in the health and development of adolescents should be a top priority. In a study, however, the process of developing life skills is still planned and managed inconsistently. In spite of these necessities anddeveloping collection of proof, the LSE has been immersing in a few metropolitan schools of India wastefully upsomewhat in light of the absence of a significant growing experience, low solace setting, andinstructors' mess up.

Result and Findings

Education in life skills can have a significant impact on students' academic performance in higher secondary schools. Several studies have produced the following

significant findings and outcomes:Enhanced Academic Achievement:Education in life skills frequently improves academic performance. Learning skills like critical thinking, problem-solving, and time management can help students do better in school.Improved Social and Emotional Competence:Education in life skills helps students develop the emotional and social skills necessary for academic success. Abilities like sympathy, correspondence, and stress the executives can makea positive learning climate and work on understudies' capacity to deal with scholastic tensions.Engagement and motivation are raised:Life skills classes can help students become more interested in and motivated in their studies. Students are more likely to be interested in and invested in their education when they can relate what they are learning to real-world situations.

Conclusion

Education in life skills has a significant positive effect on students' academic performance in higher secondary schools. Life skills education helps students better manage academic challenges by giving them essential skills like critical thinking, problem-solving, communication, and emotional regulation. A holistic approach to education, enhanced student engagement, and a supportive learning environment are all facilitated by these skills. As a result, students are better able to perform academically, improve their mental health, and acquire skills that are useful beyond the classroom. All in all, coordinating fundamental abilitiesschooling into the educational program is vital for the general turn of events and scholarly outcome of higherauxiliary understudy.

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A Comparative Study on Deep Learning Based Depression Detection

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Abstract

Depression is a prevalent yet dangerous mental illness. However, the majority of individuals with depression do not seek medical attention for this issue. However, the usage of social media sites like Twitter is growing incredibly quickly. Using this social media data, we may employ a variety of machine learning approaches to determine a user's mental health status, with a particular focus on depression. One of the greatest methods for identifying sadness in text data is to look for texts that indicate negativity. In this survey, we addressed several methods for identifying depression. We developed a system that uses a variety of machine learning approaches and deep learning approaches to analyze user data and activity to determine whether or not a person using social media is depressed.

Keyword: *Depression Detection; Machine Learning; Deep Learning; Natural Language Processing; Twitter; Social Media.*

I INTRODUCTION

People now frequently use these social media sites to express their feelings and emotions to others through their feeds. As a result, we can now analyze the depression of these individuals with the aid of this easily accessible social media content. The potential for early identification and monitoring of mental health concerns has led to significant attention being paid to the detection of depression from user-generated content on social media sites. Depression is a prevalent mental health condition that affects a substantial number of individuals worldwide [1]. It is characterized by persistent feelings of sadness, loss of interest, and impaired functioning, leading to a significant decline in overall well-being and quality of life [2]. Timely detection and intervention are crucial for the effective management and treatment of depression. Left untreated, depression can lead to severe impairments in personal, social, and occupational functioning [3]. It has a profound impact on a person's life, altering their eating, sleeping, and overall patterns of thought about themselves. When someone is depressed and loses interest in almost anything useful, it is the worst mental

condition they can be in and they are unable to get out of it. Depression is brought on by a variety of biological, social, and psychological factors [4]. In addition, depression can lead to various medical conditions. When depression strikes people between the ages of 15 and 29, self-destruction is the likely cause of mortality. People and social media users would undoubtedly benefit from using a machine learning and deep learning approach to detect depression in order to identify and anticipate depression risk. Social media users can also benefit from early intervention to overcome depression.

On social networking sites like Reddit or Twitter, a machine learning technique called supervised learning can analyze and create a model from messages. Numerous elements, including as users' tweets, posts, responses, post times, emotions, and more, might help identify depression. [5] In this situation, social media is a tool that can be investigated for the purpose of identifying individuals who are depressed. This is because those who experience depression often conceal their illness, making it challenging for a professional to make a diagnosis. Additionally, depression may be concealed in social media posts. Investigating language use on social media so becomes a worthwhile path. In particular, preventive actions can be implemented more effectively with early identification on social media. Given the task of large-scale data analysis, one can employ automated methods or direct evaluation methods, such those carried out by an expert [6].

II LITERATURE REVIEW

Depression, mental health, and social media mining are three interdisciplinary fields that intersect in the detection of depression from social data. In this section, we go over the body of research on depression detection as well as contemporary developments in the field, including everything from early conventional techniques to the use of social media data in the present.

A. *Traditional Depression Detection*

Research on depression began well before the Internet era, as researchers realized how serious the issue [7], [8]. The majority of the questionnaires used in these investigations were dependent on the user. The Beck et al. [7] depression questionnaire consists of 21 items that are primarily used to assess the mental health of the users. The CES-D Scale [8] is similarly predicated on 20 questions. The majority of these inquiries concern mental health issues, such as guilt feelings and sleep habits. Either multiple choice questions with variable scores or a question asking users to rate the severity of their situations are included in the questionnaires. The overall score is used to further diagnose the depression level.

B. *Machine Learning Based Depression Detection*

Researchers have recently begun using user-generated data on social media platforms which have gained popularity as a means of expressing one's inner self to detect sadness and provide mental health services. The first study to examine the vocabulary used on Twitter to convey depressive emotions was Park et al. [9]. They looked at the depressed attitudes and actions of Twitter users in more detail [10]. They measured the association between the Twitter data and in-person interviews they did for their study. Additionally, social media data was examined by De Choudhury et al. [11] for the prediction of "major depressive disorders." A. Noureen et al. [18] discussed several forms of human psychotic behavior and also tackled the problem of depression. The authors also provided an introduction to the many types of algorithms that can be applied to the model-implementation process in sentiment analysis. The problem statement of depression identification was emphasized by P. Arora et al. [19], who also put in place a system for depression detection. In the suggested solution, the authors explicitly used Support Vector Machine and Naïve Bayes classifiers.

Furthermore, thorough comparative studies of classic machine learning and transformer model combinations for depression identification are frequently absent from the literature currently in publication. The performance of several deep learning models, such as RoBERTa, SqueezeBERT, DeBERTa, DistilBERT, logistic regression, Naive Bayes, and random forests, is assessed in this work in order to compare their efficacy in identifying depressing content.

In a different study, Hassan et al. [12] compared three classifiers: SVM, Naïve Bayes (NB), and Maximum Entropy (ME) in relation to the subject and provided machine learning algorithms for sentiment analysis. They noticed that SVM outperforms NB and ME in terms of results.

The afore mentioned studies have provided numerous valuable methods for determining depression severity, but they have certain drawbacks. For example, no real-world experiment was conducted to see whether the suggested models were effective. This suggested model generates postings from Twitter and Facebook and uses a machine learning model to identify whether a person is susceptible to depression.

III PROPOSED SYSTEM

This study presents a structural model that uses users' social media posts to determine their level of depression.

A. *K-Nearest Neighbors (KNN)*

One categorization algorithm that makes the assumption that comparable objects reside nearby is KNN. The new case is categorized into the most similar category to the available categories based on the algorithm's assumption that the new instance and its data are similar to the examples that are already available. It keeps track of all the information that is accessible and uses similarity to categorize fresh data points.

B. *Logistic function*

For classification issues with two possible outcomes, logistic regression predicts the probability. For classification issues, it is an expansion of the linear regression model. The logistic function is used by the logistic regression model to compress the output of a linear equation between 0 and 1, as opposed to fitting a straight line or hyperplane.

C. *Multi-Layer Perceptron (MLP)*

The input layer receives the input signal to be processed; the output layer completes the necessary task of classification; and the true computational engine of the multi-layer perceptron (MLP) is an arbitrary number of hidden layers positioned between the input and output layers. The MLP is a supplement to the feedforward neural network.

D. *Support Vector Machine and Naïve Bayes*

The method is described in Figure. 2. The SVM classifier and the Naive Bayes classifier are the two characteristics of the system. A discriminative classifier with an isolating hyperplane as its official identifier is called a Support Vector Machine (SVM). Put differently, using supervised learning with marked training data, the technique produces an optimal hyperplane that classifies new models. A line that divides a two-dimensional space into two pieces, with each class lying on either side, can be represented as a hyperplane. A group of characterizing algorithms that rely on Bayes' Theorem are known as naive Bayes classifiers. It is a single algorithm well, a collection of algorithms where each algorithm is free of the others, for example, by sharing a common standard.

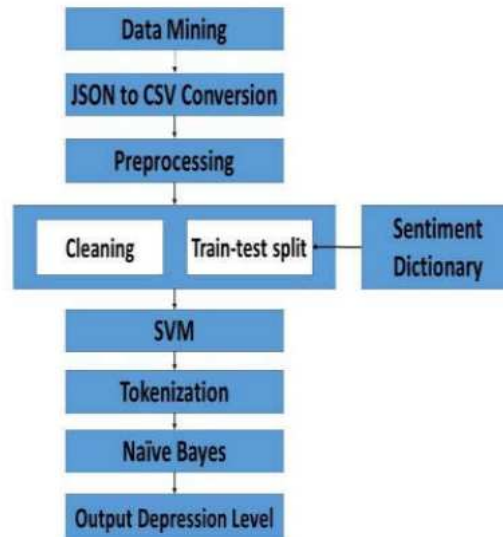


Fig.2 Proposed Method

It has two data sets as well. The first one is the Sentiment Dictionary [14] training dataset, which has close to 8000 signature keywords in it. The first column in this data set comprises signature terms, and the second column comprises binomial sentiment (Positive, Negative). User-generated SNS postings make up the second dataset.

In order to assess how well different natural language processing models classified depression in Twitter tweets, we carried out a comparative analysis of them using the framework. We evaluated the categorization accuracy of these models by comparing the results they produced. The depression dataset is created by combining the dataset with a corpus of terms associated with depression. The dataset is then subjected to additional preprocessing, such as lemmatization and stop word removal.

IV IMPLEMENTATION

A dataset was required for the purpose of training the model. Thus, we used the Twitter API to retrieve data and feeds from Twitter in order to create a dataset.

A. Data Collection

Two different kinds of tweets have been retrieved:

- 1) Tweets with depressing terms like "suicide," "sad," "unhappy," "dissatisfied," "disappointed," etc.
 - 2) Tweets with common, upbeat terms like "glad," "happy," "joyful," "pleasant," etc.
- Subsequently, we combined the two dataset types into one and saved the resultant CSV file.

B. Data Preprocessing

One of the most crucial phases in the pipeline for using machine learning models is this one. We particularly carried out all data cleaning procedures on our dataset in order to improve its usability and attractiveness throughout the model-training stage. We eliminated all of the pointless and irrelevant data from our dataset during the data cleaning process. Data cleaning aimed to remove duplicate entries, remove URLs and links from the tweet contents, remove NULL entries, remove emojis, punctuation, numerals, etc., and remove usernames.

D. Exploring Data Analysis

The process of examining data sets to highlight their key features through exploratory data analysis frequently makes use of statistical software and other data visualization

techniques. It aids in our improved understanding of our dataset[7]. We were able to identify and handle NULL values - identify and eliminate outliers - uncover underlying relationships and structure.

E. Training and Testing

After preprocessing and EDA, we had a final dataset that was thoroughly cleaned and analyzed, so we turned our attention to implementing the model. We conducted two different kinds of experiments during the implementation. We first developed the machine learning algorithms and compared with Deep Learning algorithm. Subsequently, we ascertained the individual accuracy performances of these models.

V RESULT

This section will cover the findings we discovered after testing and putting the suggested algorithms into practice. Table 1 displays the results of each of the aforementioned algorithms when used separately.

TABLE 1

K-Nearest Neighbors	73.29%
Logistic Regression	84.86%
Support Vector Machine	85.04%
Naïve Bayes Classifier	83.04%
Decision Tree	80.53%
Multi-Layer Perceptron (MLP)	78.65%

In Deep learning algorithms methodology's effectiveness and robustness were demonstrated by the models' evaluation. With an accuracy of 98.1% on the evaluation set and a mean accuracy of 0.97 (over 10 cross-validation folds), the RoBERTa model showed remarkable performance. These high accuracies show how well the model can differentiate between tweets that are and are not related to depression. The results of this study have important ramifications for the use of social media data in mental health studies. We have shown the potential for early diagnosis and tracking of depression through user tweets by utilizing machine learning techniques. This strategy has the benefit of being accessible and scalable since social media platforms offer a wealth of user-generated data that can be used to gain insights about depression.

TABLE 2

Model/Measure	Accuracy
Random Forest	94.9%
Bernoulli N.B.	90.1%
Logistic Regression	97.0%
RoBERTa	98.0%
DeBERTa	98.0%
DistilBERT	97.0%
SqueezeBERT	95.0%

VI CONCLUSION

In this work, we have discussed depression in individuals and the ways in which machine learning algorithms and deep learning algorithms can assist us in identifying this problem through the analysis of a specific user's publicly available social media data.

Using machine learning and deep learning approaches, this paper concluded with a thorough method for identifying depression in user tweets. A number of preprocessing procedures, such as feature selection and data cleaning, were used in the study's huge dataset. We obtained encouraging results (Table 1 and 2) in reliably recognizing tweets suggestive of depression by using logistic regression, Bernoulli Naive Bayes, random forests, DistilBERT, SqueezeBERT, RoBERTa, and DeBERTa models. From this survey we conclude deep learning algorithms gives more accuracy compared to machine learning algorithms.

Our method has the potential to have a big impact on the field of depression diagnosis and help individuals identify depression early on. We want to implement our model on a web application in the future. Users will be able to directly search for an individual on Twitter, and our system will analyze the individual's activity and feed to determine whether or not they are experiencing depression.

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Children's Literature as a Medium for Exploring Digital Storytelling and Narrative Strategies in Cultural Heritage

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Abstract

This paper explores digital storytelling and narrative techniques in cultural heritage through children's literature. Digital storytelling is one of the most effective ways to explore the cultural heritage and helps to spread cultural values all over the world. It is a more effective way to deliver content in the digital era. In the modern era, digital storytelling is the best way to engage an audience. Users can engage themselves by using smart phones, tablets, laptops, and desktops. Now storytelling using audio through smart-phone apps has become popular. Basically, storytelling is all about moral lessons, cultural values, and good vs. evil. In this paper, explore how digital storytelling involves the development of cultural heritage among young people. In this digital world, use animations, audios, videos, picture books, and games as the modern method for storytelling. These methods are mostly used by young people and children. So, children's literature has a major part in storytelling. This study aims to highlight the significance of digital storytelling and narrative techniques in cultural heritage. This article explore the intersection of digital storytelling, narrative techniques and cultural heritage in children's literature, highlighting innovative approaches to share cultural legacy with future generations.

Key Words: Digital storytelling, cultural heritage, narrative techniques, and children's literature.

Introduction

Storytelling is considered one of the aspects of human growth and development. Stories are used to convey positive thoughts, moral lessons, and cultural values of a place. Oral storytelling is commonly used in the olden days, and it is good for the development of communication skills. Storytelling is the most effective way to convey the cultural values of a place to young people and other country people. With the development of the technology, made everything digital. So, start to use modern technology in day-to-day activities. Even in storytelling, introduce technology. Digital storytelling is one form of modern storytelling that conveys experiences, messages, and data through the use of multiple technological devices and tools to create an engaging and captivating tale. Digital storytelling is a modern form of

narration that uses digital tools and technologies to convey messages, share experiences, and present information engagingly and interactively. This innovative approach to storytelling has revolutionized the way create, consume, and interact with stories, offering a wide range of benefits and possibilities. In the age of digital technology, storytelling has undergone a significant transformation. Digital storytelling has emerged as a powerful medium, enabling individuals and organizations to share their stories in innovative, interactive, and immersive ways. This article explores the concept of digital storytelling, its benefits, and its application across various industries.

What is digital storytelling

Digital storytelling is the process of creating and disseminating stories using digital tools and technologies. Conventional storytelling techniques are combined with digital content, such as images, audio, video, and other interactive elements. By fusing old and new storytelling methods, storytellers can now convey computer-related ideas, emotions, and experiences more successfully.

Benefits of digital storytelling

Increased engagement: Digital storytelling allows people to interact with stories in new and innovative ways that leads to higher engagement levels. In some cases, it allows the audience to make changes in stories by choosing their options.

Global reach: Digital stories can be easily shared with others through the internet. With the help of the Internet, a story can reach a global audience, transcending geographical boundaries. It breaks all the boundaries and reaches the audience easily.

Cost-effective: Digital storytelling eliminates the need for physical materials and venues. It reduces the expenses and makes the story more accessible. It eliminates all the extra expenses and creates pleasant experience for audience.

Dynamic and Adaptable: Digital stories can be easily updated, modified, and personalized. Technology made them more dynamic and adaptable. It helps the storyteller to easily make changes in their works without any hurdles.

Applications of digital storytelling

Education: Digital storytelling enhances the learning experiences and makes complex concepts more engaging and interactive. It makes the learning process easy and interesting. It makes the learners learn quick and effortlessly.

Marketing: Digital storytelling enables businesses to share their brand values, stories, vision, and mission in a more compelling way. It helps them bring out their product into the global market.

Non-profit: Digital storytelling helps non-profit organizations to raise awareness, share their impact, and mobilize support. It helps them to transfer their noble thoughts to the entire world.

Personal branding: Individuals can use digital storytelling to share their experiences, skills, and passions. By establishing a strong online presence, they can bring positive changes to society.

Tools and Techniques

Multimedia: Multimedia in digital storytelling refers to the use of multiple media to enhance the story's immersion and engagement. Text, images, audio, video, and interactive elements are all included in this. Immersion and interaction have become increasingly possible with the introduction of AR and VR.

Interactive elements: such as quizzes, games, and interactive graphics used to engage the audience and encourage them to participate. Virtual reality really helps the audience by giving them real-life experience.

With its potent medium for entertainment, education, and inspiration, digital storytelling has transformed the way communicate tales. The potential for digital storytelling is only going to grow as technology progresses, opening up new avenues for expression and interaction. Whether are an individual, organization, or business person, Embracing digital storytelling can help share story with the world in a more impactful and memorable way.

Cultural Heritage

The cultural traditions serve as both the foundation for uniqueness and the prism through which see the world and the land in it. Children's books have long been a wonderful tool to teach the next generation about a variety of cultures. With the introduction of digital storytelling, new avenues for engaging and immersive narrative experiences have become possible. This article explores how digital storytelling, narrative tactics, and cultural legacy come together to offer new means of transferring cultural customs to the next generation through examples from children's literature.

The significance of children's literature in cultural heritage

Children's books have long been a vital medium for the dissemination of historical information, cultural values, and customs. Reading aloud to kids can have a significant impact on how accepting, compassionate, and socially conscious they become. Literature can help children learn about different cultures because it can help them appreciate how universal human experience is.

Digital storytelling in children's literature

Digital storytelling has transformed the way experience and interact with children's literature. Innovative narrative techniques such as interactive eBooks allow children to engage with stories through games, quizzes, and puzzles. Virtual reality immerses children in cultural environment and historical events. Augmented reality brings cultural artworks and stories to life in 3D.

Narrative techniques for cultural heritage

Effective narrative techniques can make cultural heritage more accessible and engaging for young audience. **Personalization:** using relatable characters and storylines to connect children with cultural heritage. **Multimedia:** combining images, videos, and audio to create rich and immersive stories. **Non-linear storytelling:** Allowing children to explore cultural heritage in a non-sequential manner.

Innovative digital storytelling in children's literature

"The Snowy Day": A digital adaptation of Ezra Jack Keats' classic, using interactive elements to explore African American cultural heritage. *"The Arrival"*: A graphic novel by Shaun Tan, utilizing multimedia to share the immigrant experience. *"Coralline"*: A digital adaptation of Neil Gaiman's novel, employing virtual reality to explore cultural identity.

Digital storytelling and innovative narrative techniques have revolutionized the way share cultural heritage with children. By embracing these tools and approaches, can inspire a new generation to appreciate and value shared cultural legacy. As technology continues to evolve, the possibilities for digital storytelling in children's literature will only expand, offering excelling opportunities to reimagining and reinvigorate cultural heritage.

Conclusion

The findings of digital storytelling and narrative techniques in cultural heritage through the exploration of children's literature are: **Increased engagement:** Digital

storytelling increases children's engagement with cultural heritage, making it more accessible and enjoyable. **Improved understanding:** Interactive and immersive narrative techniques enhance children's comprehension of cultural heritage, promoting deeper understanding and empathy.

Personal connection: personalized storytelling helps children connect cultural heritage to their own experiences, fostering a sense of belonging and identity. **Cultural preservation:** Digital storytelling helps preserve cultural heritage for future generation, making it more widely available and shareable. **New perspectives:** Digital storytelling offers fresh perspectives on cultural heritage, encouraging children to think critically and creatively about the past.

Inclusivity: Digital storytelling can include diverse experiences, promoting inclusivity and representation in cultural heritage narratives. **Emotional connection:** multimedia and interactive elements create an emotional connection between children and cultural heritage, making it more memorable and impactful.

Develops critical thinking: Digital storytelling and narrative techniques in children's literature can develop critical thinking skills, encouraging children to analyze and interpret cultural heritage. **Enhances creativity:** Interactive storytelling inspires creativity and imagination in children, helping them develop their own stories and connections to cultural heritage.

Accessibility: Digital storytelling makes cultural heritage more accessible to children with disabilities, remote or underserved communities, and those with limited access to traditional cultural institutions. By exploring digital storytelling and narrative techniques in children's literature, can unlock new possibilities for sharing cultural heritage with future generations, promoting, understanding, empathy, and a deeper connection to shared human experience.

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Transforming Education Through Electronic Media

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Abstract

The 21st century has witnessed a significant transformation in education through the integration of electronic media, which has redefined the teaching and learning landscape. This paper explores how various digital tools such as Learning Management Systems (LMS), educational YouTube channels, podcasts, digital libraries, and interactive whiteboards have complemented and often surpassed traditional teaching methods. These tools offer interactive, multimedia-rich experiences, fostering dynamic, engaging, and accessible learning environments for students worldwide. The widespread adoption of electronic media in education has enabled personalized learning, improved access to resources, and equipped learners with essential skills for the digital age. This paper provides a detailed analysis of the features and uses of these tools and presents strategies for their effective implementation in educational settings. The impact of electronic media on education is multifaceted, enhancing student engagement, accessibility, and inclusivity while promoting personalized learning and resource efficiency. As technology continues to advance, the future of education will likely see deeper integration of Artificial Intelligence (AI), Augmented Reality (AR), and Virtual Reality (VR), further transforming the educational landscape. Through the strategic use of electronic media, educators can create more engaging, interactive, and effective learning environments, ultimately improving educational outcomes and preparing students for the demands of the 21st-century workforce.

Key words: Learning Management Systems, Electronic Media, Education.

Introduction

In the 21st century, electronic media has revolutionized education. Traditional teaching methods are complemented and often surpassed by digital tools that offer interactive, multimedia-rich experiences. The integration of electronic media into education has revolutionized the way teaching and learning take place, bridging the gap between traditional classroom instruction and modern digital pedagogy. Leveraging technology-driven tools such as Learning Management Systems (LMS), educational YouTube channels, podcasts, digital libraries, and interactive whiteboards, electronic media has enabled the creation of dynamic, engaging, and accessible learning environments for students across the

globe. These advancements are fostering personalized learning, improving resource accessibility, and equipping learners with skills necessary for the 21st-century workforce.

1. Learning Management Systems (LMS):

LMS platforms such as Moodle, Blackboard, and Google Classroom serve as comprehensive digital ecosystems where educators can manage, deliver, and evaluate educational content. LMS allows teachers to create structured courses, upload resources, administer assessments, track student progress, and facilitate online discussions—all in one place. By enabling self-paced learning, LMS platforms support students with varied learning styles and paces, making education more inclusive and accessible.

2. Educational YouTube Channels and Podcasts:

YouTube channels like Khan Academy, TED-Ed, and NPTEL, along with educational podcasts such as "The EdSurge Podcast" and "TED Talks Education," have become popular sources of supplemental learning. These channels and podcasts provide bite-sized educational content in various formats, catering to learners' preferences for visual and auditory learning. With topics ranging from science and technology to arts and humanities, these resources are available 24/7, breaking the barriers of time and place, and fostering continuous learning beyond the classroom.

3. Digital Libraries:

Digital libraries like the National Digital Library of India (NDLI), Project Gutenberg, and JSTOR provide students, educators, and researchers access to vast repositories of books, journals, research papers, and multimedia resources. These platforms democratize access to scholarly materials, promote independent research, and support a culture of reading and knowledge exploration. With search functionalities, digital libraries enable users to locate information quickly and efficiently, enhancing the learning experience.

4. Interactive Whiteboards:

Interactive whiteboards, such as SMART Boards, facilitate interactive learning by enabling real-time collaboration and engagement. These devices allow teachers to present lessons, annotate, draw, and interact with multimedia content, making complex concepts easier to understand. Students can also participate actively, share ideas, and solve problems collectively. The visual and hands-on approach of interactive whiteboards enhances retention and understanding, making learning more effective.

This paper investigates the role of various electronic media in enhancing student learning, providing a comprehensive analysis of how these tools can be effectively integrated into educational settings.

Electronic Media: Meaning and Definition

Meaning: Electronic media refers to any medium that uses electronic technology to disseminate information. This includes the internet, television, radio, and various digital devices such as computers and smartphones.

Definition: Electronic media encompasses a range of digital tools and platforms that deliver content electronically, facilitating communication, education, and entertainment.

Features:

- **Accessibility:** Can be accessed anytime and anywhere with internet connectivity.
- **Interactivity:** Allows for interactive engagement through multimedia content, forums, and real-time feedback.
- **Multimedia Capabilities:** Combines text, audio, video, and graphics to enhance content delivery and understanding.

Types of Electronic Media in Education

1. Learning Management Systems (LMS): An LMS is a software application that provides a framework for managing, delivering, and tracking educational courses and training programs.

Features:

- **Course Management:** Organizes and delivers course content.
- **Communication Tools:** Includes forums, messaging, and announcements.
- **Assessment and Feedback:** Facilitates quizzes, assignments, and feedback.
- **Analytics and Reporting:** Tracks student progress and performance

Uses:

- **Centralized Platform:** LMS platforms like Canvas, Blackboard, and Moodle centralize course materials, assignments, and grades, making them easily accessible to students.
- **Communication Facilitation:** Enable communication between teachers and students through announcements, discussion forums, and messaging.
- **Progress Tracking:** Analytics tools in LMS help track student performance and progress.

2. Educational YouTube Channels and Podcasts: Educational YouTube channels and podcasts are digital platforms that offer video and audio content designed to educate viewers and listeners on various topics.

Features:

- **Expert Insights:** Provides access to knowledgeable experts in various fields.
- **Engaging Content:** Uses multimedia to explain complex concepts in an engaging manner.
- **Wide Range of Topics:** Covers subjects across different disciplines and interests

Uses:

- **Visual and Auditory Learning:** Provide supplementary visual and auditory materials to explain complex concepts.
- **Expert Insights:** Offer access to expert opinions and diverse perspectives on various topics.
- **Wide Range of Topics:** Cover topics not typically included in the standard curriculum.

3. Digital Libraries : A digital library is an online database of digital objects that can include text, visual material, audio material, video material, stored as electronic media formats.

Features:

- **Vast Resources:** Provides access to e-books, journals, articles, and multimedia resources.
- **Search Functionality:** Advanced search options to find specific information quickly.
- **Accessibility:** Available 24/7 from any location with internet access.

Uses:

- **Access to Resources:** Provide access to a vast collection of e-books, academic journals, and other resources.
- **Research Support:** Aid in research projects and extended learning beyond the classroom.

4. Interactive Whiteboards Meaning and Definition: An interactive whiteboard is a large interactive display that connects to a computer and projector, allowing users to control the computer using a pen, finger, or other device.

Features:

- **Touch Sensitivity:** Allows users to interact with content directly on the screen.
- **Multimedia Integration:** Supports the display of videos, images, and interactive activities.
- **Collaboration:** Enables group activities and collaborative learning.

Uses:

- **Dynamic Lessons:** Facilitate dynamic and interactive lessons with multimedia content.
- **Visual Learning:** Enhance visual learning through diagrams, videos, and interactive activities.

Strategies to Enhance Classroom Learning with Electronic Media

Learning Management Systems (LMS)

1. **Organized Content Delivery:** Structure course materials into modules or units within the LMS to ensure a logical flow of information.
2. **Interactive Assignments:** Incorporate quizzes, discussion forums, and peer reviews to engage students actively.
3. **Regular Feedback:** Use the LMS to provide timely and constructive feedback on assignments and assessments.

Educational YouTube Channels and Podcasts

1. **Curated Content:** Select high-quality, reputable channels and podcasts relevant to the curriculum.
2. **Supplementary Materials:** Use videos and podcasts to reinforce lessons and provide additional perspectives.
3. **Interactive Viewing:** Encourage students to take notes, ask questions, and participate in discussions about the content.

Digital Libraries

1. **Research Assignments:** Design assignments that require students to use digital libraries for research.
2. **Library Guides:** Provide tutorials on how to effectively search and utilize digital library resources.
3. **Regular Updates:** Encourage students to stay updated with the latest publications and research in their field of study.

Interactive Whiteboards

1. **Collaborative Activities:** Use interactive whiteboards for group activities and collaborative problem-solving.
2. **Visual Aids:** Incorporate charts, graphs, and videos to illustrate key concepts.
3. **Student Participation:** Encourage students to interact with the whiteboard to solve problems, draw diagrams, or present their work.

General Strategies for Enhancing Learning

1. **Blended Learning:** Combine traditional teaching methods with electronic media to create a balanced and comprehensive learning experience.

2. **Active Learning:** Engage students in active participation through discussions, projects, and hands-on activities.
3. **Personalized Learning:** Use data from electronic media to tailor instruction to individual student needs and learning styles.
4. **Flipped Classroom:** Assign video lectures or podcasts as homework and use class time for discussions, problem-solving, and interactive activities.
5. **Continuous Professional Development:** Train teachers in effectively using electronic media and integrating them into their teaching practices.

Impact and Significance

The adoption of electronic media in education is not just an upgrade to existing teaching methods but a transformative shift that offers multiple benefits:

- **Enhanced Engagement:** Interactive tools and multimedia resources create more engaging and immersive learning experiences.
- **Accessibility and Inclusivity:** Digital tools ensure that educational content is accessible to learners with diverse needs, including those in remote areas or with disabilities.
- **Personalized Learning:** With digital platforms, learning can be tailored to individual needs, allowing students to learn at their own pace and according to their own preferences.
- **Cost and Resource Efficiency:** Electronic media reduce the need for physical infrastructure and materials, making education more affordable and sustainable.

The Future of Electronic Media in Education

As technology continues to evolve, the role of electronic media in education is set to expand further. Artificial Intelligence (AI) will enable more advanced personalization and adaptive learning experiences, while Augmented Reality (AR) and Virtual Reality (VR) will provide immersive simulations for hands-on learning. The integration of gamification elements and collaborative learning tools will enhance motivation and participation, creating a well-rounded educational ecosystem.

Conclusion

The integration of electronic media in education offers numerous opportunities to enhance student learning. By effectively using LMS, educational YouTube channels and podcasts, digital libraries, and interactive whiteboards, educators can create a more engaging, interactive, and effective learning environment. The strategies outlined in this paper provide a framework for maximizing the benefits of these tools, ultimately improving educational outcomes and preparing students for the demands of the 21st century.

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Integrating Adaptive Learning Technologies into Science Curricula for Enhanced Student Engagement and Achievement

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Abstract

Adaptive learning technologies, which utilize artificial intelligence and data analytics to customize educational experiences, offer transformative potential for science education. This paper explores how these technologies can enhance student engagement and achievement by providing personalized learning paths, interactive content, immediate feedback, and adaptive assessments. By addressing the unique challenges of science education, such as complex concepts and diverse learning styles, adaptive learning fosters a more inclusive and effective educational environment. Case studies from platforms like Khan Academy and Carnegie Learning demonstrate significant improvements in student outcomes. Despite challenges like implementation costs and the need for teacher training, the benefits of adaptive learning technologies are substantial. Future directions include integrating virtual and augmented reality and advancing AI capabilities to further enrich science education. This integration promises a more engaging, personalized, and effective approach to teaching science, ultimately preparing students better for future scientific endeavors.

Keywords: Gamified learning, Critical thinking, Virtual and Augmented Reality.

Introduction

In an era marked by rapid technological advancements, the educational landscape is undergoing significant transformations. Among the most promising developments is the integration of adaptive learning technologies into science curricula. Adaptive learning, which leverages artificial intelligence and data analytics to tailor educational experiences to individual student needs, holds the potential to revolutionize science education. By enhancing student engagement and achievement, these technologies can address the diverse learning styles and paces of students, making science education more effective and inclusive.

The Need for Adaptive Learning in Science Education

Science education presents unique challenges due to its inherently complex and multifaceted nature. Students often struggle with abstract concepts, intricate processes, and the application of theoretical knowledge to practical scenarios. Traditional teaching methods, while effective to some extent, often fall short in addressing the individual needs of students.

In a conventional classroom setting, teachers may find it difficult to cater to varying levels of understanding and different learning styles simultaneously.

Adaptive learning technologies can bridge this gap by providing personalized learning experiences. These technologies use algorithms to analyze student performance in real-time, adjusting the content and pace according to the learner's needs. This individualized approach ensures that each student can grasp fundamental concepts before progressing to more advanced topics, thereby building a strong foundation in science.

Enhancing Student Engagement through Adaptive Learning

Engagement is a critical factor in educational success. Students who are actively engaged in their learning are more likely to retain information, develop critical thinking skills, and apply their knowledge effectively. Adaptive learning technologies can significantly enhance student engagement in science education through various means:

1. Personalized Learning Paths: Adaptive learning systems create personalized learning paths for each student based on their strengths, weaknesses, and learning preferences. This customization makes learning more relevant and interesting for students, increasing their motivation to learn.

2. Interactive and Gamified Content: Many adaptive learning platforms incorporate interactive and gamified elements that make learning more enjoyable. For example, virtual labs, simulations, and educational games can make complex scientific concepts more accessible and engaging.

3. Immediate Feedback and Support: Adaptive learning technologies provide immediate feedback on student performance, helping them understand their mistakes and learn from them. This real-time support fosters a more interactive and responsive learning environment.

4. Adaptive Assessments: Adaptive assessments adjust their difficulty based on the student's performance, ensuring that students are neither bored with too-easy questions nor frustrated with overly difficult ones. This keeps students challenged at an appropriate level and maintains their interest.

Improving Achievement through Adaptive Learning

Achievement in science education is not only about mastering content but also about developing critical thinking, problem-solving skills, and a scientific mindset. Adaptive learning technologies can significantly contribute to these outcomes:

- **Data-Driven Insights:** Adaptive learning systems collect and analyze vast amounts of data on student performance. Teachers can use these insights to identify learning gaps, track progress, and tailor their instruction to meet the specific needs of each student.
- **Mastery-Based Learning:** Adaptive learning technologies promote a mastery-based learning approach, where students must demonstrate a thorough understanding of a topic before moving on to the next. This ensures that students build a solid knowledge base, reducing the likelihood of knowledge gaps.
- **Individualized Support:** By identifying areas where students struggle, adaptive learning systems can provide targeted support and resources. This personalized attention helps students overcome challenges and achieve a deeper understanding of scientific concepts.
- **Encouraging Self-Paced Learning:** Adaptive learning allows students to learn at their own pace, which is particularly beneficial in science education where concepts build on one another. Students who grasp topics quickly can move ahead, while those who need more time can progress without feeling rushed.

Several educational institutions and programs have successfully integrated adaptive learning technologies into their science curricula, demonstrating the potential benefits:

- ❖ **Khan Academy:** Khan Academy uses adaptive learning to offer personalized practice exercises and instructional videos in subjects including science. Their platform adjusts to the learning pace of each student, ensuring that they master each concept before moving on.
- ❖ **Carnegie Learning:** Carnegie Learning provides an adaptive math and science curriculum that uses artificial intelligence to personalize learning. Their system analyzes student data to provide tailored instruction and practice, resulting in improved student performance and engagement.
- ❖ **Smart Sparrow:** Smart Sparrow's adaptive learning platform allows educators to create customized, interactive science lessons. The platform adapts to individual student needs, providing personalized feedback and resources to enhance understanding and retention.

Challenges and Considerations

While the integration of adaptive learning technologies in science education offers numerous benefits, it also presents certain challenges and considerations:

- ✓ **Implementation Costs:** The initial cost of implementing adaptive learning technologies can be high. Schools and educational institutions need to invest in the necessary hardware, software, and training for teachers.
- ✓ **Teacher Training and Support:** Effective use of adaptive learning technologies requires teachers to be adequately trained. Professional development and ongoing support are essential to help teachers integrate these technologies into their teaching practices.
- ✓ **Data Privacy and Security:** The use of adaptive learning systems involves the collection and analysis of student data. Ensuring the privacy and security of this data is crucial to protect students' information.
- ✓ **Equity and Access:** Not all students have equal access to technology. Schools must address issues of digital divide to ensure that all students can benefit from adaptive learning technologies.

Future Directions

The future of adaptive learning in science education looks promising, with several trends and advancements on the horizon:

- **Integration with Virtual and Augmented Reality:** Combining adaptive learning with virtual and augmented reality can create immersive learning experiences, allowing students to explore scientific concepts in a more engaging and interactive way.
- **Advancements in Artificial Intelligence:** Continued advancements in AI will enhance the capabilities of adaptive learning systems, making them more accurate and effective in personalizing learning experiences.
- **Collaboration and Sharing:** Increased collaboration between educational institutions, technology developers, and researchers can lead to the development of more innovative and effective adaptive learning solutions.
- **Focus on Holistic Development:** Future adaptive learning technologies may focus not only on academic achievement but also on the holistic development of students, including critical thinking, creativity, and collaboration skills.

Conclusion

Integrating adaptive learning technologies into science curricula holds immense potential for enhancing student engagement and achievement. By providing personalized, interactive, and data-driven learning experiences, these technologies can address the diverse needs of students and make science education more effective and inclusive. While challenges exist, the benefits far outweigh the drawbacks, making adaptive learning a valuable tool in the quest to improve science education. As technology continues to advance, the possibilities for adaptive learning in science education will only expand, offering new opportunities to engage and inspire the next generation of scientists.

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Consumer Sensitivity and Market Trends of Herbal Cosmetics: a Study on the Growing Demand for Natural Beauty Products

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Abstract

The demand for herbal cosmetics has surged in recent years due to increasing consumer awareness of natural ingredients, sustainability, and product safety. This study examines consumer sensitivity and market trends in the herbal cosmetics industry, focusing on key factors influencing purchasing behavior. The research aims to analyze consumer preferences regarding product quality, brand trust, sustainability, and affordability, along with assessing the impact of digital marketing and competitive market dynamics. A structured survey was conducted among 383 respondents, using stratified random sampling to ensure representation across different demographics. The study employed descriptive statistics, Chi-square tests, and regression analysis to interpret data. Findings reveal that product quality (74.2%) and natural ingredients (69.5%) are the most critical factors influencing consumer choices, followed by brand trust (62.9%) and sustainability (58.7%). Younger consumers, particularly those aged 18-35, exhibit a stronger preference for herbal cosmetics, and digital marketing significantly influences purchasing decisions. The results suggest that brands should emphasize transparency, ethical sourcing, and high-quality formulations to enhance customer trust and loyalty. The study provides valuable insights for businesses, policymakers, and marketers aiming to navigate the evolving herbal cosmetics market. Future research can explore regional differences and long-term consumer behavior trends to further strengthen industry strategies.

Keywords: Herbal cosmetics, Consumer sensitivity, Market trends, Sustainability, Digital marketing.

Introduction

In recent years, the beauty industry has experienced a significant shift toward natural and herbal products, reflecting a growing consumer desire for safer and more sustainable alternatives to conventional cosmetics. This trend is driven by increasing awareness of the potential adverse effects associated with synthetic ingredients, leading individuals to seek

products that align with their health and environmental values (Sciendo, 2023). The global herbal beauty products market has responded accordingly, with projections indicating substantial growth in the coming years. For instance, the market size was valued at approximately USD 85.55 billion in 2024 and is expected to grow at a compound annual growth rate (CAGR) of 13.3% from 2025 to 2030 (Grand View Research, 2024). This surge underscores the importance of understanding consumer sensitivities and market dynamics within the herbal cosmetics sector. Consumer sensitivity plays a pivotal role in the adoption and success of herbal cosmetics. Studies have shown that a significant number of consumers prefer natural and organic cosmetics to avoid personal risks associated with synthetic ingredients (Sciendo, 2023). Specifically, research indicates that 80% of consumers expect natural content in their cosmetic products, especially in non-rinse items. Factors such as product quality, ingredient transparency, brand trust, and sustainability practices heavily influence purchasing decisions. Consumers are increasingly scrutinizing labels for harmful chemicals and are drawn to brands that prioritize ethical sourcing and environmental stewardship (Mordor Intelligence, 2025). This heightened awareness has compelled companies to reformulate products and adopt transparent marketing strategies to meet the evolving demands of a more informed clientele.

Market trends further illustrate the growing demand for herbal beauty products. The Asia-Pacific region, in particular, is witnessing rapid expansion in this sector, driven by cultural traditions that emphasize natural remedies and a burgeoning middle class with increased purchasing power (Grand View Research, 2024). The region's rich heritage in herbal medicine and beauty practices has seamlessly integrated with modern consumerism, leading to a fusion of traditional wisdom and contemporary aesthetics. Additionally, the influence of social media and beauty influencers advocating for natural skincare routines has amplified consumer interest globally. This digital shift has enabled niche brands to reach wider audiences, fostering a competitive landscape where innovation and authenticity are key differentiators (Mordor Intelligence, 2025). The impact of digital marketing on consumer behavior cannot be overstated. With the proliferation of online platforms, consumers have unprecedented access to information, reviews, and peer recommendations (Sciendo, 2023). This accessibility has empowered individuals to make informed choices, often favoring brands that engage transparently and authentically with their audience. Social media campaigns highlighting the benefits of herbal ingredients, user-generated content showcasing personal experiences, and collaborations with influencers have become effective strategies to build brand loyalty and drive sales. Consequently, companies that adeptly navigate the digital landscape are better positioned to capitalize on the growing demand for natural beauty products (Grand View Research, 2024). The escalating consumer inclination toward herbal cosmetics signifies a transformative period in the beauty industry. As individuals become more conscious of their health and environmental impact, the preference for products that embody quality, transparency, and sustainability continues to rise. Understanding consumer sensitivities and staying abreast of market trends are crucial for brands aiming to thrive in this dynamic environment. The fusion of traditional herbal knowledge with modern marketing strategies presents a unique opportunity to cater to the evolving preferences of today's discerning consumers.

Statement of the Problem

The global cosmetics industry has witnessed a remarkable shift toward herbal and natural beauty products, driven by growing consumer awareness of the potential health risks associated with synthetic ingredients. Consumers are increasingly seeking safer, sustainable, and eco-friendly alternatives to conventional cosmetics, prompting businesses to adapt their product offerings. However, despite the rapid expansion of the herbal cosmetics market,

several challenges remain in understanding consumer sensitivity, preferences, and market trends that influence purchasing behavior. The lack of comprehensive research in this area necessitates an in-depth examination of the factors shaping consumer decisions and the evolving landscape of herbal beauty products. One of the primary concerns in the herbal cosmetics industry is the variation in consumer sensitivity regarding product quality, ingredient effectiveness, and brand trust. Many consumers express skepticism over the authenticity of herbal products due to misleading marketing claims and the absence of standardized regulatory frameworks. The proliferation of counterfeit products and "greenwashing" practices—where brands falsely label their products as natural or organic—further complicates consumer trust (Sharma & Bansal, 2023). Additionally, while some consumers prioritize natural ingredients for their perceived safety and efficacy, others remain uncertain about their effectiveness compared to synthetic alternatives. This disparity in sensitivity affects brand loyalty and purchasing patterns, necessitating a deeper investigation into the elements that shape consumer trust in herbal cosmetics.

Another pressing issue is the sustainability aspect of herbal cosmetics. While consumers are increasingly inclined toward eco-friendly and cruelty-free products, there is limited understanding of how sustainability influences purchase behavior. Factors such as ethical sourcing, biodegradable packaging, and carbon footprint reduction have become major selling points in the industry, yet there is a gap in assessing their real impact on consumer choices. Businesses are now compelled to integrate sustainability into their brand identity, but whether this truly drives consumer decisions or merely serves as a branding strategy remains unclear. Analyzing how sustainability affects market trends will provide valuable insights into whether companies should focus on such initiatives to gain a competitive advantage. The evolving digital marketing landscape also plays a crucial role in shaping market trends in the herbal cosmetics industry. Social media platforms, beauty influencers, and e-commerce channels have significantly altered how consumers discover, evaluate, and purchase products. Online reviews, brand transparency, and user-generated content have empowered consumers to make informed decisions, yet the extent of digital marketing's impact on herbal cosmetics remains underexplored. While some studies indicate that digital campaigns enhance consumer trust and brand engagement (Patel & Rao, 2024), others suggest that misinformation and exaggerated claims on social media contribute to confusion and skepticism. Understanding how digital marketing strategies influence consumer behavior is critical for brands looking to strengthen their online presence and expand their market reach.

Additionally, the herbal cosmetics industry faces increasing competition from both established beauty brands and emerging independent labels. As consumer preferences continue to evolve, businesses must continuously innovate to retain market share. Large multinational corporations have begun incorporating herbal ingredients into their product lines to capitalize on the trend, further intensifying competition. Smaller brands, on the other hand, often struggle with limited resources and brand recognition, making it difficult to establish themselves despite offering high-quality herbal products. Identifying key market trends, demand patterns, and factors contributing to brand success will provide businesses with strategic insights to navigate this highly competitive sector. Given these challenges, this study aims to bridge the knowledge gap by analyzing consumer sensitivity and market trends in the herbal cosmetics industry. By examining factors such as product quality, ingredient transparency, sustainability, and digital marketing strategies, the research seeks to provide a comprehensive understanding of the forces driving consumer behavior in this sector. The findings will not only benefit businesses looking to refine their marketing and branding strategies but also offer valuable insights for policymakers and regulatory bodies to ensure transparency and authenticity in the herbal cosmetics market.

Literature Review

Masal et al. (2022) review herbal cosmetics' roots in Ayurveda, highlighting their natural, side-effect-free enhancement of beauty via nutrient-rich plant parts like leaves and flowers. These products nourish skin and hair, classified by application (skin, hair, oral) and form (creams, gels). Formulation challenges include microbial risks, addressed through pH testing, stability studies, and analytics like HPLC for standardization. Key ingredients—jasmine for moisturizing, saffron for whitening, ginseng for anti-aging—ensure hypoallergenic efficacy via antimicrobial assays. Global demand surges for eco-friendly options, urging research for accessibility. (92 words)

Jain et al. (2022) overview herbal cosmetics from ancient practices to cosmeceuticals treating acne, aging, and hair loss with minimal side effects. Consumers favor their safety and natural appeal over synthetics' irritants, driving market growth in hypoallergenic, cruelty-free products. Categorized for skin (aloe soothing, turmeric brightening), hair (henna conditioning, amla strengthening), and oral care (neem antibacterial), oils like jojoba add antioxidant versatility despite refining issues. Formulations like turmeric face washes exemplify innovation; standardization ensures efficacy, promoting sustainable alternatives. (85 words)

Vijayadhari et al. (2022) survey 150 Namakkal consumers on herbal personal care, finding urban awareness (57.7%) edges rural (50.7%), led by Himalaya (93-95%). Rural preferences prioritize brand image (RII 0.755) and peers; urban health consciousness (0.771) and naturals. Quality matters most, price least. Himalaya thrives rurally via trust, Indulekha urbanly for purity, post-Patanjali disruption. Tailored strategies—rural endorsements, urban digital campaigns—leverage safety to boost adoption. (72 words)

Kalra et al. (2023) survey 301 Indians on herbal intentions, revealing internet-sourced awareness and positive attitudes fueling recommendations. Safety and quality top attributes despite price/false claim barriers; functionality, quality, and tradition positively predict buys via regression, varying by demographics. Over 80% prioritize purity against adulteration. Transparent labeling and digital education combat myths, positioning herbals for growth through cultural trust. (68 words)

Vogue Business (2023) examines saffron's beauty role (\$1,600/kg) for antioxidants in a \$602M market (7.1% CAGR). Iran's supply falters from droughts (yields to 80,000kg) and wars hiking costs 30%; Afghan sources rise 5-10%. Brands like YSL and Korres absorb impacts via sourcing. Social buzz drives infused luxuries; extraction expands use. Ethical ties and vertical farming urge innovation against volatility. (70 words)

Objectives of the study

1. To analyze consumer sensitivity and preferences toward herbal cosmetics, focusing on factors such as product quality, ingredients, brand trust, and sustainability.
2. To examine current market trends in the herbal cosmetics industry, including demand patterns, competitive landscape, and the impact of digital marketing on consumer behavior.

Research Methodology

Target Population

The target population for this study consists of consumers who actively purchase and use herbal cosmetics in Erode district of Tamilnadu. The study will focus on individuals aged 18 and above who are interested in skincare, haircare, and beauty products derived from natural ingredients. The population will be drawn from urban and semi-urban regions, as these areas exhibit significant demand for herbal cosmetics. Additionally, industry

professionals, such as cosmetic brand managers and retailers, will be included to gain insights into market trends and business strategies.

Data Sources and Data Collection Mechanism

The study will employ both **primary** and **secondary** data sources:

1. **Primary Data** – The primary data will be collected through structured surveys and interviews. A well-structured questionnaire will be designed to capture consumer sensitivity, preferences, and factors influencing purchasing decisions. The questionnaire will include both **closed-ended** and **open-ended** questions to gain quantitative and qualitative insights. In addition, semi-structured interviews will be conducted with industry experts to understand market trends and business challenges.
2. **Secondary Data** – Relevant secondary data will be gathered from industry reports, journal articles, market research databases, and company reports on herbal cosmetics. This will provide a comparative analysis and support findings from primary data.

Sample Design

To determine the appropriate sample size, the study will use **Cochran's formula** for a known population. This formula is widely used in consumer research studies to determine a representative sample size and the sample size derived is 383. The sample size (n) for a known population (N) is calculated using Cochran's formula and the sample size derived is 384. A **stratified random sampling** technique will be used to ensure representation across different consumer demographics. The population will be divided into strata based on age, gender, and income levels and random sampling will be conducted within each stratum. This method minimizes bias and ensures diverse perspectives are considered. For industry professionals, a **purposive sampling** technique will be used to select relevant stakeholders with expertise in herbal cosmetics.

Analyses and Discussion

Table 1: Demographic Characteristics of Respondents

Variable	Categories	Frequency (n=383)	Percentage (%)
Gender	Male	145	37.9
	Female	238	62.1
Age Group	18-25 years	120	31.3
	26-35 years	160	41.8
	36-45 years	65	17.0
	46+ years	38	9.9
Income Level	Low (<\$20,000)	85	22.2
	Middle (\$20,000-\$50,000)	215	56.1
	High (>\$50,000)	83	21.7

- A **majority (62.1%)** of the respondents are **female**, indicating a higher interest in herbal cosmetics among women.
- The **26-35 age group (41.8%)** represents the largest consumer segment, followed by **18-25 years (31.3%)**, highlighting that younger consumers are more inclined toward herbal cosmetics.
- **Middle-income consumers (56.1%)** form the largest group of buyers, suggesting affordability plays a crucial role in herbal cosmetic purchases.

Table 2: Consumer Preferences for Herbal Cosmetics

Factor	Very Important (%)	Somewhat Important (%)	Not Important (%)
Product Quality	74.2	21.1	4.7
Natural Ingredients	69.5	25.4	5.1
Brand Trust	62.9	28.2	8.9
Sustainability	58.7	32.4	8.9
Price	53.3	37.2	9.5

- **Product quality (74.2%)** and **natural ingredients (69.5%)** are the top factors influencing consumer preferences.
- **Brand trust (62.9%)** is also a key determinant, highlighting the need for transparency in the industry.
- **Sustainability (58.7%)** is an important factor, though slightly lower in priority compared to quality and ingredients.
- **Price (53.3%)** is relevant but not the most critical factor, suggesting consumers are willing to pay more for premium herbal cosmetics.

Table 3: Chi-Square Test for Age Group and Preference for Herbal Cosmetics

Age Group (Years)	Prefer Herbal Cosmetics (%)	Do Not Prefer (%)	χ^2 (Chi-square)	p-value
18-25	98 (81.7%)	22 (18.3%)	12.43	0.002*
26-35	140 (87.5%)	20 (12.5%)		
36-45	38 (58.5%)	27 (41.5%)		
46+	20 (52.6%)	18 (47.4%)		

(Significant at $p < 0.05$)

- The **p-value (0.002)** is **significant**, indicating a strong relationship between **age group** and **preference for herbal cosmetics**.
- Younger consumers (18-35 years) are **significantly more likely to prefer herbal cosmetics**, while **older consumers (36+ years)** show lower preference levels.

Table 4: Regression Analysis - Impact of Key Factors on Purchase Intention

Independent Variables	Beta Coefficient (β)	t-Value	p-Value
Product Quality	0.48	7.21	0.000**
Natural Ingredients	0.41	6.35	0.000**
Brand Trust	0.35	5.67	0.001**
Sustainability	0.26	4.92	0.003**
Price	0.21	3.89	0.011*

(* $p < 0.05$; ** $p < 0.01$ significant at 99% confidence level)

- **Product quality ($\beta = 0.48$, $p < 0.01$)** has the highest influence on purchase intention, indicating consumers prioritize well-formulated products.

- **Natural ingredients** ($\beta = 0.41$, $p < 0.01$) strongly impact buying behavior, reinforcing the need for transparency in ingredient sourcing.
- **Brand trust** ($\beta = 0.35$, $p < 0.01$) and **sustainability** ($\beta = 0.26$, $p < 0.01$) also significantly contribute to consumer decisions.
- **Price** ($\beta = 0.21$, $p < 0.05$) has a smaller but notable influence, suggesting affordability is important but not a primary determinant.

Overall Discussion

Key Findings:

1. **Demographic Insights:** Herbal cosmetics are more popular among younger consumers (18-35 years) and females. Middle-income groups form the primary consumer base.
2. **Consumer Preferences:** **Quality and natural ingredients** are the most valued factors, followed by **brand trust** and **sustainability**. Price is important but not the primary driver.
3. **Market Trends:** The **Chi-square analysis** confirmed that younger consumers significantly favor herbal cosmetics.
4. **Influential Factors:** The **regression analysis** revealed that **product quality and natural ingredients** have the strongest impact on purchase intentions, followed by brand trust and sustainability.

Implications for Businesses:

- **Product Innovation:** Brands should **focus on high-quality formulations** with **authentic herbal ingredients** to maintain a competitive edge.
- **Transparency & Trust:** Strengthening **brand credibility** through **certifications, consumer education, and third-party endorsements** can enhance trust.
- **Sustainability Integration:** Sustainable packaging and ethical sourcing strategies can **attract environmentally conscious consumers**.
- **Targeted Marketing:** **Digital marketing strategies should be tailored for younger demographics** who are more engaged in herbal cosmetic purchases.

Conclusion

The study on *Consumer Sensitivity and Market Trends of Herbal Cosmetics* highlights the growing demand for natural beauty products, particularly among younger and middle-income consumers. The findings reveal that product quality and natural ingredients are the most influential factors driving consumer preferences, followed by brand trust, sustainability, and affordability. With an increasing awareness of health-conscious and environmentally friendly choices, herbal cosmetics are becoming a preferred alternative to synthetic products. Market trends indicate that digital marketing, brand transparency, and eco-friendly initiatives play a significant role in shaping consumer behavior. The study also confirms a statistically significant relationship between age and preference for herbal cosmetics, with younger consumers exhibiting a stronger inclination toward natural beauty solutions.

For businesses, the key takeaways include the need for high-quality formulations, ethical sourcing, and effective brand communication to build consumer trust and loyalty. Companies should focus on sustainability-driven innovation and leverage social media marketing to engage their target audience effectively. Overall, the study underscores the increasing relevance of herbal cosmetics in the beauty industry and provides actionable insights for brands aiming to capitalize on this growing market. Future research could explore regional preferences and long-term market trends for further industry development.

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Interactive and Multimedia Technologies

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Abstract

Interactive and multimedia technologies have revolutionized the way we consume, create, and interact with digital content. This paper explores the fundamental concepts, tools, and applications of these technologies, highlighting their impact on various fields such as education, entertainment, business, and healthcare. The study delves into the historical evolution of interactive and multimedia technologies, their current state, and future trends. By examining the integration of multimedia elements, user interface design, and interactive tools, this paper provides a comprehensive overview of the dynamic and rapidly evolving landscape of interactive and multimedia technologies.

Keywords: *Graphic Design Software, Web-Based Multimedia, AI and Machine Learning.*

Introduction

The advent of interactive and multimedia technologies has marked a significant shift in the digital landscape, transforming traditional modes of communication and engagement. These technologies encompass a wide range of digital tools and platforms that facilitate the creation, manipulation, and distribution of multimedia content, including text, graphics, audio, video, and animation. The increasing demand for rich, immersive experiences has driven the development and adoption of these technologies across various sectors. This aims to provide an in-depth analysis of interactive and multimedia technologies, exploring their fundamental concepts, tools, and applications. The introduction of these technologies has not only enhanced user engagement but also opened new avenues for innovation and creativity. By examining the historical evolution, current trends, and future prospects, this paper seeks to offer valuable insights into the role of interactive and multimedia technologies in shaping the future of digital interactions.

Historical Evolution

The development of interactive and multimedia technologies has progressed from simple text-based interfaces to sophisticated systems incorporating graphics, audio, video, and animation. Early examples include the advent of personal computers and the internet, followed by advancements in graphical user interfaces (GUIs), multimedia authoring tools, and interactive web technologies.

Importance in Modern Applications

These technologies are critical in various fields, including education, entertainment, business, healthcare, and communication. They provide innovative ways to present information, facilitate learning, enhance user engagement, and improve overall user experience.

Fundamental Concepts:

- ❖ **Interactivity and User Engagement:** Interactivity refers to the ability of users to interact with digital content in real-time, leading to higher levels of engagement and immersion. It includes elements such as clickable buttons, interactive videos, and user-driven narratives.
- ❖ **Multimedia Elements**
 - ★ **Text:** The primary medium for conveying information.
 - ★ **Graphics:** Visual elements such as images, icons, and illustrations.
 - ★ **Audio:** Sound elements including music, narration, and sound effects.
 - ★ **Video:** Moving images that can include live-action footage, animations, and transitions.
 - ★ **Animation:** Animated graphics that bring visual elements to life.
- ❖ **User Interface Design:** The design of user interfaces (UI) focuses on creating intuitive, accessible, and user-friendly interfaces that facilitate easy interaction with digital content. Good UI design enhances user experience and satisfaction.
- ❖ **Multimedia Tools and Software**
 - ✱ **Authoring Tools:** Software used to create multimedia content, such as Adobe Flash, Adobe Director, and modern alternatives like Adobe Animate and Unity.
 - ✱ **Graphic Design Software:** Tools such as Adobe Photoshop, Illustrator, and CorelDRAW used for creating and editing visual content.
 - ✱ **Audio and Video Editing Tools:** Software like Adobe Audition, Audacity, Adobe Premiere Pro, and Final Cut Pro used for editing sound and video clips.
 - ✱ **Animation Software:** Programs such as Adobe Animate, Blender, and Toon Boom Harmony used for creating animations.

Interactive Technologies

- **Touchscreen Interfaces:** Touch-based interfaces that allow users to interact with devices through touch gestures, prevalent in smartphones, tablets, and kiosks.
- **Virtual and Augmented Reality:** VR provides immersive experiences by placing users in a simulated environment, while AR overlays digital content onto the real world.
- **Gesture-Based Interactions:** Technologies that recognize and respond to user gestures, such as motion-sensing devices like the Microsoft Kinect.
- **Voice Recognition Systems:** Systems that process and respond to vocal commands, commonly found in virtual assistants like Siri, Alexa, and Google Assistant.

Multimedia Content Creation

- **Storyboarding and Script writing:** Planning tools for outlining the structure and narrative of multimedia projects.
- **Visual Design Principles:** Fundamentals of creating visually appealing and effective designs, including layout, color theory, and typography.
- **Audio Production Techniques:** Processes involved in recording, editing, and mixing sound elements.
- **Video Production Techniques:** Steps for producing video content, from shooting footage to post-production editing.

Web-Based Multimedia

- **HTML5 and CSS3:** Markup and styling languages used to structure and design web pages with multimedia content.
- **JavaScript and Multimedia APIs:** Scripting language and application programming interfaces used to add interactivity and multimedia functionality to web pages.
- **WebGL and 3D Graphics:** JavaScript API for rendering 3D graphics in web browsers.
- **Streaming Media on the Web:** Technologies and protocols for delivering audio and video content over the internet, such as HTML5 video, HLS, and DASH.

Interactive and Multimedia Applications

- **Educational Software:** Programs designed to facilitate learning and teaching through interactive multimedia content.
- **Interactive Storytelling:** Narrative techniques that allow users to influence the storyline through their interactions.
- **Gaming Technologies:** Technologies used in the development of video games, incorporating rich multimedia and interactive elements.
- **Virtual Tours and Simulations:** Digital simulations of real or imagined environments that users can explore interactively.

Multimedia Databases and Formats

- **Storage and Retrieval of Multimedia Data:** Methods for storing and accessing multimedia content, including databases optimized for large-scale multimedia data.
- **Compression Techniques:** Algorithms and methods for reducing the size of multimedia files while maintaining quality, such as JPEG for images and MP3 for audio.
- **Multimedia File Formats:** Standard formats for storing multimedia content, including formats like MP4, AVI, and MPEG for video, and PNG, JPEG, and GIF for images.
- **Metadata Standards:** Standards for describing and cataloging multimedia content to facilitate organization and retrieval.

Human-Computer Interaction (HCI)

- a) **Principles of HCI:** The study of how people interact with computers and designing systems that are effective and user-friendly.
- b) **Usability Testing:** Evaluating a product by testing it with real users to identify usability issues and improve design.
- c) **Accessibility in Multimedia:** Designing multimedia content to be accessible to users with disabilities, adhering to standards like WCAG.
- d) **User Experience Design:** The process of enhancing user satisfaction by improving the usability, accessibility, and pleasure provided in the interaction with a product.

Emerging Trends in Interactive and Multimedia Technologies

➤ **AI and Machine Learning in Multimedia:** Applying artificial intelligence and machine learning techniques to enhance multimedia content creation, personalization, and interaction. Artificial intelligence and machine learning are revolutionizing multimedia content creation and interaction. AI-driven algorithms enable automated editing, enhancing, and generation of multimedia content, significantly reducing the time and effort required by human creators. For instance, AI can analyze vast amounts of data to generate high-quality images, videos, and audio tailored to specific user preferences. Machine learning models can also enhance personalization in multimedia experiences. By analyzing user behavior and

preferences, these models can recommend content that aligns with individual tastes, creating a more engaging and customized experience. Platforms like Netflix and Spotify utilize ML algorithms to suggest movies, shows, and music that users are likely to enjoy based on their past interactions. Moreover, AI-powered interactive multimedia applications are becoming increasingly sophisticated. Virtual assistants like Siri and Alexa use natural language processing to understand and respond to user queries, providing a more interactive and human-like experience. In the gaming industry, AI-driven characters and environments adapt in real-time to player actions, offering a dynamic and immersive experience.

➤ **Internet of Things (IoT) and Multimedia:** Integration of multimedia capabilities into IoT devices to enable smart, interconnected environments. In the realm of healthcare, IoT-enabled multimedia devices are enhancing patient care and monitoring. Wearable health devices can track vital signs and relay real-time data to healthcare providers, enabling timely interventions and personalized treatment plans. Additionally, multimedia-rich IoT devices in smart cities facilitate efficient management of resources, from traffic control to waste management, improving overall quality of life. The convergence of IoT and multimedia is also evident in the retail sector. Smart mirrors in stores provide an interactive shopping experience by allowing customers to virtually try on clothes and accessories. These devices use augmented reality to overlay digital images onto real-world reflections, offering a seamless and engaging shopping experience.

➤ **Wearable Technologies:** Devices like smartwatches and augmented reality glasses that provide interactive and multimedia experiences. Smartwatches, for example, enable users to receive notifications, track fitness activities, and even make phone calls, all while on the go. These devices often feature vibrant touchscreens and intuitive interfaces, making multimedia interaction effortless. Fitness trackers equipped with multimedia capabilities provide audio and visual feedback during workouts, enhancing the exercise experience. AR glasses are pushing the boundaries of interactive multimedia by overlaying digital information onto the physical world. These glasses can display real-time data, navigation instructions, and even immersive gaming experiences, all while the user remains aware of their surroundings. In professional settings, AR glasses are used for remote assistance, where experts can guide field workers through complex tasks using real-time video and augmented annotations.

➤ **Blockchain and Multimedia:** Using blockchain technology to manage and secure multimedia content, ensuring authenticity and traceability. In the realm of digital art and media, blockchain enables the creation and trading of non-fungible tokens (NFTs). NFTs represent unique digital assets that can be bought, sold, and traded on blockchain platforms. This innovation has opened new avenues for artists and creators to monetize their work, as NFTs provide a secure and transparent way to manage ownership and transactions. Blockchain technology also addresses the challenges of copyright infringement and unauthorized distribution. By embedding metadata and ownership information directly into the blockchain, creators can track the usage and distribution of their content, ensuring they receive proper credit and compensation. This level of transparency and control is particularly valuable in industries such as music, film, and publishing.

Conclusion

Interactive and multimedia technologies continue to redefine the boundaries of digital interaction, offering unprecedented opportunities for creativity, engagement, and innovation. As these technologies evolve, they are poised to play an increasingly integral role in various domains, from education and entertainment to business and healthcare. The exploration of fundamental concepts, tools, and applications presented in this paper underscores the transformative potential of interactive and multimedia technologies. Looking ahead, the

integration of emerging technologies such as artificial intelligence, virtual and augmented reality, and the Internet of Things will further enhance the capabilities and applications of interactive and multimedia systems. By staying attuned to these advancements and addressing the associated challenges, stakeholders can harness the full potential of interactive and multimedia technologies to create more engaging, accessible, and immersive digital experiences.

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Cross Cultural Psychology and Digital Heritage in Teacher Education

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Abstract

*This paper examines the intersection of cross-cultural psychology and digital heritage within the realm of teacher education. It explores how cultural diversity influences cognitive processes, classroom dynamics, and emotional expression, emphasizing the need for culturally responsive teaching strategies. Additionally, the paper delves into the role of digital heritage in preserving and presenting cultural narratives, utilizing innovative technologies such as virtual and augmented reality to enhance educational experiences. By integrating these interdisciplinary approaches, the paper aims to equip future educators with the skills and knowledge to effectively manage diverse classrooms, promote mental health awareness, and engage students with culturally rich and technologically advanced learning environments. This integration ultimately seeks to foster more inclusive, effective, and enriching educational practices. **Cross-Cultural Psychology** is a branch of psychology that examines the cultural factors that influence human behavior. It aims to understand how cultural context affects psychological processes, including cognition, emotion, development, and social behavior. Key aspects of cross-cultural psychology include **Cultural Comparisons, Cultural Influence, Ethnocentrism Reduction and Acculturation**. Teachers learn about different cultural backgrounds, values, and practices. This helps them to appreciate diversity and to understand how cultural context affects students' behavior, learning styles, and educational needs.*

Keywords: Cultural Comparisons, Cultural Influence, Ethnocentrism Reduction, Acculturation.

Introduction

In a globalized world, the landscape of education is continuously evolving, with classrooms becoming increasingly multicultural. This shift necessitates a profound understanding of cultural diversity and the integration of modern technologies to preserve and present cultural narratives. Cross-cultural psychology offers valuable insights into how cultural differences impact cognitive processes, social behavior, and emotional expression. Simultaneously, digital heritage provides innovative tools to make cultural histories accessible and engaging for students. The integration of cross-cultural psychology and digital

heritage within the context of teacher education, emphasizing the importance of culturally responsive teaching strategies and the use of digital tools to enrich educational experiences.

Cross Cultural Psychology

- ✳ **Cultural Comparisons:** Comparing psychological phenomena across different cultures to identify universal traits and culture-specific traits.
- ✳ **Cultural Influence:** Studying how culture shapes individuals' thoughts, feelings, and behaviors.
- ✳ **Ethnocentrism Reduction:** Reducing biases that come from viewing one's own culture as the standard against which others are judged.
- ✳ **Acculturation:** Exploring how individuals adapt to a new culture and the psychological impacts of this process.

Cultural Influences on Learning and Instruction

Understanding cultural influences on learning and instruction is fundamental in developing effective teaching methods. Cross-cultural psychology examines how cultural backgrounds shape cognitive processes, including perception, memory, and problem-solving. For instance, research has shown that students from collectivist cultures may prefer collaborative learning environments, while those from individualist cultures might excel in competitive settings.

Teacher education programs must equip future educators with the knowledge to recognize and accommodate these diverse learning styles. This involves creating inclusive lesson plans that cater to a range of cognitive preferences and employing strategies that foster a supportive and engaging learning environment. By understanding the cultural influences on learning, teachers can better address the needs of their students and enhance their educational outcomes.

Cultural Dimensions and Classroom Dynamics

Classroom management in multicultural settings requires an understanding of cultural dimensions such as individualism versus collectivism, power distance, and uncertainty avoidance. These dimensions influence student behavior, communication styles, and attitudes towards authority. For example, students from high power distance cultures may exhibit deference to authority figures and expect a hierarchical classroom structure, while those from low power distance cultures might prefer egalitarian interactions. Teachers need to adapt their classroom management strategies to accommodate these cultural differences, fostering an environment where all students feel respected and valued. Teacher education programs should include training on cultural dimensions and their impact on classroom dynamics. This training can help future educators develop culturally responsive management techniques that promote positive behavior, encourage participation, and build a cohesive classroom community.

Emotions and Cultural Awareness in Teaching

Emotions play a crucial role in learning and teaching, and cultural differences in emotional expression and regulation can affect classroom interactions. Cross-cultural psychology provides insights into how emotions are perceived and expressed in different cultures, highlighting the importance of cultural sensitivity in recognizing and responding to students' emotional needs. Teachers must be aware of cultural norms regarding emotional expression to create a supportive classroom environment. For instance, students from some cultures may express emotions more openly, while others might suppress their feelings due to cultural norms. Educators should employ culturally appropriate strategies for emotional regulation and conflict resolution, ensuring that all students feel understood and supported.

Teacher education programs should incorporate training on emotional awareness and cultural sensitivity, equipping future educators with the skills to navigate emotional dynamics in multicultural classrooms effectively. This training can help teachers build strong relationships with their students, fostering a positive and inclusive learning environment.

Social Norms and Behavior in Schools

Cultural norms and social behavior significantly influence classroom interactions and student relationships. Understanding these norms is essential for fostering positive interpersonal relationships and effective communication in diverse classrooms.

Cross-cultural psychology examines how cultural backgrounds shape social behavior, including communication styles, group dynamics, and social identity. For example, students from collectivist cultures may prioritize group harmony and cooperation, while those from individualist cultures might emphasize personal achievement and independence. Teacher education programs should emphasize the importance of cultural competence in understanding and respecting social norms. Educators should be trained to recognize and address cultural biases and stereotypes, promoting an inclusive and respectful classroom environment. By fostering positive social interactions, teachers can enhance student engagement and create a supportive learning community.

Mental Health and Well-being in Diverse Educational Settings

The mental health and well-being of students are critical components of their academic success. Cultural differences in the perception and expression of mental health issues can impact students' well-being and their ability to seek help. Cross-cultural psychology highlights the importance of cultural competence in identifying and supporting students with diverse mental health needs. Teachers must be aware of cultural syndromes and idioms of distress, recognizing that mental health issues may manifest differently across cultures. Teacher education programs should include training on culturally competent mental health practices, equipping future educators with the skills to support the well-being of all students. This training can help teachers identify signs of distress, provide appropriate support, and promote mental health awareness in the classroom.

Acculturation and Identity Development in Education

Acculturation, the process of adapting to a new culture, can significantly impact students' identity development and educational experiences. Understanding the challenges and opportunities associated with acculturation is essential for supporting students in multicultural classrooms. Cross-cultural psychology provides insights into the processes of acculturation, including the development of bicultural identity and the impact of cultural adaptation on well-being. Teachers must be equipped to support students in navigating these challenges, fostering a sense of belonging and cultural integration. Teacher education programs should include training on acculturation and identity development, helping future educators understand the complexities of cultural adaptation. This training can empower teachers to support students' cultural identities, enhance their sense of belonging, and promote positive educational outcomes.

Ethical Considerations in Cross-Cultural Educational Research

Conducting cross-cultural research in education presents unique ethical challenges. Researchers must navigate methodological considerations, cultural sensitivity, and ethical standards to ensure the validity and integrity of their studies. Cross-cultural psychology emphasizes the importance of ethical practices in diverse educational settings, highlighting the need for culturally sensitive research methodologies. Teacher education programs should include training on ethical considerations in cross-cultural research, equipping future educators with the skills to conduct ethical and culturally competent research. By

understanding the ethical implications of cross-cultural research, teachers can apply research findings to improve their teaching practices and enhance the educational experiences of their students.

Digital Preservation of Educational Materials

Digital preservation techniques play a crucial role in maintaining and sharing educational materials. The digitization of teaching resources ensures their accessibility and longevity, making them available to a wider audience. Teacher education programs should incorporate training on digital preservation, teaching future educators how to digitize and archive educational content effectively. This training can help teachers create digital repositories of teaching materials, ensuring that valuable resources are preserved for future use. By utilizing digital preservation techniques, educators can enhance the accessibility and sustainability of educational materials, benefiting both teachers and students.

Virtual and Augmented Reality in Teaching

Virtual and augmented reality (VR and AR) offer innovative tools for enhancing cultural heritage education. These technologies provide immersive and interactive experiences, allowing students to explore cultural narratives and historical contexts in engaging ways. Teacher education programs should include training on the use of VR and AR in the classroom, teaching future educators how to integrate these technologies into their teaching practices. This training can help teachers create virtual field trips, historical reconstructions, and interactive heritage education tools that engage and inspire students. By leveraging VR and AR technologies, educators can provide students with unique learning experiences that bring cultural heritage to life.

Big Data and Cultural Heritage in the Classroom

Big data and cultural heritage offer valuable resources for teaching historical trends and cultural narratives. By analyzing large datasets, educators can uncover patterns and insights that enhance their teaching practices. Teacher education programs should include training on the use of big data in cultural heritage education, teaching future educators how to integrate data analysis and spatial analysis into their lessons. This training can help teachers create data-driven projects that engage students and promote critical thinking. By incorporating big data into their teaching practices, educators can provide students with a deeper understanding of cultural heritage and historical trends.

Accessibility and Access to Digital Educational Resources

Ensuring accessibility and equitable access to digital educational resources is essential for promoting inclusive education. Addressing the digital divide and providing accessible materials ensures that all students have the opportunity to engage with digital heritage content. Teacher education programs should include training on accessibility and digital equity, teaching future educators how to create and provide accessible digital resources. This training can help teachers address the needs of diverse learners, ensuring that all students can benefit from digital heritage materials. By promoting accessibility and digital equity, educators can create inclusive learning environments that support the success of all students.

Technological Innovations in Cultural Heritage Education

Technological innovations offer new opportunities for enhancing cultural heritage education. Emerging technologies such as 3D scanning, virtual reality, and augmented reality provide innovative tools for engaging students with cultural narratives and historical contexts. Teacher education programs should include training on the use of emerging technologies in cultural heritage education, teaching future educators how to integrate these tools into their teaching practices. This training can help teachers stay at the forefront of educational technology, providing students with cutting-edge learning experiences. By leveraging

technological innovations, educators can create dynamic and engaging cultural heritage education experiences that inspire and educate students.

Conclusion

Integrating cross-cultural psychology and digital heritage into teacher education is essential for preparing educators to meet the demands of culturally diverse classrooms. Understanding the impact of cultural differences on learning and behavior enables teachers to adopt inclusive and responsive teaching strategies. It is vital for cultivating culturally responsive and technologically adept educators. By understanding diverse psychological frameworks, teachers can better support the varying needs of their students, fostering inclusive and equitable learning environments. Digital heritage tools further enrich this process by providing innovative methods to engage with cultural content, preserving and sharing diverse histories in interactive ways. Ultimately, integrating these elements enhances teachers' abilities to connect with and inspire a multicultural student body, preparing them for the complexities of a globalized world.

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Next-Gen Methods to Investigate Where in Cultural Education Adaptive Learning Fits

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ABSTRACT

This study addresses how to integrate adaptive learning technologies into cultural education, to discover new methods that allow for enhanced learning experiences in a plethora of cultural situations. Adaptive learning technologies created personalised pathways making it adaptable for every learner suited to his/her own needs. Adjustments need to be made for this application to serve the cultural education sector effectively and deal with diversity-related issues, contributing towards inclusive learning. This study will provide a view and discussion on trends, challenges faced, as well the opportunities available to adaptive learning technology in culturally sensitive settings. This investigation serves two main goals: - first, to assess the practicality and feasibility of adaptive learning tools implemented in cultural education; second, to Significantly optimize the deployment of these technologies to serve a wider audience of culturally based learners.

Keywords: *Adaptive Learning Technologies, Cultural Diversity in Education Cultural education, inclusive learning environments, and differentiated student pathways.*

INTRODUCTION

Adaptive learning technology works as a promising model to meet the personal educational convenience, with its provision of one-on-one content delivery and exams; and feedback systems. Cultural Education: Adaptive technologies are developed to offer a classroom experience that caters to individual learning paces and different cultural backgrounds; adapting to these differences can help improve educational outcomes in cultural education. Cultural education is aimed at raising awareness or respect for different cultural viewpoints. This paper introduces innovative methods for improving cultural education and promoting inclusivity in connection to the complexity of culture through adaptive learning technologies.

REVIEW OF PAST STUDIES

With the help of adaptive learning tools, it is possible to extend our educational practices by creating diverse and inclusive learning environments that foster cultural competency. More work is needed to study the scalability of these technologies in different

cultural contexts and their lasting impact on learner engagement, student retention rates, and value creation for Indigenous groups (Robinson et al., 2022). One emerging area of interest designed to optimize learning through the lens of multiple contexts is adaptive learning technology in cultural education. Adaptive learning technologies work dynamically to serve the needs of each learner by offering personalized content delivery, testing, and feedback systems (Johnson, 2020). An adaptive learning system must have native multilingual help, cultured contextually adapt the material, and make sure that each student has access to appropriate technology infrastructure.

OBJECTIVE 1: Evaluate the efficiency of the currently used adaptive learning tools in teaching culture. Adaptive learning technologies relate to several technologies and practices that revolve around the modification of the learning process to suit the learners. For cultural education, the technologies should be in a position to consider the language, social, as well as environmental differences as a way of meeting the students from all backgrounds. Therefore, the section under discussion aims to assess the relevance and validity of the concept and modern variations of adaptive learning, including personalized LMS and ITS in the multicultural educational environment. The unchangeable or essential types of changes include for instance the diploma and course adjustments to the international culture in the way of evaluation, incorporation of multiculturalism in the content, and utilization of the relevant data in the achievement of the intended goals by the learners.

I. ADVANCES IN TECHNOLOGY REGARDING FLEXIBLE LEARNING

Studied adaptive learning systems include dream box learning, Knewton, and smart Sparrow; and these systems have been adopted in several contexts with the overall intent of improving student learning through the utilization of a student's learning path. These platforms work through the analysis of learner profiles, meaning each person's specific profile, their inclinations, their effectiveness, or things they need to improve to deliver relevant and optimized learning content.

II. CULTURAL EDUCATION'S EFFICACY

Incidentally, most of these technologies in cultural education have not been proven to be effective despite their consistent use. Recent findings have indicated that adaptive learning technology increases the students' performance and learning attitude in mathematics and science courses. Nevertheless, to apply these platforms in cultural education, additional modifications are needed. Thus, the cultural education under consideration also implies a profound understanding of students and cultural settings.

III. OPPONENT: ADAPTIVE LEARNING TECHNOLOGY IN CULTURAL EDUCATION

1. **Cultural Relevance:** The material offered should be able to consider the facts that the students are in a diverse classroom. A typical issue that afflicts most conventional adaptive learning systems is the lack of ability to consider a culture.

2. **Language Barriers:** It is quite a daunting task to provide adaptive information to people especially when there is a difference in languages. Speaking and understanding must also be multilingual.

3. **Modification of Evaluation:** This may be so because learners, especially from different cultural backgrounds, may not be 'captured' in academic advancement by traditional means of evaluation. The final consideration while changing the test is the differences in cultural factors affecting cognitive processes and learning styles.

4. **Access and Equality:** Adaptive learning affects the learner's performance by appropriately delivering instructional materials and learning resources; therefore, it must be made available to everyone. If children from poor backgrounds have no access to the right

technology other than what can be afforded in their school, such gaps may even widen.

OBJECTIVE 2: Mapping the strategies for enhancing adaptive learning technologies in the continuation of cultural learning

I. The dynamics in cultural education are being addressed by introducing ideas on enhancing the application of AL tech in teaching. These include the following techniques:

1. **Cultural Content Customization:** Culturally appropriate case studies, examples, and multimedia resources in the development of flexible educational modules that the procedures indicated are most grounded since it would help address results to students from culturally diverse backgrounds understand the material better. We can refer to this as the customization of cultural content. For example, the use of folklore, historical events, and cultural ceremonials increases the likelihood of learning since they relate to culture.

2. **Modifiable Evaluation Techniques:** Employing flexible means of assessment that reflect the success, learning styles, language, and cultural norms of students. Evaluations can also be more versatile as opposed to the current rigid formats of the assessment tools that are aligned with the different cultures of the contributors as well as the response formats and styles.

3. **Collaborative Learning Communities:** In virtual or hybrid models for learning communities, also enable the students to engage in face-to-face peer-to-peer learning exchange, cross-cultural discussions, and shared cooperative learning projects for the development of empathy and reason. Respect and a feeling of community can be fostered and also enhanced with the help of adaptive technologies that connect alike children with similar talents or interests.

4. **Interactive Simulations and Game-Based Learning:** Elements such as games and simulation with the incorporation of cultural aspects that may resemble real-life situations might help the learners apply the cultural information that has been learned in real situations. Using games in teaching enhances the students' motivation and learning, and the use of a simulation prepares the students for an interactive adventure that offers the enlightenment of cultural experiences.

5. **Multimodal Learning Materials:** To cater to diverse learners, wide and diverse information, educational, counselling, and training products are made available in the forms of video, instantaneous graphics, and YouTube among others. This way, the multimodal resources can enhance the content's applicability and relevance between various cultural contexts along with the frameworks for learning and development.

6. **Artificial Intelligence & Machine Learning:** Learner data is utilized alongside machine learning and artificial intelligence to provide targeted suggestions for cultural learning. To effectively address the needs of diverse cultural backgrounds, AI enhances the ongoing improvement of adaptive learning systems by identifying patterns and trends in learner behavior.

7. **Community and Stakeholder Involvement:** This ensures the inclusion of insights from local communities in the development and implementation of adaptive learning technologies. In summary, community feedback helps align methods and materials with local ethnocultural practices, ultimately enhancing educational outcomes.

II. CULTURAL CONTEXTS AND INNOVATIVE LEARNING AN ESSENTIAL COMPONENTS OF MODERN CURRICULA

Since adaptive technologies address the individual needs and wants of each learner in the course delivery systems, these technologies are gradually transforming cultural education. This unique strategy applies personalized algorithms and appropriate data-driven insights to enhance the learning results excluding the conventional 'one-size-fits-all' methods. In the

framework of cultural learning, adaptive learning can provide the individual course through several topics of the culture, such as historical, art, language, and traditional courses. An adaptive learning system, for instance, has the flexibility of adjusting the content to the student's past knowledge and learning speed in a biology course that introduced the learner to conventional medicine. A complex lecture on the biochemical profiles of medicine manufactured from plants consumed by various societies might be given to a student who has a good foundation in plant physiology, whereas an illiterate might be introduced to fundamentals. Adaptive learning methodologies which are considered the modern state-of-art are enhanced by applying immersive technologies such as virtual reality (VR) and augmented reality (AR) to cultural learning. Thanks to these technologies, students can explore the empirical approaches and results about the cultural aspects. For instance, a virtual reality simulation approximately the gardens in China that were used to cultivate herbs for China's conventional medical approaches would enable students to identify the plant species that are used in usual remedies and understand the imperial importance of such practices. Thus, both the aspects of botanical science and cultural studies can be implemented into the process of education as smoothly as in this case. Further, learner data could be used by the adaptive learning platforms to determine the strong, weak, and improvement zones. It enables them to give specific material assistance and targeted strategies. An adaptive system might provide individual practice problems concerning the mechanics and the materials science principles used in the construction of the pyramids and the Roman aqueducts for instance to a high school physics class with a focus on the marvels of the ancients. Subsequently, as the next step of the hints described above, adaptive learning may be stated as a true further development of educational technology because it offers students extremely personal and sensitive approaches to the explanation of cultures. If these suggestions are implemented then the status of institutions will improve, people will have a better insight and perception about the diverse culture and the institutions will become a justified and open place to carry out learnings. Here are some points and the Importance of why adaptive learning is relevant to improve cultural education in today's institutions.

Personalized Learning Paths:

Recommendation: When it comes to the students, there is also a chance to employ the element of adaptive learning technology to which contents matter to them, and how they prefer to learn, and develop.

Why It's Crucial: It is for this reason that having personal learning paths, helps in making learning about cultures not just necessary but enjoyable for each student. Since adaptive learning systems help in matching content relevant to each learner's situation and preferences, students are in a position of being able to relate to different aspects of culture hence improving their understanding and appreciation of the mentioned issues.

Instant Feedback and Evaluation:

Recommendation: Use learning management systems to deliver pertinent information to the learners about the results of cultural knowledge tests and fun items.

Why It's Crucial: Instantiation helps the students in that they can untangle and solve any ambiguity or lack of certain cultures at that instance. The checking is done on the spot which makes the growth steady and learning livelier.

Enhanced Engagement Through Gamification:

Recommendation: Integrate the schemes of games into the adaptive learning solutions to increase the levels of cultural content.

Why It's Crucial: Therefore, as part of further educational activity, the current key approaches can be implemented into practice in the form of developing types of lessons and

coursework – gamification; such actions can not only increase the interest of students in the process of learning as a whole, but it will also make the material being studied more interesting and comprehensible, considering the specifics of various cultures. Thus, it can contribute to the improvement of the process of preserving historical and/or cultural knowledge and skills.

Data-driven perceptivity for preceptors:

Recommendation: Share data and analysis deduced from adaptive literacy systems with the preceptors to help in determining the civilization of artistic literacy needs as well as their progress.

Why It's Crucial: The use of data ensures that constructive information can be used to justify the approaches used in the tutoring and operation of scholars. This in turn assists in tutoring and in the operation of scholars who develop certain literacy difficulties.

Flexible literacy surroundings:

Recommendation: Apply the concept of adaptivity to develop a system where literacy can be done at an accessible time and in a asked place; this will enable scholars to learn about societies on their own terms.

Why It's Key: By espousing inflexibility in a literacy terrain, a pupil's artistic education becomes flexible enough to be planned to suit the favoured times of utmost scholars as well as the favoured system of learning for the scholars.

Cultural Exchange openings:

Recommendation: Promote virtual artistic commerce practices grounded on espousing scholars' literacy platforms that will enable scholars to interact with scholars from other societies.

Why It's Crucial: Virtual exchanges enhance the two parties' artistic knowledge since the scholars get to learn and interact directly with individuals from the different corridors of the world.

CONCLUSION

In conclusion, one can assert that the integration, customization, and active learners' engagement stimulated by adaptive literacy technologies shift artistic education. Through similar innovative strategies, preceptors may allow the scholars to explore and appreciate the interrelation of wisdom and culture in colorful and dynamic mores by which the scholars' learning technologies deliver learning in new ways they produce fresh possibilities for the delivery of artistic education with perceptivity and development of learners' artistic perceptivity. In doing so, this exploration contributes to the growing dialogue on how technology could serve the purpose of diversifying culture or equating education by proposing how strengths with the technologies could be maximized, and at the same time presenting a particular perspective and notice on them. Unborn exploration studies should thus concentrate on examining the effectiveness of adaptive literacy results in different artistic settings and assessing the long-term impact of the results on learners' engagement and culture-sensitive knowledge gain.

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