



LITERARY FINDINGS

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

லிட்ஃடெரி ஃபைண்டிங்ஸ்

பல்துறை அய்யவுக்கான பன்னாட்டு அய்யவுதிழ்து

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A Study on Machine Learning Approach for Analysis and Forecasting Season-Wise Agricultural Crop Production

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Abstract

Agriculture is a crucial part of India's economy, contributing to GDP and employing over 60% of the population. Despite significant growth in recent decades, its share of the overall economy has decreased. To meet the demands of a growing population with rising incomes, India must increase crop production. Crop yields in India exhibit notable fluctuations annually because of variables such as monsoon patterns and latest and precise crop production data for India. Machine Learning is pivotal in contemporary decision-making, aiding organizations in extracting valuable insights from their data to enhance operations and achieve a competitive edge. This paper considers crop production statistics India-related dataset like state, district, crop, crop_year, season, area, production, yield. The machine learning approaches which is used to analysis and predict the dataset using linear regression, multilayer perceptron, random forest, random tree, and REP tree. Numerical illustrations are provided to prove the proposed results with test statistics or accuracy parameters.

Keywords: *Machine learning, crop yields, decision tree, correlation coefficient, and test statistics.*

1.0 Introduction and Literature Review

Utilizing machine learning and data mining in this research has the potential to enhance agricultural practices, boost crop yields, foster sustainability, and increase the efficiency of farming in India. Furthermore, it can assist farmers and policymakers in making well-informed decisions. Research in data mining has the potential to yield valuable discoveries, enhance decision-making, and foster a deeper comprehension of intricate phenomena across diverse domains. It entails an iterative journey, frequently requiring refinement and revisitation of various stages to attain significant outcomes. Machine learning research extends across diverse fields, encompassing areas like computer vision, natural

language processing, healthcare, finance, and beyond. This research frequently entails experimentation, rigorous testing, and iterative processes to pioneer groundbreaking algorithms and applications, expanding the frontiers of machine capabilities and knowledge.

Authors suggest introduces a system designed to forecast crop yields based on historical data. The approach involves the utilization of machine learning algorithms such as Support Vector Machine and Random Forest on agricultural datasets, enabling the recommendation of appropriate fertilizers tailored to specific crops. The primary objective of this research is the development of a predictive model that can be employed for future crop yield predictions. Additionally, the paper offers a concise analysis of crop yield forecasting using machine learning methodologies [1].

Machine learning techniques to forecast the yields of four widely cultivated crops across India. Once the crop yield predictions are made for specific locations, flexible adjustments in fertilizer application can be tailored to match the anticipated crop and soil requirements. The research focuses on the utilization of machine learning methodologies to construct a trained model that identifies patterns within the data, facilitating crop predictions. The study specifically addresses the prediction of the most commonly cultivated crops in India, which encompass Maize, Potatoes, Rice (Paddy), and Wheat [2].

The application of machine learning to classify soils into hydrologic groups. Leveraging characteristics like sand, silt, clay percentages, and saturated hydraulic conductivity values, our machine learning models were trained to categorize soil into four distinct hydrologic groups. We compared the classification results obtained from various algorithms, including k-Nearest Neighbors, Support Vector Machine with Gaussian Kernel, Decision Trees, Classification Bagged Ensembles, and TreeBagger (Random Forest), against those derived from traditional soil texture-based estimation. The models' performance was assessed and compared using per-class metrics as well as micro- and macro-averages. Overall, kNN, Decision Tree, and TreeBagger outperformed SVM-Gaussian Kernel and Classification Bagged Ensemble in terms of performance metrics. Interestingly, among the four hydrologic groups, Group B exhibited the highest rate of false positives [3].

A model designed to assess soil fertility, facilitate the optimal selection of crop seeds for fertile soil, and predict crop yields based on varying soil characteristics. The model's predictions can inform recommendations for crops that are likely to thrive. We leverage a range of Machine Learning algorithms, including Support Vector Machine (SVM), Random Forest, Naive Bayes, Linear Regression, Multilayer Perceptron (MLP), and Artificial Neural Networks (ANN), for soil classification and crop yield predictions. Our test results demonstrate that the proposed ANN approach adopts a deep learning architecture with multiple interconnected layers for enhanced accuracy, surpassing the performance of numerous existing methods [4].

Conducts an examination of various parameters found in the literature that are employed to describe soil characteristics and their utilization as inputs for machine learning algorithms in the prediction of soil fertility. This investigation reveals that employing optimized soil parameters can enhance the accuracy of soil fertility predictions and reduce the need for extensive human intervention, thereby enabling more efficient prediction techniques [5].

Data mining is a valuable tool for the practice of examining large pre-existing databases to generate previously unknown helpful information; in this paper, the input for the weather data set denotes specific days as a row, attributes denote weather conditions on the given day, and the class indicates whether the conditions are conducive to playing golf. Attributes include Outlook, Temperature, Humidity, Windy, and Boolean Play Golf class variables. All the data are considered for training purpose, and it is used in the seven-

classification algorithm likes J48, Random Tree (RT), Decision Stump (DS), Logistic Model Tree (LMT), Hoeffding Tree (HT), Reduce Error Pruning (REP) and Random Forest (RF) are used to measure the accuracy. Out of seven classification algorithms, the Random tree algorithm outperforms other algorithms by yielding an accuracy of 85.714% [6].

A framework for predicting the absolute Crop Growth Rate (CGR) in hydroponic tomato cultivation using machine learning techniques. Key input variables, such as Electric Conductivity (EC) limits, Nutrient Solution (NS), ion concentration uptake, and dry fruit weight, play pivotal roles in ensuring the successful growth of hydroponic tomato crops. Our study reveals both positive and negative correlations between growth parameters, fruit dry weights, and the absolute CGR of the plants. We analyze the dynamics of nutrient ion uptake, including Na, K, Mg, N, and Ca, throughout the tomato fruit growth process and investigate their impact on the target variable, absolute growth. This correlation analysis enables us to identify the critical variables influencing CGR, providing valuable insights into the optimal nutrient supply for robust crop growth and development. The proposed system design offers an intelligent and efficient approach for predicting and achieving optimal absolute CGR, while also aiding in the estimation of the ideal values for essential parameters to ensure high-quality crop yields [7].

The authors introduce an IoT monitoring sensor board designed for horticulture, aimed at establishing an IoT framework within the agricultural industry to monitor soil micro and macronutrients and analyze various soil parameters in Thiruvavur District, Tamil Nadu. This framework facilitates data-driven decision-making by collecting information from IoT sensors and storing it on a server for subsequent analysis using machine learning (ML) algorithms. The ML model categorizes the dataset based on micro and macronutrient threshold values obtained from the National Food Security Mission (NFSM). To assess the effectiveness of this classification, various ML algorithms, including Naive Bayes (NB), Logistic Regression (LR), Random Tree (RT), and K-Nearest Neighborhood (KNN), are employed. The performance of these classifiers is evaluated using metrics such as accuracy, Relative Absolute Error (RAE), Root Mean Square Error (RMSE), Root Relative Squared Error (RRSE), and Mean Absolute Error (MAE). The KNN classifier stands out with lower MAE, RMSE, and RRSE values of 0.2398, 0.3908, and 94.1845, respectively, demonstrating superior performance compared to the other classifiers. However, the RT algorithm achieves a lower RAE value of 66.24 when compared to KNN [8].

Authors suggest an innovative approach for assessing leaf nutrient levels in citrus trees using unmanned aerial vehicles (UAVs) equipped with multispectral imagery and artificial intelligence (AI). The study was conducted across four separate citrus field trials located in Highlands County and Polk County, Florida, USA. Each trial consisted of 'Hamlin' or 'Valencia' sweet orange scions grafted onto over 30 different rootstocks. Laboratory analysis of collected leaves determined macro- and micronutrient concentrations through traditional chemical methods. Spectral data from tree canopies were captured across five distinct wavelength bands (red, green, blue, red edge, and near-infrared) using a UAV fitted with a multispectral camera. An estimation model was developed utilizing gradient boosting regression trees and evaluated using various metrics, including mean absolute percentage error (MAPE), root mean square error, MAPE-coefficient of variance (CV) ratio, and difference plots. This innovative model achieved high precision in determining macronutrients (nitrogen, phosphorus, potassium, magnesium, calcium, and sulfur) with average errors of less than 9% and 17% for the 'Hamlin' and 'Valencia' trials, respectively, while exhibiting moderate precision in determining micronutrients (average errors of less than 16% and 30% for 'Hamlin' and 'Valencia' trials, respectively). Overall, this UAV and AI-based methodology demonstrated efficiency in assessing nutrient concentrations and

generating nutrient maps within commercial citrus orchards, with potential applications in other crop species [9].

Data mining is discovering hiding information that efficiently utilizes the prediction by stochastic sensing concept. This paper proposes an efficient assessment of groundwater level, rainfall, population, food grains, and enterprises dataset by adopting stochastic modeling and data mining approaches. Firstly, the novel data assimilation analysis is proposed to predict the groundwater level effectively. Experimental results are done, and the various expected groundwater level estimations indicate the sternness of the approach [10] and [11].

The input for the chronic disease data denotes a specific location as a row; attributes denote topics, questions, data values, low confidence limit, and high confidence limit. All the data are considered for training and testing using five classification algorithms. In this paper, the authors present the various analysis and accuracy of five different decision tree algorithms; the M5P decision tree approach is the best algorithm to build the model compared with other decision tree approaches [12].

2.0 Backgrounds and Methodologies

A data mining decision tree is a widely used machine learning technique for classification and regression tasks. It visually depicts a sequence of decisions and their possible outcomes in a tree-like structure. Each internal node represents a decision based on a specific feature, and each branch corresponds to the potential result of that decision. The tree's leaf nodes represent the final decision or the predicted outcome. The "CART" (Classification and Regression Trees) algorithm is the most used algorithm for building decision trees [13].

2.1 Linear Regression

Linear regression is a statistical technique employed to comprehend and forecast the connection between two variables by discovering the optimal straight line that most effectively aligns with the data points. It aids in ascertaining how alterations in one variable correspond to changes in another, proving valuable for predictions and trend recognition.

The core idea of linear regression is to find the best-fitting straight line (also called the "regression line") through a scatterplot of data points. This line represents a linear equation of the form:

$$y = m_x + b \quad \dots (1)$$

Where:

- ❖ y is the dependent variable (the one you want to predict or explain).
- ❖ x is the independent variable (the one you're using to make predictions or explanations).
- ❖ m is the slope of the line, representing how much
- ❖ y changes for a unit change in x.
- ❖ b is the y-intercept, indicating the value of y when x is 0.

2.2 Multilayer Perception

A Multilayer Perceptron (MLP) is an artificial neural network consisting of multiple layers of interconnected nodes or neurons. It's a fundamental architecture in deep learning and is used for various tasks, including classification, regression, and more complex tasks like image recognition and natural language processing. The architecture of an MLP typically includes three types of layers:

- i. **Input Layer:** This layer consists of neurons receiving input data. Each neuron corresponds to a feature in the input data, and the values of these neurons pass through the network.
- ii. **Hidden Layers:** These layers come after the input layer and precede the output layer. They are called "hidden" because their activations are not directly observed in the final output.
- iii. **Output Layer:** This layer produces the network's final output. The number of neurons in the output layer depends on the problem type.

2.3 Random Forest

Random Forest is a popular machine learning ensemble method for classification and regression tasks. It is an extension of decision trees and is known for its high accuracy, robustness, and ability to handle complex datasets. Random Forest is widely used in various domains, including data science, machine learning, and pattern recognition. The main idea behind Random Forest is to create an ensemble (a collection) of decision trees and combine their predictions to make more accurate and stable predictions. The following steps describe what Random Forest works like.

- ❖ Bootstrap Aggregating (Bagging)
- ❖ Decision Tree Construction
- ❖ Voting for Classification, Averaging for Regression

The key advantages of Random Forest are:

- ❖ Reduced overfitting
- ❖ Robustness
- ❖ Feature Importance

Steps involved in Random Forest

Random Forest is an ensemble learning method combining multiple decision trees to make more accurate and robust predictions for classification and regression tasks. The steps involved in building a Random Forest are as follows:

- Step 1. Data Bootstrapping
- Step 2. Random Feature Subset Selection
- Step 3. Decision Tree Construction
- Step 4. Ensemble of Decision Trees
- Step 5. Out-of-Bag (OOB) Evaluation
- Step 6. Hyperparameter Tuning (optional)

2.4 Random Tree

In machine learning, a Random Tree is a specific type of decision tree variant that introduces randomness during construction. Random Trees are similar to traditional decision trees but differ in how they select the splitting features and thresholds at each node. The primary goal of introducing randomness is to create a more diverse set of decision trees, which can help reduce overfitting and improve the model's generalization performance. Random Trees are commonly used as building blocks in ensemble methods like Random Forests. The critical characteristics of Random Trees are as follows:

- ❖ Random Feature Subset
- ❖ Random Threshold Selection
- ❖ No Pruning
- ❖ Ensemble Methods

Steps involved in Random Tree

- Step 1. Data Bootstrapping:

- Step 2. Random Subset Selection for Features:
- Step 3. Decision Tree Construction:
- Step 4. Voting (Classification) or Averaging (Regression):

2.5 REP Tree

REP (Repeated Incremental Pruning to Produce Error Reduction) Tree is a machine learning algorithm for classification and regression tasks. A decision tree-based algorithm constructs a decision tree using a combination of incremental pruning and error-reduction techniques. The key steps involved in building a REP Tree are as follows:

- ❖ Recursive Binary Splitting
- ❖ Pruning
- ❖ Repeated Pruning and Error Reduction

Steps involved in REP Tree

REP Tree (Repeated Incremental Pruning to Produce an Error Reduction Tree) is a machine learning algorithm for classification and regression tasks. It is an extension of decision trees that incorporates pruning to reduce overfitting and improve the model's generalization performance. Below are the steps involved in building a REP Tree.

- Step 1. Recursive Binary Splitting
- Step 2. Pruning
- Step 3. Repeated Pruning and Error Reduction
- Step 4. Model Evaluation

2.6 Accuracy Metrics

The predictive model's error rate can be evaluated by applying several accuracy metrics in machine learning and statistics. The basic concept of accuracy evaluation in regression analysis is comparing the original target with the predicted one and using metrics like R-squared, MAE, MSE, and RMSE to explain the errors and predictive ability of the model [14]. The R-squared, MSE, MAE, and RMSE are metrics used to evaluate the prediction error rates and model performance in analysis and predictions [15] and [16].

R-squared (Coefficient of determination) represents the coefficient of how well the values fit compared to the original values. The values from 0 to 1 are interpreted as percentages. The higher the value is, the better the model is.

$$R^2 = 1 - \frac{\sum(y_i - \hat{y})^2}{\sum(y_i - \bar{y})^2} \quad \dots (2)$$

MAE (Mean absolute error) represents the difference between the original and predicted values extracted by averaging the absolute difference over the data set.

$$MAE = \frac{1}{N} \sum_{i=1}^N |y_i - \hat{y}| \quad \dots (3)$$

RMSE (Root Mean Squared Error) is the error rate by the square root of MSE.

$$RMSE = \sqrt{\frac{1}{N} \sum_{i=1}^N (y_i - \hat{y})^2} \quad \dots (4)$$

Relative Absolute Error (RAE) is a metric used in statistics and data analysis to measure the accuracy of a forecasting or predictive model's predictions. It is particularly useful when dealing with numerical data, such as in regression analysis or time series forecasting.

$$RAE = \frac{\sum |y_i - \hat{y}_i|}{\sum |y_i - \bar{y}|} \quad \dots (5)$$

Root Relative Squared Error (RRSE) is another metric used in statistics and data analysis to evaluate the accuracy of predictive models, especially in the context of regression analysis or time series forecasting.

$$RRSE = \sqrt{\frac{\sum (y_i - \hat{y}_i)^2}{\sum (y_i - \bar{y})^2}} \quad \dots (6)$$

Equation 3 to 7 are used to find the model accuracy, which is used to find the model performance and error. Where Y_i represents the individual observed (actual) values, $\hat{Y}_i$ represents the corresponding individual predicted values, $\bar{Y}$ represents the mean (average) of the observed values and Σ represents the summation symbol, indicating that you should sum the absolute differences for all data points.

3.0 Numerical Illustrations

The dataset is rich with detailed crop production statistics for India, organized by state and district. It encompasses data for four significant crop seasons - kharif, rabbi, summer, and autumn - spanning from 1997 to 2020. This dataset offers insights into both the yearly crop production and yield across various regions of the nation. This dataset provides extensive agricultural production statistics for India, sourced directly from the Indian government's Area Production Statistics (APS) database. The APS, overseen by the Ministry of Agriculture and Farmers Welfare, offers in-depth information regarding crop production, yield, and cultivation area, spanning various states and districts across India. [17].

Table 1. Crop production statistics India sample dataset

State	District	Crop	Crop_Year	Season	Area	Production	Yield
Andaman and Nicobar Island	NICOBARS	Arecanut	2007	Kharif	2439.6	3415	1.4
Andaman and Nicobar Island	NICOBARS	Arecanut	2007	Rabi	1626.4	2277	1.4
Andaman and Nicobar Island	NICOBARS	Arecanut	2008	Autumn	4147	3060	0.74
Andaman and Nicobar Island	NICOBARS	Arecanut	2008	Summer	4147	2660	0.64
Andaman and Nicobar Island	NICOBARS	Arecanut	2009	Autumn	4153	3120	0.75
Andaman and Nicobar Island	NICOBARS	Arecanut	2009	Summer	4153	2080	0.5
Andaman and Nicobar Island	NICOBARS	Arecanut	2000	Kharif	1254	2000	1.59
Andaman and Nicobar Island	NICOBARS	Arecanut	2001	Kharif	1254	2061	1.64

Andaman and Nicobar Island	NICOBARS	Arecanut	2002	Whole Year	1258	2083	1.66
Andaman and Nicobar Island	NICOBARS	Arecanut	2003	Whole Year	1261	1525	1.21
Andaman and Nicobar Island	NICOBARS	Arecanut	2004	Whole Year	1264.7	806	0.64
Andaman and Nicobar Island	NICOBARS	Arecanut	2006	Whole Year	896	478	0.53
Andaman and Nicobar Island	NICOBARS	Arecanut	2010	Rabi	944	1610	1.71
Andaman and Nicobar Island	NICOBARS	Arecanut	2011	Rabi	957	1090	1.14
Andaman and Nicobar Island	NICOBARS	Arecanut	2012	Rabi	959	1362	1.42
Andaman and Nicobar Island	NICOBARS	Arecanut	2013	Rabi	890.5	846	0.95

Table 2: Machine Learning Models with Correlation coefficient

ML Approaches	Area	Production	Yield
Linear Regression	0.0538	0.4395	0.4369
Multilayer Perceptron	0.0031	0.4637	0.7506
Random Forest	0.9833	0.9970	0.9961
Random Tree	0.9842	0.9931	0.9943
REP Tree	0.9611	0.9890	0.9865

Table 3: Machine Learning Models with Mean Absolute Error

ML Approaches	Area	Production	Yield
Linear Regression	17470.6918	1356734.4153	124.8619
Multilayer Perceptron	24167.2920	1293959.9860	68.6951
Random Forest	520.0557	112393.9307	7.7286
Random Tree	775.0137	136177.9119	9.2886
REP Tree	917.7509	165275.1456	12.2442

Table 4: Machine Learning Models with Root Mean Squared Error

ML Approaches	Area	Production	Yield
Linear Regression	46059.8890	19339651.3698	830.5156
Multilayer Perceptron	51159.144	19078111.64	610.7335
Random Forest	8613.781	1733092.371	83.366
Random Tree	8200.9297	2532332.264	99.4777
REP Tree	12774.208	3214853.217	151.055

Table 5: Machine Learning Models with Relative Absolute Error (%)

ML Approaches	Area	Production	Yield
Linear Regression	99.3725	73.7382	82.7120
Multilayer Perceptron	137.4624	70.3264	45.5055
Random Forest	2.9581	6.1086	5.1197
Random Tree	4.4082	7.4012	6.1531
REP Tree	5.2201	8.9827	8.1109

Table 6: Machine Learning Models with Root Relative Squared Error (%)

ML Approaches	Area	Production	Yield
Linear Regression	99.8548	89.8229	89.9530
Multilayer Perceptron	110.9097	88.6082	66.1484
Random Forest	18.6741	8.0493	9.0294
Random Tree	17.7791	11.7614	10.7744
REP Tree	27.6936	14.9314	16.3607

Table 7: Machine Learning Models with Time Taken to Build Model (Seconds)

ML Approaches	Area	Production	Yield
Linear Regression	1.3000	0.3600	0.3200
Multilayer Perceptron	69.6100	127.1700	152.6300
Random Forest	163.4900	73.0900	196.6600
Random Tree	6.2100	1.1400	2.5800
REP Tree	3.4800	1.3300	2.2500

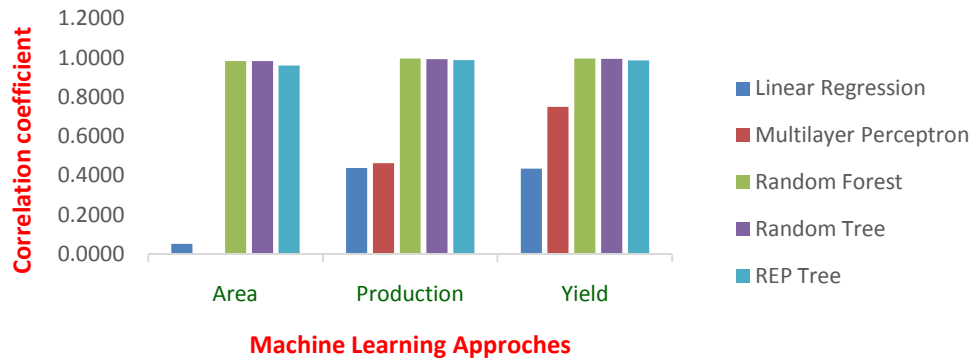


Fig. 1. Correlation coefficient for Machine Learning Approaches

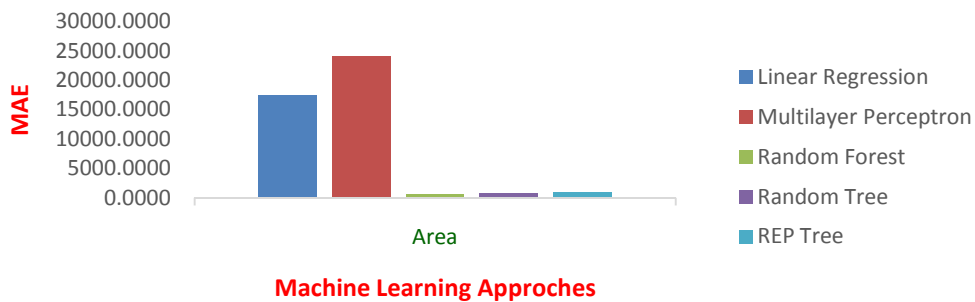


Fig. 2(a). Machine Learning Models with MAE

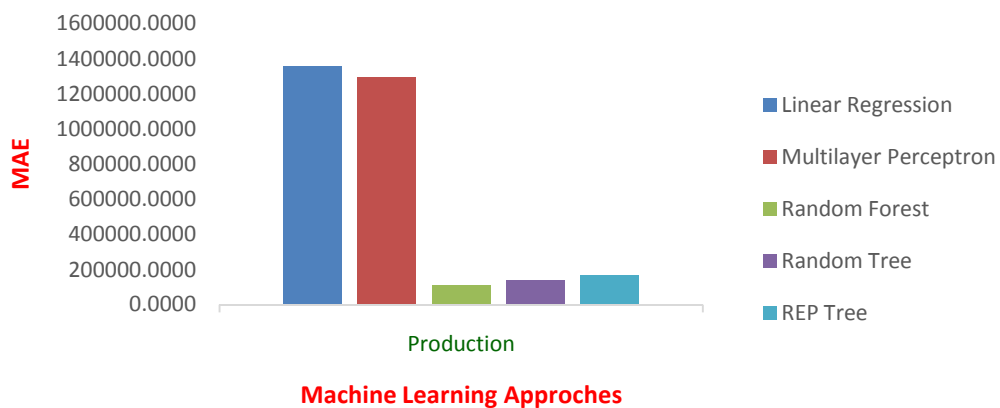


Fig. 2(b). Machine Learning Models with MAE

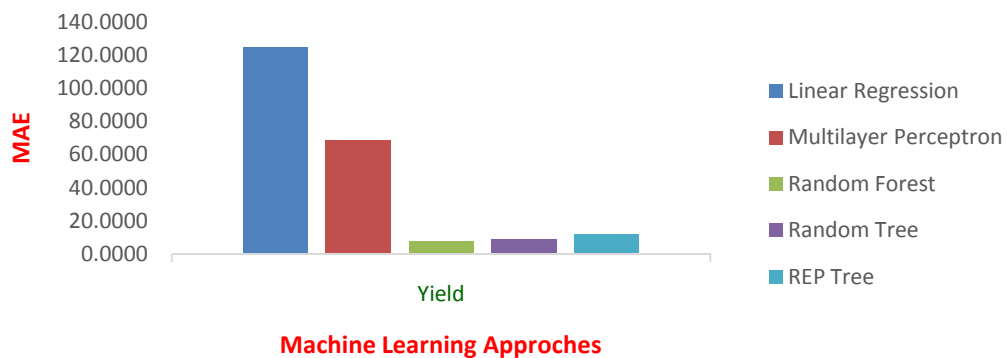


Fig. 2(c). Machine Learning Models with MAE

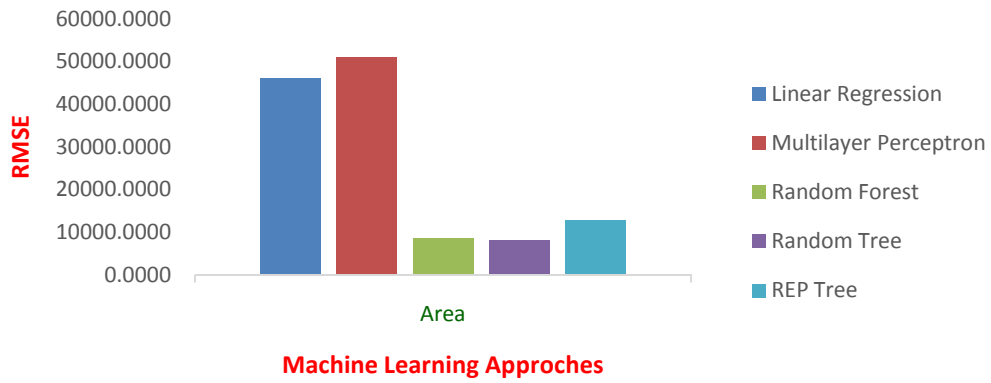


Fig. 3(a). Machine Learning Models with RMSE

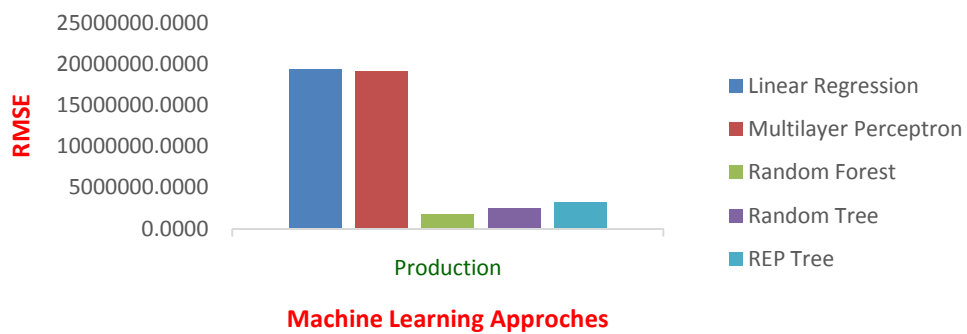


Fig. 3(b). Machine Learning Models with RMSE

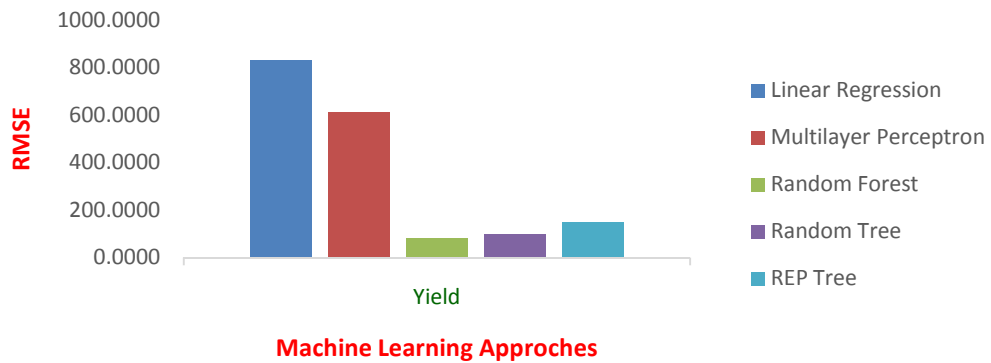


Fig. 3(c). Machine Learning Models with RMSE

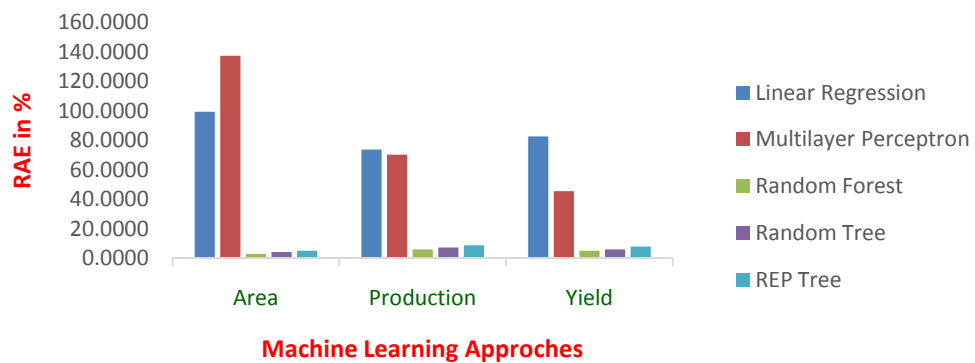


Fig. 4. Machine Learning Models with RAE (%)

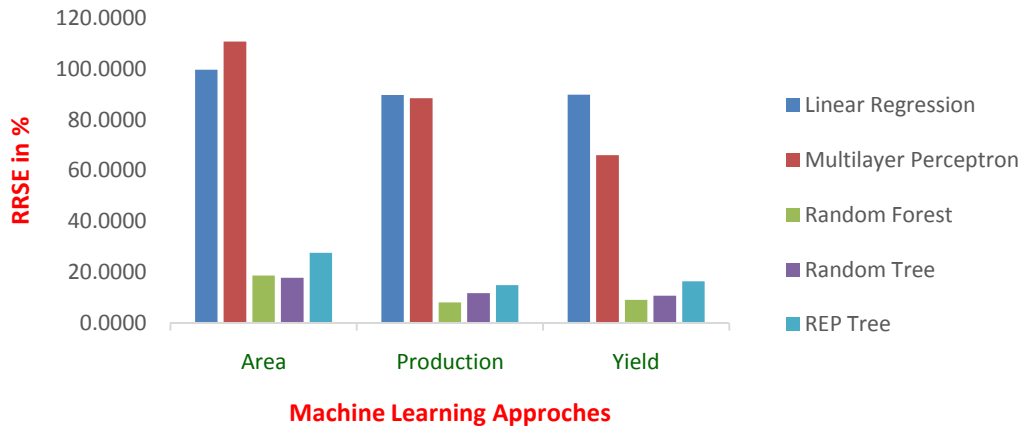


Fig. 5. Machine Learning Models with RRSE (%)

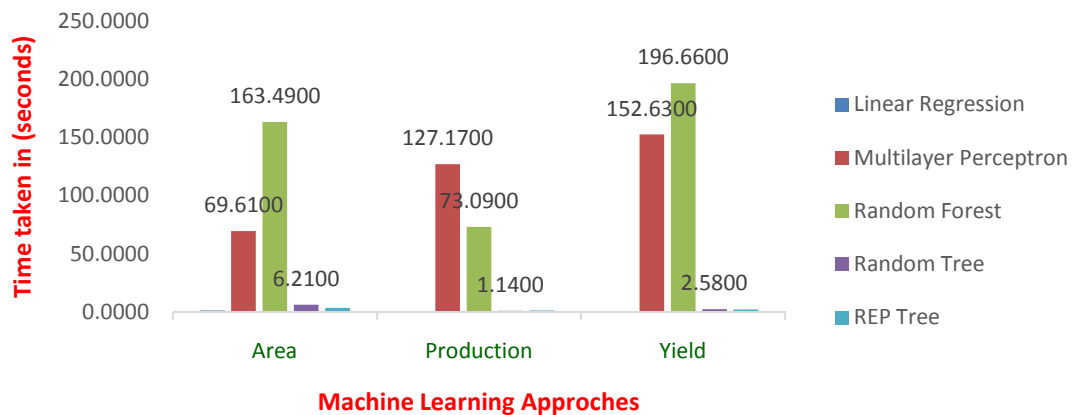


Fig. 6. Machine Learning Models and its Time Taken to Build the Model (Seconds)

4.0: Results and Discussion

In Section 4.0, the findings and discussions are presented. Table 1 provides a comprehensive overview of eight parameters, encompassing various data categories, including state, district, crop, crop_year, season, area, production, yield, and various agricultural product information. To uncover hidden patterns and determine the most influential parameter for future predictions, five distinct machine learning approaches—linear regression, multilayer perceptron, random forest, random tree, and REP tree—have been employed. The results and numerical illustrations can be found in Tables 1 to 7 and Figures 1 to 6.

These insights are rooted in Equation 2, Table 2, and Figure 1, which have been instrumental in calculating the correlation coefficient across the eight parameters. The numerical representations reveal significant variations among these parameters, with the use of area, production, and yield yielding a robust positive correlation of nearly 0 when employing the five different machine learning approaches.

Furthermore, the Mean Absolute Error (MAE), as defined by Equation 3, is utilized to assess model errors with the aid of five machine-learning algorithms. In this context, all five machine learning approaches exhibit exceptional error performance, with an average error of approximately 7. The relevant numerical illustration is presented in Table 3 and Figure 2.

The Root Mean Square Error (RMSE), measuring the disparity between predicted and actual values through Equation 4, also showcases exceptional error performance across all

machine learning approaches, with an average error of nearly 83. These results are visualized in Table 4 and Figure 3.

Additionally, the Relative Absolute Error (RAE), which evaluates accuracy using Equation 5 to compare predicted and actual values in terms of percentages, is examined across five machine learning classification algorithms. The RAE analysis reveals that linear regression and multilayer perceptron exhibit the highest error rates, while the remaining three machine learning approaches—area, production, and yield—deliver superior performance with minimal error. The corresponding results are represented in Table 5 to Table 6 and Figure 4 to Figure 5.

In the realm of time efficiency, a critical aspect of machine-learning approaches, Table 7 and Figure 6 highlight the time taken by different algorithms to solve the problem. Random Forests and multilayer perceptron require the most time, while Random tree and REP tree are the quickest in building these models. Furthermore, the linear regression approach also boasts a swift model development process. These findings are consistent with the visualizations presented.

5.0: Conclusion and Future Research

Section 5.0 summarizes the conclusions drawn from the study and suggests avenues for further research. It addresses the limitations of the model, including considerations related to state, district, crop, crop_year, season, area, production, and yield, as well as specific factors that may impact model underperformance and computational constraints that influenced model development. Additionally, it proposes potential enhancements and future steps, such as exploring additional data sources, investigating improved algorithms and hyperparameters, and fine-tuning the model to enhance its performance. This research serves as a valuable resource for the Department of Agriculture and related stakeholders, offering insights into the development of the agriculture sector based on micro and macronutrient levels.

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லிட்ரெரி ஃபைண்டிங்ஸ்
பல்துறை அய்வுக்கான பன்னாட்டு அய்விதழ்

LITERARY FINDINGS

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Appraising Secondary School Teachers Awareness Toward Psycho-Social Wellbeing of School Going Adolescents

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ABSTRACT

The suddenness and rapid pace, with which the changes take place in the body and mind of adolescents, generate a number of problems and special needs which they find difficult to understand and address on their own. The present study involved survey which was conducted in Bengaluru. It employed self-made and content validated questionnaire. Purposive sampling technique was used in selecting 109 secondary school teachers. The findings reveal that gender and subject have influence but, locality and type of school have no influence on the awareness towards psychosocial wellbeing of school going adolescents among teachers. Male teachers have more awareness than female teachers. Science and Mathematics teachers and English and Social Science teachers have similar levels of awareness. However, both Science and Mathematics teachers have more awareness than Social Science and English teachers. 52%, 27% and 21% of teachers respectively have excellent, very good and good level of awareness. It proves that teachers are well equipped understand and address the needs of school going adolescents.

Key Words: *Psycho-social Wellbeing, School Going Adolescents, Secondary School Teachers etc.*

INTRODUCTION

Adolescence is the momentous period in an individual's life. It is the period of transition between childhood and adulthood which occurs between ages 10 and 19. Developmental psychologists regard it as a period of rapid physical, psychological, cognitive and behavioural changes and biological changes, including, urge to experiment, attainment of sexual maturity, development of adult identity, and transition from socio-economic dependence to relative independence. All these transitions steadily touch upon the individual's behaviours, development and relationships.

NEED AND IMPORTANCE OF THE STUDY

Globally it is estimated that one in seven adolescents suffers from a mental disorder, with anxiety, depression and behavioural disorders being leading ones. Thus, mental health

and wellbeing are crucial for adolescents. The National Mental Health Survey of India 2015–2016 shows 7.3% prevalence of all psychiatric morbidity among 13–17 years age group.

The difficult transition from childhood to adulthood creates a crisis wherein they are vulnerable to peer pressure. Most of them may experiment with smoking, alcohol, tobacco or drugs and with sex. Therefore, parents and teachers should be more aware of what is happening to adolescents. Awareness on psychosocial wellbeing is an integral part of early identification of mental health issues (Samidha Dhungel Pokharel Ranju Adhikari, 2020). With the involvement of parents and teachers, it can help adolescents learn to deal with stressors and manage their physical and mental health. Teachers support has been shown to enhance adolescent mental health. Secondary school teachers are in a position to provide authentic knowledge to adolescents influencing their attitude, behaviour and value orientation, and developing life skills. There were reports of prevalence of depression, anxiety among children and adolescents in Bengaluru during Covid-19 Pandemic and even in Post Pandemic. Hence; the present study was undertaken to find out awareness of psycho social wellbeing of adolescents among secondary school teachers working in Bengaluru.

OBJECTIVES

1. To construct and content validate the awareness questionnaire.
2. To find out the different awareness levels of secondary school teachers toward psycho-social wellbeing of school going adolescents.
3. To study the influence of demographic variables on the awareness of secondary school teachers toward psycho-social wellbeing of school going adolescents.

VARIABLES

Demographic Variables: Gender (Male and Female); Teaching Subject (English, Social Science, Science and Mathematics); Locality (Urban and Rural); School (Government and Private)

Dependent Variable: Awareness towards psycho-social wellbeing of school going adolescents.

OPERATIONAL DEFINITIONS

1. **Psychosocial Wellbeing:** It implies the ability to be resilient and manage one's emotions. It also involves the ability to communicate, develop better relationships with others and create one's own emotional support network.
2. **School Going Adolescents:** It implies secondary school adolescents studying in the grade 10. They include both boys and girls. They are in the age group of 15 to 17 years.
3. **Secondary School Teachers:** It indicates teachers working in government and private secondary schools in Bengaluru. They handle the classes for grade 8 to 10. They include male and female, English, Social Science, Science and Mathematics, urban and rural teachers.
4. **Awareness of Psycho-Social Wellbeing of School Going Adolescents:** It implies teachers being conscious and understanding the nature, needs, challenges, problems of the school going adolescents and also able to contribute for their psycho-social wellbeing.

RESEARCH METHOD

The study involved survey method for collecting the quantitative data.

SAMPLING

The study followed purposive sampling technique in drawing a sample of 109 teachers.

RESEARCH TOOL

The researcher self-constructed questionnaire and obtained content validity from the experts. The tryout of the tool was done on ten secondary school teachers. The final tool has 27 multiple choice questions. One mark was given for choosing correct option and zero mark for choosing incorrect option or omitting question. Maximum 40 minutes was given to the sample to answer the tool.

DATA ANALYSIS AND INTERPRETATION

H₀₁: There is no significant difference in the awareness towards psycho-social wellbeing of school going adolescents between male and female secondary school teachers.

Table 1: Secondary School Teachers Awareness towards Psycho-Social Wellbeing of School Going Adolescents Based on Gender

Gender	N	Mean	SD	t-value	LoS at 0.01 Level
Male	40	25.25	1.335	5.938	Significant
Female	69	23.087	2.466		

The obtained 't' value 5.938 is more than the table value 2.58 at 0.01 Level of Significance. It means there is influence of gender on the teachers awareness towards psycho-social wellbeing of school going adolescents. Male teachers have more awareness than female teachers.

H₀₂: There is no significant difference in the awareness towards psycho-social wellbeing of school going adolescents between urban and rural secondary school teachers.

Table 2: Secondary School Teachers Awareness towards Psycho-Social Wellbeing of School Going Adolescents Based on Locality

Locality	N	Mean	SD	t-value	LoS at 0.05 Level
Urban	64	23.922	2.464	0.219	Not Significant
Rural	45	23.822	2.229		

The obtained 't' value 0.219 is less than the table value 1.96 at 0.05 Level of Significance. It means that there is no significant difference in the awareness towards psycho-social wellbeing of school going adolescents between urban and rural teachers. It implies that information and exposure towards adolescent students remained alike among teachers regardless of their locality.

H₀₃: There is no significant difference in the awareness towards psycho-social wellbeing of school going adolescents between government and private secondary school teachers.

Table 3: Awareness among Secondary School Teachers towards Psycho-Social Wellbeing of School Going Adolescents Based on Type of Secondary School

Type of School	N	Mean	SD	t-value	LoS at 0.05 Level
Government	57	23.947	2.239	0.189	Not Significant
Private	52	23.808	2.505		

The obtained 't' value 0.189 is less than the table value 1.96 at 0.05 Level of Significance. It means that the type of school has no influence on teachers awareness towards psycho-social

wellbeing of school going adolescents. It implies that both government and private school teachers are getting similar level of exposure to the information and realities of adolescent students.

H₀₄: There is no significant difference in the awareness towards psycho-social wellbeing of school going adolescents among teachers with respect to subject.

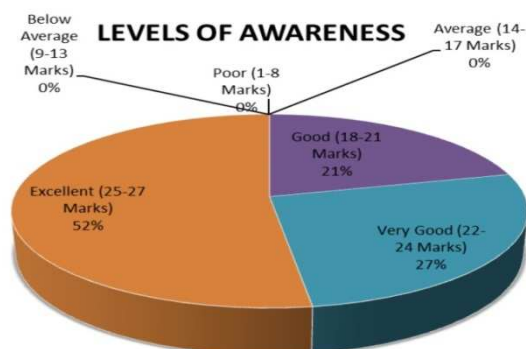
Table 4: Awareness among Secondary School Teachers towards Psycho-Social Wellbeing of School Going Adolescents Based on Subject

Subject	N	Mean	SD	t-value	LoS at 0.01/0.05 Level
English	24	22.292	2.331	0.182	Not Significant at 0.05 Level
Social Science	28	22.179	2.109		
English	24	22.292	2.331	6.525	Significant at 0.01 Level
Science	32	25.656	1.125		
English	24	22.292	2.331	5.063	Significant at 0.01 Level
Mathematics	25	25.04	1.306		
Social Science	28	22.179	2.109	7.807	Significant at 0.01 Level
Science	32	25.656	1.125		
Social Science	28	22.179	2.109	6.004	Significant at 0.01 Level
Mathematics	25	25.04	1.306		
Science	32	25.656	1.125	1.877	Not Significant at 0.05 Level
Mathematics	25	25.04	1.306		

It can be seen that, there is no significant difference in the awareness toward psycho-social wellbeing of school going adolescents between English and Social Science and also between Science and Mathematics secondary school teachers. This can be attributed to their equivalent exposure to the information and realities of adolescence. Also, there is significant difference in the awareness between English and Science teachers; English and Mathematics teachers; Social Science and Science teachers; Social Science and Mathematics teachers. The science and Mathematics teachers have more awareness than English and Social Science teachers. This can be attributed to the opinion that these teachers due to the nature of their teaching subject, and better exposure to the information on adolescents are having better awareness than other subject teachers.

Awareness Levels of Secondary School Teachers

Graph 1: Awareness Levels among Secondary School Teachers



From the graph, it can be seen that among 109 secondary school teachers, 52%, 27% and 21% of them respectively have excellent, very good and good level of awareness. It proves that teachers are well equipped understand and address the needs of school going adolescents.

EDUCATIONAL IMPLICATIONS

1. Adolescence is a stage where maximum growth and development takes place. The roles of teachers, parents and school for adolescents are important to support and guide them to cope-up with the rapid changes of growth, mood disruptions and other common problems.
2. Parents, teachers, school etc. should consider adolescence as a positive stage of life instead of problematic and traumatic stage.
3. Schools should arrange guidance and counselling services for adolescents. They can appoint a counsellor at least on part-time basis. This can significantly helpful to the teachers in coping with adolescents needs and problems.
4. Adolescence education should be a part of regular school curriculum. It should consider diversity among adolescents and enable them to articulate their issues and know their rights, build up self-esteem and self-confidence.
5. Schools should invite scientists, celebrities to give talk. This can help the adolescents to realize that in spite of hardships they have emerged victorious due to their determination, hard work, positive attitude etc. This can inspire them to aim high and work hard.
6. Schools should inform parents to be clear with their expectations for responsible behaviour, reward proper behaviour and enforce sensible consequences for inappropriate behaviours to help adolescents learn from his or her mistakes and successes. Further parents should be asked to avoid being too ambitious about the academic performance of adolescents.
7. Teachers and parents should provide a caring environment to adolescents. They should give the proper knowledge of health, personal hygiene, cleanliness, various disease and their prevention.
8. Secondary school teachers have the responsibility to organize the Adolescence Education Program for the holistic development of adolescents. They should periodically get updated.
9. Schools and family should provide for regular meditation and mindfulness practice for adolescents. They help them to cope with their stress with respect to homework, academic achievement, peer pressure etc. They create awareness on how to control and express anger and frustrations in appropriate ways; be responsible for actions; and accept consequences. They also can enable them to improve their attention and focus better.
10. Schools should ensure that physical education should be well structured that focuses on developing physical fitness among adolescents.

DE-LIMITATIONS

1. The study is confined to 109 teachers working in government and private secondary schools in Bengaluru in Karnataka.
2. The study is confined to measure the influence of gender, subject, locality, and type of school on the teachers awareness of toward psycho-social wellbeing of school going adolescents.
3. Th tool is only content validated and it has only 27 items.

CONCLUSION

Due to the complexities and challenges faced by an individuals during adolescence, psychologists have termed it as a period of great 'stress and storm'. Hence, mental health and wellbeing are crucial for adolescents. After the parents, teachers play vital role in enhancing adolescent mental health. The study found that Science and Maths teachers have better

awareness than other subject teachers w.r.to awareness towards psychosocial wellbeing of adolescents. The study calls for various measures to strengthen the teachers awareness.

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லிட்஫ெரி ஃபைண்டிங்ஸ்
பல்துறை அய்வுக்கான பன்னாட்டு அய்விதழ்

LITERARY FINDINGS

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Steam Revolution: Leveraging Science Teaching Through Multidisciplinary Approach

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Abstract

The twenty-first century is the era of rapid technological changes and innovation. In this era, knowledge is also in a transforming phase. Many environmental crises continue to occur worldwide like climate change, tsunamis, global warming, etc. Addressing such crises demands skilled man forces all around the globe who can critically analyse the cries from multiple perspectives. The educational system needs to be rethought & revamped to address these demands of the 21st century. The educational planner suggests a multi-disciplinary and interdisciplinary approach to pedagogy. Our National Educational Policy (NEP) 2020 also advocates a multidisciplinary approach and interdisciplinary approach for teaching to today's learners. The STEM approach is one of the interdisciplinary approaches to learning Science, Technology, Engineering, and Mathematics disciplines. Education systems all around the world have introduced STEM education in the school system. STEM education is a way of learning that prepares the students for future workplace. It promotes curiosity, skills, and critical thinking amongst student which sets the ground for the student's future career. Moreover, to promote creativity and innovation, many educationists have suggested integrating 'Art' into STEM, and the new acronym "STEAM" has evolved. The reason to integrate art is to develop skills like creativity, problem-solving, critical thinking, communication, self-direction, initiative, and collaboration. All these skills—which align with what many educators now refer to as "twenty-first-century skills"—will be needed by every student in order to survive successfully as an adult in an increasingly complex, fast-paced, and technologically driven world. The new abbreviation of STEAM is Science, Technology, Engineering, Art and Mathematics. This approach fulfils the twenty-first-century requirements. This paper explores the concept of STEM and STEAM education, its importance, integration of STEAM in teaching science as well as a teacher's role in teaching science through STEAM approach.

Keywords: *STEM & STEAM education, Importance, teacher's role, STEAM based lesson plan.*

1.0. Introduction

In twenty-first century, there occur many technical changes and innovation. Global crisis arises in this era. A world face too many environmental problems due to human interference to the nature. Nature has been disturbed by human unnecessary activities, climate change, global warming, carbon emission and so on. Due to such unethical activities, whether has disturbed, health issues had raised and it directly affect to the human social activities. To overcome such issues, we need skilled work-forced. Education has a potential to increase quality of life. (this would be possible through education) It has a significant effect to prepare us to face the twenty-first century skills. To acquire such skills like creativity, critical thinking, communication, collaboration, problem-solving skill, we have to adopt multidisciplinary approach because one subject or discipline cannot solve mentioned problems. STEM education is one of the approaches by which students enable to acquire twenty-first century skills. STEM term proposed by the NSF (National Science Foundation), United States in 1990 as an abbreviation for “science, technology, engineering and mathematics” (sanders,2009). STEM education is an interdisciplinary approach to learning where rigorous academic concepts are coupled with real-world lessons as students apply science, technology, engineering, and mathematics in contexts that make connections between school, community, work, and the global enterprise enabling the development of STEM literacy and with it the ability to compete in the new economy (Tsupros,2009). Our National Educational Policy (NEP) -2020 talks about the multidisciplinary approach to bring quality of education. Therefore, STEM is the best concept for teaching with multidisciplinary aspect. STEM education increases the effectiveness of the teaching learning. According to (David A. & Pilecki, Thomas, 2018), art integration in STEM programme has more relevance to promote in-depth learning. Art has a potential to create something novel which is ultimate goal of science. Arts develop cognitive and social growth, enhance creativity, make teaching more enjoyable. Researchers found that students scored better on standardised tests when they were more active on arts compared to those who were less active in the arts. Thus, the new term has evolved which known as STEAM. It is the integrated STEM approach with integration of “A”. this paper discusses about the concept and importance of STEAM in science teaching and role of the teachers in STEAM based teaching approach.

2.0 Understanding the foundations

History of STEM

In the 1990s, the National Science Foundation (NSF) began using “SMET” as shorthand for “science, mathematics, engineering, and technology.” When an NSF program officer complained that “SMET” sounded too much like “smut,” the “STEM” acronym was born. As recently as 2003, relatively few knew what it meant. Many that year asked if the STEM Education graduate program.

STEM was introduced by U.S. National Science Foundation (NSF) 2001. STEM is integrative approach that contains four disciplines in single structured programme. It is an interdisciplinary approach. According to The National Science Teachers Association, STEM education is "an experiential learning pedagogy in which the application of knowledge and skills are integrated through in-context projects or problems focused on learning outcomes tied to the development of important college and career readiness proficiencies." STEM education teaches various subjects through hands-on instruction. STEM based teaching programme helps students to solve the real-world problems. Moreover, STEM also help the students to develop the core skills which help them to build STEM career.

Concept of STEAM

STEAM is an advancement of STEM acronym. STEAM is interdisciplinary approach which contains two or more integrated subjects that equally inform each other. STEAM's

discipline- science, technology, engineering, arts and mathematics. In STEAM, the “A” is introduced into STEM. According to the British Education Research Association (BERA), STEAM has been adopted worldwide to indicate the involvement of art, or artistic practice, in education. STEAM has more effectiveness as compare to STEM. STEAM solve the problems with the help of arts. Art is enjoyable subject matter which bring interest into the students. According to G. Sharifov; Dashdemirov. A. (2022), Yakman is credited with transforming STEM into STEAM by incorporating arts into the curriculum. He established the STEAM Education Framework in 2006.

- Science is the study of nature and the materials that constitute all things that make up the universe.
- Technology refers to scientific knowledge that result in the production of tool, application, devices, and methods to fulfil human’s need.
- Engineering is the process to solve real-world problems using scientific principles, technologies and existing knowledge.
- Arts are acts of human expressions that result creative products and performances.
- Mathematics is the scientific study of problem solving.

3.0 Importance of STEAM based education

STEAM is heart about innovation and innovation is about more than developing the latest gadget. Innovation is one of the keys to solve the most pressing problems of our time and ensuring a healthy, sustainable future. STEAM have no hard separation of the subjects. Students can learn all the discipline together. By this integrative approach students be able to solve the problems at 360⁰ aspects. These approaches develop interest into them to overcome from the problems. It helps students to collaborate with each other and understand subjects with in a different way. It also develops natural curiosity and creativity into the students. STEAM education make student able to face the problems and find solutions.

STEAM education research has broadly classified 243 STEAM skills into eight primary categories in the United States, Austria, Belgium, Cyprus, Finland, Ireland, Slovenia, Spain, and Sweden (Mcloughlin et al., 2020):

- 1 - Problem Solving;
 - 2 - Innovation and Creativity;
 - 3 - Communication;
 - 4 - Critical Thinking;
 - 5 - Metacognitive Skills;
 - 6 - Collaboration;
 - 7 - Self-Regulation;
 - 8 - Disciplinary Competences
- STEAM-based teaching is to help students to develop the twenty-first century skills. It will be used in furthermore education such as higher education. It creates inclusive learning environment that stimulate students to problem-solve.
 - STEM education promotes higher-order thinking skills like critical thinking and creativity and innovation.

4.0 Integration of STEAM in science teaching

The idea of STEAM is to integrate science into one single area of human knowledge and apply that knowledge in practice (Pardabarv, 2020). STEAM is very useful to understand the concept of science by incorporating technology, engineering, mathematics and art. It helps students to see how science is connected to other fields. In science, there are three major fields: chemistry, physics and biology. Here physics relates with engineering and

technology, chemistry relates to art, mathematics and biology relates with art, technology, mathematics. It promotes the student's curiosity about the world around them. It also teaches them to apply the scientific approach for day-to-day life situation. By teaching science student knows about natural world, geographical condition, surroundings and also aware about the problems which disturb over natural cycles. STEAM has a potential to develop knowledge to overcome of such issues.

5.0 Teachers' Role in implementation of STEAM

Teacher's role is notable in building the character of the students. Students spend more time with their teachers. Without interference of teacher, STEAM based teaching programme cannot be work properly. Teachers need to hold certain skills and knowledge so that they can integrate technology and engineering concepts into their classroom practices (Akaygun & Aslan-Tutak, 2016). Therefore, the role of the teacher is very crucial in the process of integration of STEAM in teaching. A teacher needs to collaborate effectively with the students in STEAM teaching. It is the responsibility of the teacher to make effective lesson plans having challenging activities for students that develop higher-level thinking of students. A teacher needs to design such activities for integration of STEAM which connect to the real world. He/she needs to create a conducive environment that promotes discussion of new ideas amongst students. He/she needs to provide continuous guidance and motivation to students so that they can be actively engaged in STEAM activities in the classroom. Teachers also need to discuss & collaborate with their colleagues to design effective learning activities for STEAM. (The Teachers Academy, 2020).

6.0 Example of Integration of STEAM in Science Teaching:

State board: Gujarat Secondary and Higher Secondary Education Board.

Standard: 6th grade

Topic: Motion and Measurement of Distances

Sub-topic: Modes of Transportation

Duration: This lesson plan will take 70 minutes (2 period).

Objectives of the lesson plan:

- Students will understand the concept of modes of transportation.
- Students will be able to list the different vehicles of transportation.
- Students will be able to explain the evolution of technology used in different modes of transportation.
- Students will be able to explain the involvement of different concepts of science, maths, engineering, and technology behind the designing of various vehicles of transportation.
- Students will be able to create a clay model of a bicycle.

Materials to be used: Chart paper, Pencil, eraser, Cutter, Card-board, Rounder, Scale, Video clip, Toy steamboat, colour.

Outline of STEAM integrated teaching-learning process:

1. Content Analysis

The chapter is about motion and the measurement of distances. For the integration of STEAM-in lesson plan, the subtopic of modes of transportation is selected. Content analysis was done for the integration of STEAM. The entire content is divided into sub-points which are as follows:

Water-ways	Road-ways	Air-ways
• Boat • Motor Boat • Steam Boat • Steamer	• Wheels • Bull-cart • Bicycle • Motor Cycle • Bus • truck • Rail-way • Electric Rail • Monorail	• Aeroplane • Spacecraft • Super Sonic Aeroplane

2. Integration of STEAM in the content of science teaching:

Content	Interwoven Concept of the science	Accommodation of STEAM fields			
		Technology	Engineering	Art	Concept of mathematics
Modes of Transportation Boat Bull-cart Bicycle Motorcycle Rail-way Steamer Aero-Plane	Types of the force Law of motion Concept of friction	Technology for designing different vehicles. For example: invention of wheel, invention of steam engine	Process of making a different type of vehicles; (Mechanical & automobile engineering, electric engineering)	Craft: Making a model of Wheel using card-board	Concept of Circles, radius, diameter & other shapes, Angle

3. Detailed description of classroom interaction:

Step 1: Teacher will divide students in three to four group and ask them to make the model of wheel using the card-board. (**Art**)

Step 2: Teacher ask the students to design the bicycle using wheel. Also, instruct them to make a list of things/materials/objects to be needed for designing the bicycle and making it functional on the road. (**Science +Engineering**)

Step 3: Teacher will ask the following questions to the student for the development of content.

- (1) Imagine you are driving a bicycle, and suddenly you find an old lady crossing the road and so, you will need to stop the bicycle, what will you do for that? (**Science**)
- (2) Bicycle is stopped by applying the break. Which concept of science is used behind applying the break? (**Science**)

- (3) Do the wheels of a bicycle have to be of the same size? Why? **(Science)**
- (4) Which concept of mathematics will you use to make two wheels of the same size for a bicycle **(Mathematics)**
- (5) What are the other vehicles you can make which has wheels for motion? Make a list. **(Science +Technology + Engineering)**
- (6) Make the classification of vehicles that are used in different kinds of mode of transportation like waterways, roadways, airways, etc. **(Science + Technology)**
- (7) Which vehicles were used for transportation in ancient times? **(Technology)**
- (8) Give the name of vehicles which are used in the present time? **(Technology + Engineering)**
- (9) Which technology is being used in latest vehicles? **(Technology + Engineering)**

Step 4: Teacher will show the video clip of a steam toy boat to the students and explain the concept of steam engine used in video clip for transportation. **(Science +Technology+ Engineering)**. Teacher will explain the concept of engineering to make the students understand the evolution process in different kinds of vehicles and ask the question.

- (1) Select the vehicle of your choice and imagine the type of engineering involved in designing the same. **(Engineering)**
- (2) Make a chart of different kinds of vehicles following their timeline. **(Art)**
- (3) Arrange the vehicles in sequence keeping in mind the proportion of technology and engineering used in designing those vehicles. **(Technology + Engineering)**

7.0 Conclusion

This paper focuses on STEAM based teaching programme, as well as STEM to STEAM journey. There are many important aspects of STEAM programme such as solving the real-world problems, Learners become more creative and innovative. Teachers have significant role in implementation of STEAM education. Many studies said that STEAM approach is effective for cognitive development. In this paper, example of lesson plan has been included.

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லிட்஫ெரி ஃபைண்டிங்ஸ்
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Role of Digital Media in Conserving Tribal Handicrafts

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Abstract

Tribal art and craftsmanship have consistently possessed a distinct aura, eliciting a feeling of fascination and reverence. These concealed valuables, crafted by native cultures across the globe, provide a distinctive insight into their abundant cultural legacy. Each piece, whether it be elaborate beadwork or mesmerizing wood carvings, serves as a testament to the rich cultural heritage that has been transmitted across centuries. An intriguing characteristic of indigenous artwork is its ability to effortlessly combine practicality with creative creativity. Tribal art and craftsmanship have a strong foundation in tradition, with numerous processes and supplies being passed on from one generation to the next. This presents an occasion to acknowledge the exceptional expertise and ingenuity of indigenous populations, who frequently have difficulties in safeguarding their customary way of life amidst the process of modernity. Social internet has been instrumental in facilitating this rebirth, enabling individuals to explore and establish connections with indigenous artists without leaving their homes. Instagram and Pinterest have transformed into digital galleries, showcasing breathtaking photos of tribal art and skilled workmanship to a worldwide audience. The advent of the internet revolution has not only broadened the accessibility of tribal artists' work, but has also ignited discussions on cultural appropriation and the ethical considerations surrounding the purchase and collection of these artefacts. This study focuses on the relationship between tribes, digital media, and the preservation of their art and craft traditions.

Keywords: tribes, digital media, conservation, art, heritage.....

Introduction

Cultural legacy is an essential component of our society, serving as a reflection of our collective history, values, and customs. Media is essential in the preservation and promotion of cultural heritage in today's digital era. Now, let's explore the importance of media in this context. To begin with, media channels offer a potent method of safeguarding cultural heritage. By utilising documentaries, archive video, and digital libraries, we have the ability to collect and preserve significant artefacts, narratives, and traditions for the benefit of future

generations. These digital archives guarantee the continued accessibility and safeguarding of our cultural legacy, even in the presence of physical decay or natural calamities. Furthermore, media channels function as a means to promote cultural heritage on a worldwide level. Through the utilisation of social media and internet platforms, we possess the capacity to access an extensive audience, surpassing limitations imposed by geographical limits. By utilising captivating graphics, captivating storytelling, and immersive experiences, we are able to present the vastness and variety of our cultural history to a larger audience, so promoting cross-cultural comprehension and admiration. Indian handicraft products are an essential component of our society and are much sought after by Western buyers (Jena, 2010). Moreover, the media serves as a stimulus for cultural innovation and creativity. By integrating conventional artistic practices with contemporary media methods, we may generate compelling material that revitalises our cultural legacy. Through the use of media, we are able to recontextualize and reinterpret our legacy, making it meaningful and captivating for modern audiences. This includes virtual reality tours of historical locations and interactive apps that teach traditional crafts. Moreover, media outlets offer an opportunity for marginalised populations to regain and commemorate their cultural legacy. Often, cultural traditions and practices have been disregarded or marginalised. By utilising digital platforms, these communities have the ability to exchange their narratives, question preconceived notions, and affirm their cultural heritage. This empowerment is crucial in safeguarding and rejuvenating at-risk cultural traditions, guaranteeing their longevity for future generations. Ultimately, media is crucial in safeguarding and advancing cultural heritage. Through utilising digital channels, we can protect and preserve our cultural heritage, disseminate it globally, encourage innovation, and uplift disadvantaged areas. Digital media is essential for the preservation of tribal handicrafts since it enables communication, marketing, and the revitalization of cultural practices. It allows craftsmen to exhibit their work, expand their audience, and participate in intercultural interactions. Artisans can utilise mobile applications to upload photographs of their crafts, acquire training, and engage with relevant agencies for assistance and marketing purposes. Nevertheless, obstacles such as lack of knowledge and skills in using digital technology, restricted availability of technology, and insufficient legislative safeguards impede the complete utilisation of digital media in safeguarding indigenous handicrafts. Although there are challenges, digital technologies provide chances for innovation and the rejuvenation of intangible cultural heritage through digital creation and collaborative efforts. By combining digital media with traditional crafts, tribal tribes can not only retain their cultural identity but also promote economic development and social empowerment.

Tribes

Indian tribes are among the most ancient residents of the sub-continent. The term "tribes" was first adopted during the colonial era. Due to administrative expediency, the British colonists in India employed a singular designation 'tribe' to encompass a wide range of distinct tribes. In India, the term 'tribe' carries the connotation of a fascinating and captivating collective of individuals. A speech community is a collection of individuals who share a same dialect and belong to a preliterate and localised social group. The indigenous population has been referred to by different terms as Adivasi, Vanavasi, Vanyajati, Adimjati, Girijan, and Pahari, among others. A tribe is a cohesive social unit comprised of individuals who possess a shared lineage and cultural heritage, and who choose to reside exclusively inside their own self-contained community. The tribes of India, widely dispersed throughout the country, are the autochthonous or aboriginal population. Indigenous communities make up a substantial portion of the Indian populace, and the cultural traditions of these tribes are an essential component of our intangible national legacy. The preservation of India's tribal communities and their cultural heritage is of utmost significance, as they serve as vital

stewards of the environment and possess invaluable wisdom that may contribute to the restoration of ecological equilibrium.

Digital media

The internet is arguably one of mankind's most significant inventions, comparable in impact to sliced bread, as it has given rise to a virtual realm that can be regarded as a remarkable achievement of humanity. With the increasing compatibility of a wide range of devices, its utilisation has been accessible to everyone. Furthermore, while discussing devices, significant progress has been made in both software and hardware. Undoubtedly, the influence of digital media on our society is readily apparent, encompassing both advantageous and detrimental consequences. Our daily activities have become increasingly reliant on technology, whether for enjoyment or education. Efficiently navigating this planet has been our utmost priority. It is common for us to frequently encounter new smartphones or laptops that have been upgraded. Given the prevalence of digital media, a significant concern arises over its influence on tribes, particularly in relation to the preservation of their handicrafts and overall way of life. Digital media refers to the use of digital equipment to convey opinions or ideas in a digital format. It is a rapid, uncomplicated, and efficient method of communication and dissemination of content. This encompasses many forms of media, such as text, audio, video, and graphics, that are conveyed via the internet or other digital platforms like television and radio. Digital media content can be generated, disseminated, and altered using digital technologies, distinguishing it from conventional media.

Digital media and tribes

Digital media is the latest iteration of media, encompassing numerous elements and distinct traits. The channel offers a variety of features such as communication, text messaging, image sharing, audio and video collaborating, rapid posting, global connectivity, and direct connection. It is also the most cost-effective and efficient way to connect with the world, making it highly significant for individuals of all age groups. Its usage is steadily growing worldwide at a rapid pace. Tribal traditions are being assimilated into digital media as valuable artefacts of human civilization that are likely to vanish in the near future (Wu et al., 2022). A significant proportion of young people are rapidly transitioning from traditional forms of electronic media, such as television and radio, to social media platforms across all age groups. The youth population is increasingly transitioning to social media, resulting in significant impacts on young people. The popularity of social media has raised numerous inquiries about its societal effects. While it is widely acknowledged that social media influences people's lifestyles, there is an ongoing effort to understand the specific nature of these influences in different societies and countries, particularly among the youth. This study also examines the impact of social media on tribal youth, including their lifestyle, trends, educational and political awareness, physical activities, social life, and learning.

The Indian society is a complex society characterised by diverse cultures, tribes, castes, and languages, as well as significant gaps between urban and rural populations. Since the inception of independent India, it is undeniable that the nation has experienced significant progress in various sectors, including infrastructure, public healthcare, communication, and IT. However, development does not follow a straight path but rather operates as a multidimensional system with intricate concepts. Rural India challenges any conventional understanding of development. Initially, the Internet diminishes conventional barriers to commerce and industry, enabling small enterprises in developing nations to directly promote their goods to the United States and other advanced economies. Furthermore, the Internet's ability to store and transmit vast amounts of information has empowered developing nations to make significant progress in enhancing essential services. By utilising it, anyone from all over the globe can access information from any location. In India, the most effective

approach to bridging this gap is to ensure that rural populations are equipped with comprehensive knowledge about the internet and its applications.

Forms of Tribal arts

Indian tribal craft is a notable aspect of contemporary Indian culture that has gradually acquired a refined appearance. The exquisite tribal crafts that adorn and embellish elegant Indian city residences can only truly be appreciated via profound appreciation. Indian tribal crafts are widely accessible in every aspect of décor and adornment, offering a diverse range of attractive choices that greatly stimulate one's desire to purchase tribal products. Indian tribal crafts accurately reflect the lifestyles, dietary habits, rituals, and efforts to appease supernatural powers that influence their artistic expressions, music, and dance. India produces a diverse range of tribal crafts, including antiques, art, baskets, paper mache, ceramics, clock making, embroidery, block printing, decorative painting, glass work, fabric, furniture, gifts, home decor, jewellery, leather crafts, metal crafts, paper crafts, pottery, puppets, and stone and wood works. Art serves as a comprehensive expression and is seen in the craftsmanship. Indian tribal craft typically embodies ritualistic elements, establishing a clear distinction between the maker and the art enthusiast. Tribal crafts have a strong enthusiasm for the indigenous botanical system. Tribal arts and crafts have been transmitted across generations, preserving their original methodologies. An exemplary instance is Dhokra art, a technique with origins stretching back around 7,000 years. The base of Dhokra art is formed by combining clay, mud, and cow dung. A rudimentary mould is created and let to dry for a period of 24 hours. Sikhe, which are small metallic coins, are utilised for the purpose of creating wax wires with different diameters. These coins, each featuring holes of varying sizes, are inserted into the nozzle of a 'Pichkari.' The desired design and dimensions are carefully crafted using wax threads. The wax threads are wrapped around the clay model in a continuous manner until the entire surface is evenly covered. The model is then allowed to dry for a period of one day. Tribal arts and crafts are widely recognised for their exceptional quality and long-lasting nature, making them a highly appealing option.

Warli Art refers to a traditional kind of art that originated from the Warli tribe in India. The Warli paintings, originating from the Warli tribe of the north Sahyadri Range in the state of Maharashtra, are a valuable tribal art form that has gained recognition, admiration, and practicality in contemporary society despite being practiced by the tribe for many years. The utilisation of brushes and other painting materials was implemented at a later point in time (Heinz 2006). Warli, originating from the indigenous people of the Maharashtra region, can be traced back to the 10th century. According to Vilhat (2019), it is widely acknowledged as the most ancient type of art in the history of India. These paintings employ minimalistic techniques, utilising fundamental geometric forms to describe natural phenomena. For instance, a circle represents the sun or the moon, a triangle symbolises hills and mountains, a square signifies a sacred enclosure representing fertility, and dotted lines are used as additional visual elements. Warli paintings were traditionally found on the mud walls of village houses throughout ancient times. Even modern Warli paintings continue to be created on a background of reddish earthen tone. The colour choice is exceptionally minimalistic, employing white pigment as paint to accentuate the black background.

Madhubani Art, originating from the periods of Ramayana, is known for its unique style characterised by geometric patterns, elaborate craftsmanship, and vibrant colours, which enhance its visual appeal. Madhubani paintings mostly embellished the earthen walls of the residences in the Madhubani district of the Mithila area of Bihar. These paintings depict the everyday lives of the people in this region, and they incorporate natural and colourful dyes and pigments. However, the art form has developed throughout time, and modern Madhubani paintings now utilise acrylic colours on mediums such as paper and canvas. Presently, we

observe this artwork being prominently shown on sarees, scarves, kurtas, home decor, and other items.

Pattachitra is a style of scroll painting that involves depicting folk tales and mythical stories on cloth in a continuous and complicated manner. This art form demands a great deal of discipline and patience from the craftsmen. Pattachitra is derived from the Sanskrit terms 'patta', which refers to canvas, and 'chitra', which means painting. Therefore, we have Pattachitra, a form of painting executed on canvas, embellished with vibrant themes and intricate designs. This art style originates from the eastern regions of Odisha and the state of West Bengal. The paintings primarily revolve around Lord Jagannath, who is considered an avatar of Lord Krishna. Vibrant patterns and intricate designs. Over time, we have witnessed the migration of this exquisite and complex art form into the realm of Tussar silk sarees, wall hangings, and various other home decorations.

Gond Art:

The Gonds, a prominent tribe in India, mostly inhabit the state of Madhya Pradesh, but can also be found in Andhra Pradesh, Maharashtra, Chhattisgarh, and Odisha. The term 'Gond' has a historical origin stretching back 1400 years. It is derived from the Dravidian word 'Kond', which translates to 'green mountain'. This picture exhibits a profusion of intricate features, precise lines, and vibrant colours such as red, orange, yellow, and blue. In this art form, dots, lines, and dashes are crucial elements that hold more significance than just being mathematical patterns. These paintings, which were originally created on mud walls, are now executed on paper and canvas. The predominant topics encompass myths, stories, and nature.

Bhil Art originates from the Bhils, the second biggest tribal population in India. They are located in the states of Madhya Pradesh, Chhattisgarh, Gujarat, Rajasthan, Karnataka, Andhra Pradesh, and Maharashtra. The paintings vividly portray the tribe's way of life, including its rituals and also incorporate mythology and folklore. The villagers utilise vividly coloured dots to represent the Sun, Moon, nature, Gods, and other elements. These dots are made from natural and herbal pigments and are applied to the clay walls of their dwellings. Turmeric, leaves, flowers, vegetables, wheat, and oils were used to obtain vibrant natural colours.

Preservation and Promotion of India's Tribal Handicrafts

Handicrafts refer to a diverse range of meticulously designed objects created manually. They not only embody the culture and customs of an area but also transmit habits inherited from previous generations. India, a country known for its diverse culture, has a wide range of unique handicrafts that differ based on geographical regions. Indian handicrafts have experienced significant growth in recent years, establishing themselves as a vital component of the Indian economy. They have emerged as a catalyst in facilitating employment opportunities for millions of highly qualified professionals in India.

Impact of digital media on the handicrafts of tribes

Digital media has a significant impact on behaviours, lifestyles, views, cognitive processes, perspectives, perceptions, and societal values. The utilisation of digital media across several platforms enables the promotion of cultural identities through diverse mediums such as animations, movies, documentaries, advertisements, and online games. The use of contemporary media in cultural activities is regarded as a catalyst for promoting sustainable development, as stated by UNESCO in 2012. Motion films are widely regarded as a very influential medium for engaging the audience with easily understandable features and effectively conveying messages. The audience can experience the content of virtual events, such as advertisements for videos on YouTube, video documentaries on television, and animated films on smartphone applications, in a way that makes them feel as if they are

actually present. This is achieved through the careful arrangement of elements such as light, colour, sound, surface, and other details of the events (Chayacharoen, 2014). Digital media can enhance the livelihood of tribal communities by enabling communication, education, trade, preservation of social values, and maintenance of cultural identities. The digital media provides a clear means of expressing the visual language of traditional arts (Alnaghaimshi & Pearson, 2021). The idea of establishing a network between tribal and urban societies entails utilising contemporary media to introduce the tribal people to the global stage and facilitate their integration into a changing society. The emergence of digital technology offers indigenous communities the opportunity to enhance their quality of life. The rise of today's media has led to the establishment of connections at the national, regional, communal, and individual levels. The current era of technical progress facilitates the widespread distribution of information through social media platforms. Three primary concepts and guidelines exist for boosting the potential of the community in accordance with its way of life and needs.

- To safeguard cultural rights.
- To enhance the capacity of ethnic communities.
- To establish equity in cultural diversity.

Tribal art is an exceptional mode of artistic representation that is firmly grounded in the cultural legacy of diverse indigenous people throughout India. For millennia, these people have been producing unique art forms that have received global attention for their beauty and cultural importance.

Conclusion

Ultimately, the conservation and advancement of India's indigenous handicrafts are not just topics of contemplation but essential requirements. This attempt not only preserves tradition but also maintains our environment. The handicraft business is a lucrative sector that has the capacity to stimulate economic expansion and offer sustainable livelihoods for future generations. This is a clear demonstration of the effectiveness of sustainable development and responsible management of the environment. When exploring the realm of tribal art and craftsmanship, it is crucial to approach it with reverence and tact. It is imperative that we make an effort to educate ourselves on the cultural importance of these artworks, valuing them not just as objects for trade but as carriers of cultural legacy. Amidst the rapid transformations in the current technological era, when technology permeates every aspect of life, it is imperative to utilise modern technology for the generation and fabrication of digital media. Integrating information is essential for decision-making and increasing awareness of societal issues. The relevance and significance of fostering the preservation of tribal handicrafts through digital media should be widely publicised and transmitted to future generations. By engaging in this action, we may actively support the safeguarding and commemoration of indigenous cultures, guaranteeing that these concealed gems persist in captivating and motivating future generations.

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Challenges and Benefits of Mobile Apps for Teaching English to Higher Secondary Students

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Abstract

The integration of mobile applications in education has introduced innovative methodologies for enhancing language learning, particularly in teaching English to higher secondary students. This review explores the effectiveness of mobile apps in improving English proficiency among this demographic, focusing on aspects such as engagement, personalized learning, and overall learning outcomes. Notable apps like Duolingo, Memrise, Babbel, HelloTalk, and Busuu are highlighted for their user-friendly interfaces and educational efficacy. The review also addresses challenges such as the quality of app content, the role of teachers, and the digital divide. Overall, while mobile apps present significant benefits, their successful implementation in educational settings requires careful consideration of pedagogical design and support systems.

Keywords: Mobile-Assisted Language Learning (MALL), English Proficiency, Higher Secondary Education, Educational Technology.

Introduction

The proliferation of technology in education has transformed traditional teaching methodologies, offering innovative solutions to enhance learning experiences. Among these technological advancements, mobile applications (apps) have emerged as potent tools for language education, particularly in teaching English. This phenomenon is especially pertinent among higher secondary students who are at a critical juncture in their academic journey, preparing for higher education and professional careers where English proficiency is often essential.

Mobile apps for language learning offer several advantages over traditional methods. They provide interactive and engaging content that can make learning more enjoyable and effective. Features such as gamification, multimedia integration, and instant feedback cater to the diverse learning styles and preferences of students, thereby fostering a more personalized learning experience. Additionally, the convenience and accessibility of mobile apps allow

students to learn at their own pace and in their own time, which can be particularly beneficial in managing the demanding schedules of higher secondary education.

Despite these potential benefits, the effectiveness of these apps in improving English language skills among higher secondary students remains a subject of academic inquiry. It is crucial to understand not only the impact of these tools on language proficiency but also the challenges and limitations associated with their use. Factors such as the quality of app content, the role of teachers in facilitating app-based learning, and the digital divide must be considered to provide a comprehensive evaluation.

This review aims to explore the existing literature on the effectiveness of mobile apps in teaching English to higher secondary students, highlighting both the positive outcomes and the areas that require further research and development.

There are several mobile applications designed specifically to teach English that are known for their user-friendly interfaces and effective teaching methodologies. Here are some notable ones:

1. Duolingo

Features:

- **Gamified Learning:** Duolingo uses gamification to make language learning engaging and fun. Students earn points for correct answers, race against the clock, and level up as they progress.
- **Bite-Sized Lessons:** Lessons are short and focused, making it easier for students to fit learning into their busy schedules.
- **Instant Feedback:** The app provides immediate feedback on exercises, helping students understand their mistakes and learn from them.
- **Adaptive Learning:** Duolingo adjusts the difficulty of lessons based on the user's performance, ensuring that the learning experience is tailored to their skill level.

Benefits:

- **Engagement:** The interactive nature keeps students motivated and engaged.
- **Accessibility:** Available on both iOS and Android platforms and can be accessed offline, making it convenient for students with varying access to the internet.

2. Memrise

Features:

- **Multimedia Content:** Memrise incorporates videos of native speakers, which helps students understand pronunciation and context.
- **Spaced Repetition System (SRS):** This method ensures that learned words and phrases are reviewed at optimal intervals, enhancing retention.
- **User-Created Courses:** In addition to official content, users can create and share their courses, providing a wide range of learning materials.

Benefits:

- **Real-Life Context:** The use of real-world videos helps students learn how language is used in everyday situations.
- **Customization:** Students can choose from a variety of courses tailored to their specific interests and needs.

3. Babbel

Features:

- **Conversational Practice:** Babbel focuses on practical conversation skills, which is crucial for higher secondary students preparing for real-world communication.

- **Grammar Tips:** Integrated grammar explanations help students understand the rules and structures of the language.
- **Speech Recognition:** This feature allows students to practice their pronunciation and receive feedback.

Benefits:

- **Practical Focus:** Emphasis on conversation helps students gain confidence in speaking English.
- **Structured Courses:** Lessons are organized into themed modules, making it easy to follow a structured learning path.

4. HelloTalk

Features:

- **Language Exchange:** HelloTalk connects students with native English speakers for language exchange, allowing them to practice speaking and writing with real people.
- **Built-in Tools:** Translation, correction, and pronunciation tools help facilitate smooth communication and learning.
- **Cultural Exchange:** Users can learn about the culture and context of the language through interactions with native speakers.

Benefits:

- **Real-Time Practice:** Provides opportunities for real-time communication, which is invaluable for language acquisition.
- **Community Support:** A large community of learners and native speakers offers support and motivation.

5. Busuu

Features:

- **Comprehensive Courses:** Busuu offers complete language courses that cover reading, writing, speaking, and listening.
- **Feedback from Native Speakers:** The app includes a feature where users can submit exercises for feedback from native speakers.
- **Personalized Study Plan:** Busuu creates a personalized study plan based on the user's learning goals and schedule.

Benefits:

- **Holistic Approach:** Addresses all language skills comprehensively.
- **Community Feedback:** Receiving feedback from native speakers helps improve accuracy and fluency.

These apps, with their user-friendly designs and innovative features, provide valuable tools for higher secondary students to improve their English proficiency. Each app offers unique advantages, making them suitable for different learning preferences and goals.

Limitations of Mobile Learning Apps

Despite the numerous benefits of mobile learning apps for teaching English, several limitations must be considered to ensure a balanced understanding of their effectiveness.

1. Digital Distraction

Mobile devices can be a source of distraction due to the availability of non-educational apps and notifications. Students might be tempted to engage with social media, games, or other entertainment apps, which can detract from their focus on learning.

2. Quality and Pedagogical Soundness

Not all mobile learning apps are designed with sound pedagogical principles. Some apps may prioritize engagement and entertainment over educational value, leading to superficial learning. It's essential to critically evaluate the content and methodologies employed by these apps to ensure they meet educational standards.

3. Digital Divide

Access to mobile learning apps can be limited by socio-economic factors. Students from low-income families might not have access to smartphones, tablets, or reliable internet connections, leading to disparities in learning opportunities. This digital divide can exacerbate existing educational inequalities.

4. Teacher Training and Integration

Effective use of mobile learning apps requires teachers to be adequately trained in integrating these technologies into their curriculum. Without proper training, teachers might struggle to incorporate apps meaningfully, reducing their potential impact on learning outcomes.

5. Limited Interaction and Social Learning

While mobile apps offer personalized learning experiences, they often lack the interactive and social dimensions of traditional classroom settings. Face-to-face interactions, group discussions, and collaborative learning activities are vital for language acquisition and can be challenging to replicate in a mobile app environment.

6. Technical Issues and Reliability

Technical issues such as app crashes, bugs, and compatibility problems can disrupt the learning process. Additionally, reliance on digital devices raises concerns about battery life, data storage, and security, which can affect the consistent use of learning apps.

7. Motivation and Self-Discipline

Mobile learning apps require a high degree of self-motivation and discipline from students. Without the structure and accountability provided by a traditional classroom, some students might find it challenging to stay committed to regular use of the app and consistent study habits.

Addressing these limitations is crucial for maximizing the effectiveness of mobile learning apps in teaching English to higher secondary students. A balanced approach that combines technological tools with traditional teaching methods, adequate teacher support, and equitable access can help overcome these challenges.

Review of Literature

Positive Impact on Learning Outcomes

Numerous studies highlight the positive impact of educational apps on English language learning among secondary students. According to Kim and Kwon (2012), mobile learning apps can enhance vocabulary acquisition and improve grammar skills through interactive and engaging activities. Their study showed that students using language learning apps outperformed those who followed conventional methods.

Increased Student Engagement

Engagement is a critical factor in successful language learning. Wang and Smith (2013) found that mobile apps with gamified elements, such as quizzes and interactive exercises, significantly increased student engagement. Their research indicated that students were more motivated to practice English regularly when using apps, leading to better retention and understanding.

Personalized Learning

The ability of apps to offer personalized learning experiences is another significant advantage. According to Liu et al. (2014), adaptive learning technologies in apps can tailor content to meet individual student needs, allowing for differentiated instruction. This personalization helps address diverse learning paces and styles, making English learning more effective for a broader range of students.

Challenges and Limitations

Despite the benefits, some challenges and limitations exist. A study by Kukulska-Hulme and Shield (2008) pointed out that not all apps are designed with sound pedagogical principles. Moreover, issues such as digital distraction and the digital divide can hinder the effectiveness of mobile learning solutions. There is also a need for teachers to receive proper training to integrate these technologies effectively into their curriculum.

Teacher and Student Perceptions

Teacher and student perceptions of the effectiveness of mobile apps in language learning are generally positive. Research by Hwang and Fu (2019) revealed that both teachers and students believe that these apps provide valuable supplementary resources for classroom instruction. However, they also noted the importance of aligning app content with curriculum standards to maximize effectiveness.

Conclusion

The literature suggests that mobile apps can be highly effective tools for teaching English to higher secondary students, offering benefits such as enhanced engagement, personalized learning, and improved learning outcomes. These apps leverage interactive content, gamification, and adaptive learning technologies to cater to diverse learning styles and preferences, making language learning more accessible and enjoyable. However, the successful integration of these apps into the educational landscape requires addressing several challenges. Ensuring the quality of app content, providing adequate teacher training, and overcoming issues related to digital distraction and access are crucial for maximizing the benefits of mobile-assisted language learning. As technology continues to evolve, further research and development are necessary to fully harness the potential of mobile apps in enhancing English language education for higher secondary students.

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லிட்ரெரி ஃபைண்டிங்ஸ்
பல்துறை அய்வுக்கான பன்னாட்டு அய்விதழ்

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Difficulties Encountered by Students in Learning Accountancy at the Higher Secondary Level

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ABSTRACT

The purpose of the present study was to study learning difficulties in Accountancy among higher secondary school students. Normative survey method was used in the present investigation. The sample consists of 300 higher secondary students selected from schools of Pudukkottai District in Tamil Nadu state using random sampling techniques. The findings of study revealed that gender, locality and medium of instructions had influence in the learning difficulties in Accountancy of higher secondary school students. Type of management and Types of school and parent's educational qualification had no impact in study learning difficulties in Accountancy of higher secondary school students.

Keywords: *Higher secondary School Learning Difficulties in Accountancy. Gender, Private, Government.*

Introduction

Education is a systematic process through which a child or an adult acquires Knowledge, experience, skills and sound attitude. It makes an individual civilized, refined, cultured and educated. The aim of education is not only the acquisition of information but the development of that bent of mind and attitude, which will make as responsible citizens. There-fore the goal of education is commitment to knowledge and advancement of learning. Its goal is to make an individual perfect. Every society gives importance to education because it is a panacea for all evils. It is the key to solve problems of life.

ACCOUNTANCY

Today, accounting is called “the language of business” because it is the vehicle for reporting financial information about a business entity to many different groups of people. Accounting concentrates on reporting to people inside the business entity is called management accounting. It is used to provide information to employees, managers, owner-

managers, and auditors. Management accounting is concerned primarily with providing a basis for making management or operating decisions. Accounting the provides information to people outside the business entity is called financial accounting and provides information to present and potential share- holders, creditors such as banks or vendors, financial analysts economics, and government agencies. Because these users have different needs, the presentation of financial accounts is very structured and subject to many more rules than management accounting.

Learning Difficulties

The identification of learning difficulties in students is very necessary for every teacher to develop corrective program. The learning difficulties may be out of many reasons.

1. Accountancy students face various challenges when transitioning from school to work.
2. These challenges include insufficient technical knowledge, poor communication skills, difficulty in adapting to the workplace, inadequate stress and time management skills, and lack of hands-on experience.
3. Students may struggle with returning to full-time study after a year-long placement.
4. Students may be demotivated to teach subjects they are not inclined towards, such as textbooks, and poor career guidance are also perceived as challenges, in learning accounting.
5. The student may not understand the concept and facts.
6. The locality in which the student lives influence the learning difficulties
7. The education of the parents also causes learning difficulties.

OBJECTIVES OF THE STUDY:

1. To find out the level of difficulties in learning accountancy at higher secondary level students.
2. To find out any significant difference between Male and Female students in learning difficulties in accountancy at higher secondary level.
3. To find out any significant difference between Rural and Urban students in learning difficulties in accountancy at higher secondary level.
4. To find out any significant difference between Tamil and English Medium students in learning difficulties in accountancy at higher secondary level.
5. To find out any significant difference Government and Private school students in learning difficulties in accountancy at higher secondary level.
6. To find out any significant difference between Boys, Girls, and Co-Education school students learning difficulties in accountancy at higher secondary level.
7. To find out any significant difference Parent's Educational Qualification 10th pass and above 10th pass students learning difficulties in accountancy at higher secondary level.

METHODS AND PROCEDURES

The Present study was under taken from both private and government schools from the Pudukkottai district, 300 students (148 Girls and 152 Boys) currently studying in higher secondary students, were taken as samples for the study. Normative survey method was employed and the sampling technique was Random sampling. For the purpose of data collection, the following tools will be used. Learning difficulties questionnaire was constructed by the Dr.T. Ravichandran and the Investigator. The responses were measured using a five-point scale: Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree. There were 30 items included in the present study. Different statistical techniques were used for the analysis.

DELIMITATION OF THE STUDY:

- The present study confined only to the XI standard school students.
- The investigator has selected two types of school, government school and private school.
- The sample is restricted to 300 students only.

Data Analysis

Ho1: There is significant difference between higher secondary Male and Female learning difficulties in Accountancy.

Table: 1

Mean, SD and 't' scores between Male and Female Students of higher secondary level in respect of their learning difficulties encountered in Accountancy.

S. No	Gender	N	Mean	SD	't' Value	Level of Significant
1.	Male	167	101.61	8.004	2.673	Significant
2.	Female	133	99.17	7.764		

(Table value $1.96 < \text{Calculated value } 2.673$ at 0.05 level)

From above the table value it is understood that the calculated 't' value 2.3 is significant at 0.05 levels. The mean calculated value for Male in 101.61 and Female is 99.17 respectively. This shows that the learning difficulties encountered in Male students is more than that of Female students in learning difficulties encountered in Accountancy.

Hence it is found that there is no significant difference between the male and female students in higher secondary level in respect of their accountancy and therefore the research hypothesis is rejected.

Ho2: There is no significant difference between the Rural and Urban school students of higher secondary level in respect of their learning difficulties encountered in Accountancy.

Table 2: showing the name mean, SD and 't' scores between Rural and Urban school students of higher secondary level in respect of their learning difficulties in encountered in Accountancy.

S. No	Locality of school	N	Mean	SD	't' value	Level of significant
1.	Rural	104	101.35	7.605	1.325	Not significant
2.	Urban	196	100.09	8.156		

From above the table is understood that the calculated "t" 'value 1.325 is not significant at 0.05 level. The mean calculated value for Rural is 101.35 and Urban is 100.09 respectively. This shows that the learning difficulties encountered in Rural Area students is more than that of Urban Area students in learning difficulties encountered in Accountancy. .

Hence it is found that there is no significant difference between Rural and Urban higher secondary school students in learning difficulties encountered in Accountancy, and therefore the research hypothesis is accepted.

Ho3: There is no significant difference between the Tamil and English medium students of higher secondary level in respect of their learning difficulties encountered in Accountancy

Table 3: Table showing the Mean, SD, 't' scores between Tamil and English medium students of higher secondary level of respect of their learning difficulties encountered in Accountancy.

S. No	Medium of Instruction	N	Mean	SD	't' value	Level of significant
1.	Tamil	166	100.51	7.749	0.035	Not significant
2.	English	134	100.54	8.284		

Table value 1.96 > Calculated value 0.35 at 0.05 level

From above the table it is understood that the calculated 't' value is 0.35 is not significant at 0.05 level. The mean calculated value for Tamil medium students is 7.749 and English medium students is 8.284 is respectively. This shows that the learning difficulties encountered in by English medium students is more than that of Tamil medium students in learning difficulties encountered in Accountancy.

Hence it is found that there is no significant difference between the Tamil and English medium students of higher secondary level in respect of the research hypothesis is rejected.

Ho4 : There is no significant difference between the types of management of higher secondary level students in respect of their learning difficulties encountered in accountancy.

Table 4: showing the mean, SD, and 't' value scores between the Type of Management of higher secondary level of students in respect of their learning difficulties encountered in Accountancy.

S. No	Types of Management	N	Mean	SD	't' value	Level of significant
1.	Government	144	101.41	7.653	1.854	Not significant
2.	Private	156	99.71	8.209		

(Table value 297.9 > Calculated value 1.854 at 0.05 level)

From above the table it is understood that the calculated 't' value 1.854 is not significant at 0.05 level. The mean calculated value for Government 101.41 and Private 99.71 is respectively. This shows that the learning difficulties encountered in by Government school students is more than that of Private school students in learning difficulties encountered in Accountancy.

Hence it is found that there is no significant difference between the Government and Private school students of higher secondary level in respect of their accountancy and therefore the research hypothesis is accepted.

Ho5: There is no significant difference between the parent's educational qualifications of higher secondary level students in respect of their learning difficulties encountered in Accountancy.

Table 5: Table showing the Mean, SD, t 'value of scores between the

Parents Educational Qualification of higher secondary level students in respect of their learning difficulties in encountered in Accountancy.

S.No.	Parent's Educational Qualification	N	Mean	SD	't' value	Level of significant
1.	10 th pass	220	100.65	7.851	0.445	Not significant
2.	Above 10 th	80	100.20	8.365		

Table value 2.571 > Calculated value .445 at 0.05 level)

From above the table it is understood that the calculated 't' value 0.445 is not significant at 0.05 level. The mean value for 10th pass parents is 100.65 and above 10th 100.20 is respectively. This shows that the learning difficulties is encountered in by 10th pass parents is more than that of Above 10th pass parents in learning difficulties encountered in Accountancy.

Hence it is found that there is no significant difference between the 10th pass and above 10th school students of parent's educational qualification at higher secondary level of respect of their accountancy and therefore the research hypothesis is accepted.

Ho6 : There is no significant difference between the Type of school of higher secondary level in respect of their learning difficulties encountered in accountancy of students

Table:6: Table showing the mean, SD, 't' value of scores between the Type of School of higher secondary level of students in respect of their learning difficulties in Accountancy.

S. No	Type of school	N	Mean	SD	'F' Value	Level of significant
1.	Boys	104	101.26	8.192	2.289	Not significant
2.	Girls	22	97.27	5.487		
3.	Co-education	174	100.50	8.047		

(Table value 2.9957 > Calculated value 2.289 at 0.05 level)

From the above table is understood that the calculated 'F' value 2.289 is not significant at 0.05 levels. The mean calculated value for Boys 101.26 and Girls 97.27 and Co-education 100.50 is respectively. This shows that the learning difficulties in encountered in by Boys school students is more than that of Girls and Co-education school students in learning difficulties encountered in Accountancy.

Hence, it is found that there is no significant difference between boys, girls, and co-education school students at the higher secondary level in respect to their accountancy skills. Therefore, the research hypothesis is accepted.

Conclusion:

This methodology provides the guidelines for the investigator about the way for the study has to be conducted. It is imperative to adopt a suitable methodology thereby we can generalize the findings. Research is a vital and comprehensive area. The purpose of any research os to find solution mentally for the problem related to education, society etc. Accountancy is very essential in the educational field. They should be promoted in the minds of the students to improve their educational status without the fear.

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The Opium Wars and Economic Consequences in the Amitav Ghosh's Novels *Sea of Poppies*, *River of Smoke*, and *Flood of Fire*

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Abstract

Amitav Ghosh's Trilogy, *Sea of Poppies*, *River of Smoke*, and *Flood of Fire*, is a literary masterpiece that delves into the 19th-century opium traffic between India and China. The novel *Sea of Poppies* examines the socio-cultural landscape of 19th-century India, examining the beliefs and behaviors of the people during that time. The trilogy also explores the historical aspects of the opium trade and the system of indentured labor in colonial India. Two major events shape the narrative: the series of incidents leading to the first Opium War and the trade relations between India, China, and Britain. The story also focuses on environmental issues and the consequences of imbalance. The trilogy, based on the *Ibis*, a schooner used for transporting opium and indentured laborers, depicts the opium trade between India and China, as well as the trafficking of *girmityas* to Mauritius.

Keywords : Colonialism, Globalisation , Opium War, Economic Consequence, and Postcolonial Literature.

Introduction

Deeti, a native of northern Bihar, had a vivid vision of a large ship with tall masts navigating the sea. She and her daughter, Kabutri, traveled in an ox cart, fearing encountering Kalua's face would bring bad luck. Deeti's brother Chandan Singh bathed in the river, while Kabutri and her mother applied poppy-seed oil to their hair. Family portraits and depictions of Shivji and Bhagwan Ganesh adorned Deeti's residence. The *Ibis* ship arrived on Ganga-Sagar Island in March 1838, where the sacred river converged with the Bay of Bengal.

Amitav Ghosh writes in his Novel *Sea of Poppies*

The village in which Deeti lived was on the outskirts of the town of Ghazipur, some fifty miles east of Benares. Like all her neighbours, Deeti was preoccupied with the lateness of her poppy crop: that day, she rose early and went through the motions of her daily routine, laying out a freshly washed dhoti and kameez for Hukam Singh, her husband, and preparing the rotis and achar he would eat at midday.(7)

Zachary, a seafarer, encountered a diverse group of seafarers on the *Ibis*, a ship intended for Mauritius to engage in commercial transactions. However, the captain fell ill and required medical aid, leaving Zachary too academically proficient to control the ship. Deeti, a

pregnant woman, was influenced by Saturn, a celestial being associated with conflict, sadness, and lack of harmony. She received chandu, a factory-made substance that could not be consumed like abkari or inhaled like madak. Deeti's growing belly from pregnancy led her to marry Hukam Singh, a habitual opium user. Raja Neel Rattan Halder, a landlord of Raskhali, and his wife Kalua were renowned for their kite flying and wrestling skills. The Maharaja of Benares invited them to a competition, but Deeti, a member of the girmitiyas, witnessed Kalua's defeat and experienced profound sorrow.

Benjamin Burnham established a trading enterprise with his siblings, which later became a renowned commercial organization. He ascertained that the British had absolute dominion over the opium commerce in eastern India, with the East India Company supervising the manufacturing and packaging processes. Deeti's poor income led to verbal abuse from Chandan Singh, and Neel and Raj Rattan were apprehended for committing forgeries while kite-flying. Deeti received help from Kalua, impoverished people cultivating poppies as a cash crop. Neel's sentence included confiscation and sale of possessions, settlement of outstanding obligations, and imprisonment in a penal colony on the Mauritius Islands for seven years. The story emphasizes the difficulties women face when managing marriage, family, and personal connections while also emphasizing the importance of adhering to cultural standards and expectations. Bhyro Singh, who subjected Deeti to mistreatment, was responsible for his own death.

The Economic, Social, and Political Impact of the Opium Wars

River of Smoke, Deeti and Kalua journey from India to Mauritius on the Ibis, encountering severe meteorological conditions along the way. Ellen decides to travel to China to collect botanical specimens, inspired by Paulette's father's experiences. The Mistries were awarded a contract by the East India Company to market opium outside, but it involved substantial risks. China is considering a complete prohibition on opium shipment, and several businesses in Bombay have decided to cease their participation due to the loss of Bahram's shipment during a storm. Many chests have broken loose, causing the earthenware containers of opium to crash around like cannonballs. The opium, which is mud-brown and leathery, dissolves when mixed with liquids.

The cargo in the after-hold consisted almost entirely of opium. Under the battering of the storm, hundreds of chests had broken loose and splintered, spilling their contents. Earthenware containers of opium were crashing into the bulkheads like cannonballs. Opium, in this form, was of a mud-brown colour: although leathery to the touch, it dissolved when mixed and stirred with liquids (16).

The author explores the experiences of Bahram, a British opium smuggler who faced challenges in his role as governor of Kiangsi province. Bahram encounters Kerr, a Scottish horticulturist, who introduces the Tiger Lily, Chinese Juniper, and Christmas Camellia to the international botanical community. Bahram experiences a sense of weightlessness and detachment from Canton, where signs depicting celestial entities adorn the streets. As a defensive measure against invasions, the Chinese constructed the Great Wall and anchored numerous ships at various locations, each laden with tens of thousands of opium-laden containers. Chinese and foreign parties jointly issued a proclamation in the early 20th century that forbade the transportation of opium by ships within the country. This raised problems for Bahram, who had constructed ships for the East India Company. Bahram was concerned about the substantial fall in opium prices in Bombay. A convocation was held in British Hong Kong, but the captain refrained from addressing his government's complicity in the illegal opium trade or allegations against Dent and other persons.

Flood of Fire is a literary masterpiece that centers around Havildar Kesri Singh, a military leader who led the 25th Regiment of the East India Company in Assam. His physical appearance played an important role in his appointment as march leader. A judicial inquiry accused Zachary Reid, a 21-year-old seaman, of causing disturbances aboard the Ibis during its voyage to Mauritius, which resulted in the assassination of Bhyro Singh, the main leader

of the immigration organization. The gravity of the charges led to Reid's repatriation to India and his detention in judicial custody. Shireen was unaware that her husband had employed a new secretary, a highly educated Bengali, who desired to remain in China. "he was going through an article in the *Chinese Repository*, on opium production in India. It was lucky for him that I came by for he was having trouble making sense of it"(34).

Amitav Ghosh is a narrative that chronicles the events that led to the opium crisis in March. The author arrives at Fanqui-town and observes significant changes compared to their previous visit, with only the Americans remaining. Both factories, owned by Parsi industrialists in Bombay, are currently unoccupied, with the British Factory conspicuously abandoned. The city's printshop has seen significant changes in recent months, marked by empty shelves and a pleasant scent of incense in the air. Kesri, a young officer, joins a group of experienced English officers committed to long-term service with the paltan. The contingent of incarcerated Burmese troops carries the paltan's more substantial armaments, including dismantled howitzers, mortars, and field pieces. The hospital facility provides care for the sick and injured. Kesri comes across a herd of tamed animals intended for the officers' consumption.

The sudden presence of a butterfly outside her window profoundly disturbs Shireen, a widow, who wonders if she can recover any portion of her spouse's investments. The London authorities actively opposed these confiscations, recognizing the significance of trade. Rumours circulated about their intention to dispatch a military expedition to China to seek compensation. Shireen, who has never ventured outside her familiar surroundings unaccompanied, finds herself captivated by the idea of undertaking a solitary expedition to China. Neel meets Compton on Thirteen Hong Street and discovers that Zhong Lou-si has expressed a desire to see them. Compton is fascinated by the narrator's profound understanding of opium production in Bengal and has voiced a strong desire to host a tea party. In April, Captain Elliot, the British Plenipotentiary, formally petitioned the British Governor-General in Calcutta to gather a military contingent for a mission to China. In India, the military forces would most probably consist of a blend of English and Indian personnel.

Zhong Lou-si contended that sepoys are not enslaved and receive much lower wages than British soldiers. They reside separately and encounter disparities in treatment, with people of British origin occupying positions of authority. Subsequently, sepoys have been advocating for their rights, similar to rajas and nawabs. Sepoys, a prominent contingent of troops during the British colonialism of India, have sporadically revolted, particularly when deployed overseas. Ram Singh, their father, was a veteran soldier who had keen discernment in selecting recruits. An initial recruiter approached them through an agent of the Darbhanga Raj, a zamindari with a familial link, but they rejected the offer. Ram Singh's firm beliefs originated from the East India Company's annexation of their country several years ago, which led to involvement in areas such as agriculture and harvesting. Price fluctuations in the opium industry frequently resulted in financial losses and increased indebtedness for producers. As recruiters arrived at their location, Ram Singh questioned them about compensation, benefits, and other specifics to ensure a thorough understanding of his son's introduction.

Conclusion

During the 1830s, opium was actively trafficked, cultivated, and consumed in various regions of China's interior, including Yunnan, Guizhou, Sichuan, Gansu, Shaanxi, and Xinjiang. Each region had unique indications of the opium issue and was linked together through a system of production, transportation, and consumption. Xinjiang's distinctive geographical features made it a pivotal component of this network, presenting extraordinary difficulties for the Qing government in its efforts to control opium. Britain participated in military combat in China to protect and expand its business interests in that area. William Jardine, a British businessman involved in the opium trade and ship surgeon, had a substantial impact on promoting the conflict. He deeply engaged himself in the realm of

commerce and founded his own company in Canton, devoting himself to the execution of business transactions in China.

Elliot, a British colonel, acknowledged that he was responsible for the British population placed under quarantine at Canton. After seizing the opium, Lin commanded the traders to depart from Canton and dispose of it at Canton Bay. The British sought assistance from William Jardine, who devised a plan to use military force to compel China to deliver compensation. In October 1839, Jardine suggested implementing a blockade on the primary ports along the Chinese coastline, which the British effectively quelled. In 1842, the British successfully coerced the Chinese government into signing the Treaty of Nanking, which entailed the surrender of Hong Kong to the British, the creation of accessible ports for global commerce, and compensation for costs and seized opium.

The Treaty of Nanjing granted the British the privilege to continue their opium trade with little restrictions across a larger area of land. China's international trade experienced a substantial metamorphosis after the First Opium War, expanding to unhindered trade across numerous ports. The Convention of Peking, held in 1860, ratified three treaties, including the surrender of the Kowloon Peninsula to Great Britain, the establishment of the Office of Foreign Affairs, and the designation of Tianjin as a liberated port for commercial interchange. The opium trade in China has substantial adverse effects, including addiction, resource depletion, and deterioration of moral, social, and physical well-being. The pact between the United States and China explicitly stated the prohibition of the opium traffic, showing the Chinese authorities' sincere commitment to eliminating the trade.

The Opium War and the Arrow War were significant events in British foreign policy, resulting in the transfer of Hong Kong and the surrender of the Kowloon Peninsula. The Chinese position on the transfer of both islands and peninsulas has generated confusion among opponents due to divergent understandings of legal provisions. The ideology of free trade influenced British foreign policy in a comprehensive manner. The debt of India escalated due to the widespread cultivation of opium in Bengal, which began in the early 1800s. The Malwa Opium Agency, established in 1823, was responsible for overseeing the cultivation and distribution of Malwa opium. The opium industry earned net revenue before the conflict, with productivity greatly enhanced by carefully choosing rich territory and employing low-cost workers.

Peasants were given interest-free upfront payments as a motivation to cultivate the poppy, while those who did not cultivate the poppy were required to pay a penalty. The East India Company obtained revenue by issuing licenses to opium merchants engaged in the shipment of Malwa opium, which was highly valued by British authorities. The money derived from Bengal and Bombay constituted the second greatest source of income in the entirety of British India. The expensive nature of opium was directly correlated with its ability to fetch high prices in the international market. The excessive prices of opium can be traced to the catastrophic conditions that China had experienced due to internal unrest and external conflicts. The Taiping Rebellion, Red Turban Rebellion, and Arrow War led to the devastation of Beijing.

The Canton Trade System, enforced by the Qing dynasty, restricted Western merchants to engage in trade solely via the southern port of Canton (Guangzhou). Authorities closely supervised these trade relations, overseeing the involvement of Western merchants. The Cohong, a monopolistic guild of Chinese merchants, exclusively permitted trading activities to approved merchants hailing from Western countries. In March 1839, Lin, an Imperial Commissioner, arrived in Canton with the objective of terminating the opium traffic. He insisted that the British surrender their opium stocks and was captured by Hong merchants Howqua and Mowqua. Captain Charles Elliot, the principal overseer of British commerce in China, assumed accountability for the opium. Discussions commenced in Canton in late December, with Elliot serving as the representative for the British faction. The first Opium War was a notable triumph for England and Western concepts of economic and technological

progress. England's implementation of the "unequal treaty" system set in motion a persistent campaign to compel China to grant access to its internal territories to foreign entities. The Second Opium War was inevitable due to the Chinese's hesitance in implementing the terms of the treaty they viewed as unfair.

The British Factory in Fanquytown, one of the thirteen enterprises, is the largest and most enchanting among the Thirteen Hongks. In Fanquytown, the legitimate trade includes the importation of woollen goods, timepieces, and timekeeping devices, as well as the exportation of tea and silk. However, the value of legal commerce is significantly lower than the earnings generated from the opium trade. The price of a chest of opium in the city has increased compared to a year ago. Fitcher, Bahram, Zadig, and Markwick were pivotal figures in facilitating botanical interaction between Western countries and China in the 18th century. *River of Smoke*, a novel by Amitav Ghosh, chronicles the events aboard the *Ibis*, a ship that was ensnared in a tempest and ultimately found itself in Mauritius. The story takes place in Fanqui town, where foreign businessmen engage in commerce with native Chinese merchants one year prior to the commencement of the First Opium War.

Fitcher, a botanist, played a vital role in facilitating the botanical interaction between Western countries and China. He exchanged American plants for Chinese ones that were unfamiliar to the Western world, despite the fact that he was prohibited from obtaining plants outside the city limits or visiting royal gardens. The government granted European vessels permission to transport a wide range of fruits, young trees, fruit-bearing trees, and plants for personal commerce and financial gain. Under General Fitcher's leadership, the British Company began exporting Indian opium to China to address the imbalance in the silver trade between Britain and China. The demand for Chinese tea in Britain and America has experienced a significant surge since the mid-19th century, making it the primary source of profit for the East India Company. However, the Chinese people demonstrated limited interest in European goods due to their strong belief in their own products and customs.

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Factors Affecting Academic Achievement: Social Media, Instruction, and Personal Factors

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Abstract

This abstract synthesizes findings from diverse studies exploring the impact of technology, social media, and instructional methodologies on academic achievement across educational contexts worldwide. The proliferation of social media platforms has introduced both challenges and opportunities for students, as evidenced by studies highlighting their influence on academic performance. While some research indicates distractions and reduced focus associated with social media use (Ghani Abd et al., 2018), others suggest potential benefits through collaborative learning and knowledge exchange (Rahim-Al Mugahed & Waleed Othman, 2013).

Advancements in instructional methods such as cooperative learning and augmented reality (AR) have reshaped traditional educational practices, particularly in subjects like Biology, where interactive and immersive learning experiences enhance student engagement and academic achievement (Molla & Muche, 2018; Erbas & Demirer, 2019).

Additionally, personal factors including self-efficacy and study habits significantly influence academic success across different educational levels and subjects (Yuksel & Geban, 2016; Sakiyo & Waziri, 2015). Understanding these multifaceted dynamics is crucial for educators and policymakers aiming to optimize educational practices and support student success in a rapidly evolving digital age.

This abstract provides a comprehensive overview of the complex interactions between technology, social media, instructional methodologies, and personal factors in shaping academic achievement. By integrating insights from these studies, educators can devise targeted strategies to foster academic excellence and meet the diverse needs of students in contemporary educational environments.

Keywords : Social media, Academic achievement, Educational technology.

Introduction

The intersection of technology, social media, and instructional methods has profoundly influenced academic performance across educational settings worldwide. This introduction explores the diverse array of studies that investigate the impact of various factors on academic achievement among students. From the effects of social media use to innovative instructional methodologies like cooperative learning and augmented reality, these studies provide critical insights into the complex dynamics shaping educational outcomes.

In recent years, the proliferation of social media platforms has introduced new challenges and opportunities in educational contexts. Studies such as those by Owusu Larson (2020) and Tarawneh-Al Heyam (2019) highlight the pervasive influence of platforms like Facebook and Twitter on student academic performance. While some findings suggest a negative impact, indicating distractions and reduced academic focus among users (Ghani Abd et al., 2018), others underscore potential benefits through collaborative learning and knowledge exchange (Rahim-Al Mugahed & Waleed Othman, 2013).

Concurrently, advancements in instructional methods such as cooperative learning and augmented reality (AR) have reshaped traditional classroom dynamics. Research by Molla and Muche (2018) and Erbas & Demirel (2019) demonstrates how cooperative learning enhances student engagement and academic achievement in subjects like Biology. Similarly, studies on AR highlight its potential to improve learning outcomes by providing immersive and interactive educational experiences.

Moreover, the influence of personal factors such as self-efficacy and study habits cannot be understated. Studies like those by Yuksel & Geban (2016) and Sakiyo & Waziri (2015) examine how self-efficacy levels and effective study habits correlate with academic performance across different subjects and educational levels.

By synthesizing these studies, this introduction aims to provide a comprehensive overview of the multifaceted factors influencing academic achievement. Understanding these dynamics is crucial for educators, policymakers, and stakeholders striving to enhance educational practices and support student success in a rapidly evolving digital age.

Foreign Studies

1. **Gokhan Bas (2020)** conducted a study titled 'Relation between Student Mental Health and Academic Achievement Revisited: A Meta-Analysis'. The study investigated the relationship between mental health and academic achievement in adolescents using a meta-analysis approach. Thirteen independent studies were included, and their data were synthesized to calculate effect sizes. The findings indicated a positive relationship between mental health and academic achievement.
2. **Acheaw M. Owusu Larson Gifty (2020)** conducted a study titled 'Use of Social Media & its Impact on Academic Performance of Tertiary Institution Students'. This study examined the impact of social media use on academic performance at Koforidua Polytechnic in Ghana. Using stratified sampling, 1578 students were surveyed, with a 95.5% response rate. Various social networking platforms such as Facebook, WhatsApp, Twitter, Yahoo Messenger, Skype, and MySpace were analyzed. The study found that 80.1% of respondents reported a negative impact of social media on their academic performance.
3. **Tarawneh-Al. A. Heyam (2019)** studied the 'Influence of Social Networking on Students Academic Achievement'. This research explored how social media use affects high school students' academic performance. Using a survey method and random sampling, 206 students were surveyed. The study revealed a negative

influence of Facebook on students' academic achievement, suggesting lower academic outcomes associated with high social media use.

4. **Erbas & Demirer (2019)** investigated the effect of augmented reality (AR) on students' academic achievement and motivation in a Biology course. Adopting a mixed-methods approach with a pretest control group design, the study included 40 ninth-grade students. Classroom observations and student opinions were also considered. The findings suggested that AR positively impacted students' academic achievement and motivation in Biology.
5. **Ghani Abd, Mazuri et al. (2018)** examined the 'Effect of Social Media Apps on Performance of Students in Higher Educational Universities'. Using quantitative and experimental methods, the study focused on the impact of social media apps, particularly Facebook, on university students. The research highlighted that extensive use of social networks among students can lead to distractions from academic responsibilities, negatively affecting their academic performance.
6. **Molla and Muche (2018)** investigated the effect of cooperative learning approaches on laboratory proficiency and academic achievement in Biology. Using a quasi-experimental design with a central group and time-series analysis, the study involved 369 students and 18 Biology teachers from three schools. The findings indicated significant improvements in academic achievement and laboratory proficiency when cooperative learning methods were implemented.
7. **Nidrika & Ubani (2017)** studied the effect of peer tutoring strategies on achievement in Biology. Adopting a quasi-experimental design with purposive sampling, the study involved 40 students from two private schools. Data analysis using mean, median, and standard deviation revealed an interaction between students' ability levels and instructional techniques, impacting academic achievement.
8. **Hazat & Bello, Abimbola (2017)** investigated the effect of computer animation packages on achievement in practical Biology in Ilorin, Nigeria. Using a quasi-experimental design, the study employed Biology Practical Achievement Tests (BPTA). The results indicated that computer animation packages improved instructional effectiveness and student achievement in Biology.
9. **Yuksel & Geban (2016)** examined the influence of self-efficacy and academic anxiety on Physics, Chemistry, Biology, and Mathematics achievements among secondary school students. The study highlighted that self-efficacy and academic anxiety varied in their impact depending on the course and student characteristics.
10. **Sakiyo & Waziri (2015)** investigated the effect of concept mapping strategies on academic achievement in Biology among secondary school students. Using a quasi-experimental design, the study included 122 senior secondary students. Data analysis using ANCOVA demonstrated that concept mapping enhanced academic achievement in Biology.
11. **Lepp, Andrew and Barkley E., Jacob et al. (2015)** studied 'The Relationship Between Cell Phone Use and Academic Performance' among U.S. college students. The study involved 536 undergraduate students from large public universities. Hierarchical regression analysis indicated a significant negative relationship between cell phone use and college GPA, suggesting that increased cell phone use was associated with decreased academic performance.
12. **Rahim-Al, Mugahed and Waleed, Othman et al. (2013)** analyzed the 'Impact of Social Media Use on Academic Performance among University Students: A Pilot Study'. The research focused on 80 undergraduate and postgraduate students at the

University of Technology Malaysia. Using a qualitative approach and a survey questionnaire, the study found that social media use, particularly through collaborative learning, positively influenced academic performance.

13. **Ogedebe M. P, Emmanuel A. J., Musa (2012)** researched 'The Usage of Facebook and Its Academic Performance in Nigerian Universities'. Conducting a survey among approximately 150 students from various Nigerian universities, the study used SPSS for data analysis. The findings indicated no significant correlation between time spent on Facebook and grade point average (GPA), nor between other social media activities and academic performance.

Indian Studies

1. **Shamsuddeen & Amina (2016)** studied the 'Effect of Instructional Methods on End-Term Achievement in Biology Students at the Secondary Level' in Sokoto Metropolis. Using a cross-sectional survey design, the study involved 381 students and Biology teachers. Results showed strong positive correlations between academic achievement and cooperative learning, moderate positive correlations with guided discovery methods, and very positive correlations with simulation methods in Biology.
2. **Khyrun, Nisa (2014)** investigated the 'Impact of Social Networking Sites on General Awareness and Academic Achievement of Postgraduate Students at Central University Kashmir'. This study used random sampling to survey 110 postgraduate students across various demographics. The findings indicated a positive correlation between social networking sites and academic achievement, particularly in enhancing educational aspects such as note exchange, concept clarification, and sharing of lectures.
3. **Suresh Chand (2013)** conducted research on 'Study Habits of Secondary School Students in Relation to Type of School and Type of Family'. This study involved 200 secondary school students from government and private schools, as well as nuclear and joint families. Using a study habit inventory and statistical tests, the research found significant differences in study habits between government and private school students, particularly in home environment, planning, and exam preparation.

Conclusion

In conclusion, the studies reviewed underscore the complex interplay of technological, social, and instructional factors shaping academic achievement among students. The impact of social media platforms like Facebook and Twitter on academic performance remains a topic of considerable debate, with findings ranging from detrimental effects on focus and attention (Ghani Abd et al., 2018) to beneficial outcomes through collaborative learning and information sharing (Rahim-Al Mugahed & Waleed Othman, 2013).

Furthermore, innovative instructional methodologies such as cooperative learning and augmented reality (AR) offer promising avenues for enhancing student engagement and learning outcomes in subjects like Biology (Molla & Muche, 2018; Erbas & Demirer, 2019). These approaches leverage interactive technologies to create immersive learning experiences that cater to diverse learning styles and preferences.

Personal factors such as self-efficacy and effective study habits also play significant roles in determining academic success across educational contexts (Yuksel & Geban, 2016; Sakiyo & Waziri, 2015). Understanding and fostering these factors are essential for educators and policymakers seeking to optimize educational practices and support student achievement.

As we navigate the complexities of education in the digital age, continued research and evidence-based strategies are crucial for mitigating challenges and harnessing the full

potential of technology and instructional innovations. By integrating findings from these studies, educators can tailor interventions that promote academic excellence while addressing the evolving needs of students in a dynamic global landscape.

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A Study on High School Student's Achievement and Their Attitude Towards English in Pudukkottai District

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ABSTRACT

The present study is a sincere attempt by the researcher to examine the attitudes of high school students in Pudukkottai district towards learning the English language. The study, titled "Attitude towards English Language of IX Standard Students," focuses on the attitudes of ninth-grade students. The variables considered in the study include gender, locality, type of school, medium of school, and parents' educational qualifications and occupational status.

The researcher used a simple random sampling technique to collect data from 300 ninth-grade students in high schools across Pudukkottai. To measure the students' attitudes towards English, the Students' Attitude towards English Scale was utilized. Data analysis involved the use of t-tests, F-tests, and chi-square tests. Descriptive research methods were also employed to provide context and meaning to the findings.

The results of the data analysis indicated that gender, locality, and medium of school have no significant impact on the attitudes of ninth-grade students towards learning English. However, the type of school and the parents' educational qualifications and occupational status did have an impact on these attitudes.

Key words: *gender, locality, qualification, occupation.*

INTRODUCTION:

The present study investigates "the achievement of school students and their attitude towards English." Students face many challenges in school each year. The title of the research paper is "Students' Attitude towards English Language Learning and their Academic Achievement among IX Standard Students: A Case Study." It is important for language teachers to understand and guide students to improve their language competence. It is necessary to help students overcome their anxiety towards language acquisition. Among the various subjects, fostering curiosity towards the English language is crucial, as it triggers a positive attitude. The researcher has focused particularly on attitude because it plays a vital role in education, becoming a primary and essential part of an individual's life in language

acquisition. Attitude is a key element for learning a language (Karahana, 2007). It may be influenced both externally and internally. The current study attempts to explore the attitudes of ninth-grade students towards English language learning and its association with their academic achievement. It is important for teachers and parents to understand children's problems and address them through innovative teaching and learning processes. Any problem can be addressed with some psychological treatments, which require a basic understanding of their attitude and its association with achievement motivation.

REVIEW OF LITERATURE

GAJALAKSHMI (2013) attempted to investigate the IX-standard students' attitude towards learning English language. A standardized questionnaire was administered in the form of normative survey to 600 IX schools in Puducherry region) to collect their attitude towards learning English language. The collected data was statistically analyzed by SPSS ver-16. The results revealed that there is a significant difference based on the gender, locality of the school, type of school, type of management. Hence it was concluded that more classroom activities in the study of English enhance pupils' attitude to learn English.

Gayenet.al., (2021) found that the use of English in India, both as a language and as a medium of instruction, is of growing interest, particularly in regions where it is not the first language. This study focuses on the attitudes of secondary school students in the Cooch Behar district of West Bengal towards English. A sample of 320 students from various secondary schools in the district was selected using a simple random sampling technique. The research highlights key points related to students' attitudes towards English, aiming to broaden the understanding of its role as both a language and a medium of instruction. Quantitative analysis of the data provides insights into the actual state of these attitudes in secondary schools in West Bengal. After the analysis of the data, the result showed that gender, locality and medium of school have strong impact on the class IX students but type of school and socio-economic status didn't have any impact on the attitude towards English language learning of the students of class IX.

Grover (2016) studied in the article "An Analysis of Inclusive Attitudes of Teachers for English as Medium of Instruction at Secondary Stage of Schooling" about the possibilities of English language to serve as inclusion tool for the majority of the learners where 'inclusion may be financial, social, cultural, political, and literary and others' (Grover 129). He also said that in other way, this article is studying English, not causing exclusion of the learners from the domain of learning by studying hundred teachers as participant for this research work. The researcher found out that magnitude of inclusive attitudes of secondary school teachers are not at significant level. Rather teachers have been found to prefer other languages over English as a medium of instruction at secondary level schools. He also suggested that demographic variables are not influencing teachers' inclusive attitude for the same.

OBJECTIVES OF THE STUDY

To find out the level of high school students with respect to the background variables such as:

1. Gender
2. Medium of instruction
3. Locality of students
4. Types of school
5. Type of management
6. Parents' educational qualifications
7. parent's occupation

METHODS AND PROCEDURES

Normative survey method was employed and the sampling technique was Random Sampling. For the purpose of data collection, the following tools will be used. Attitude toward English questionnaire was constructed by Nancy and the Investigator. The responses were five point scale used.

Delimitation of The Study

- The present study will be limited to the students studying in the high schools only.
- The study will be confined to Schools in Pudukkottai district.

Table 1

Mean and Standard Deviation for the Scores on problem in learning English for the Entire sample.

Dimensions / variable	Mean	SD	Percentage
Attitude towards English	160.16	13.659	64.064

HYPOTHESIS-1

There is no significant difference between male and female High School Students attitude towards English.

Table 2

Showing the Mean, S.D and ‘t’ values of High School Students based on attitude towards English.

Dimensions\ variable	Male (174)		Female (126)		‘t’ value	Sigvalue	Remarks
	mean	SD	mean	SD			
Attitude towards English	155.2	13.802	166.97	10.106	8.500	.000	S

INFERENCE

In order to find out the significant mean difference between Male and female High School Students attitude towards English score, the investigator calculated ‘t’ value, It is given in the Table 4.2, it is found to be 8.500, which is significant at 0.05 levels. Hence, the framed null hypothesis is rejected. It is inferred that male and female high school students differ significantly in their attitude towards English. Female students attitude towards English 166.97 are more than male students.

HYPOTHESIS – 2

There is no significant difference between Tamil and English Medium High School Students attitude towards English.

Table 3

Showing the Mean, S.D and ‘t’ values of High School Students based on attitude towards English.

Dimensions\ variable	Tamil (156)		English(144)		't' value	Sig.value	Remarks
	mean	SD	mean	SD			
Attitude towards English	157.73	10.986	162.80	15.68	5.068	.001	S

INFERENCE

In order to find out the significant mean difference between Tamil and English Medium High School Students attitude towards English score, the investigator calculate 't' value, It is given in the Table 4.3, it is found to be 5.068, which is significant at 0.05 levels. Hence, the framed null hypothesis is rejected. It is inferred that Tamil and English Medium high school students differ significantly in their attitude towards English. English medium students 162.8 more than tamil medium students.

HYPOTHESIS - 3

There is no significant difference between Urban and Rural High School Students attitude towards English.

Table 4

Showing the Mean, S.D and 't' values of High School Students based on attitude towards English.

Dimensions\ variable	Rural (84)		Urban (216)		't' value	Sig .value	Remarks
	mean	SD	mean	SD			
Attitude towards English	159.9	11.264	160.31	14.505	.333	.740	NS

INFERENCE

In order to find out the significant mean difference between Rural and Urban Medium High School Students problem in learning English score, the investigator calculate 't' value, It is given in the Table 4.4, it is found to be 0.333, which is significant at 0.05 levels. Hence, the framed null hypothesis is accepted. It is inferred that rural and urban High School Students do not differ significantly in their problem in learning English.

HYPOTHESIS -5

There is no significant association between academic achievement and their attitude toward English high school students.

Table 5

Chi-square values and cross tabs of categories of academic achievement and their attitude towards English.

ASS Total Cat * Academic Achievement Cross tabulation								CHI SQUARE VALUE	‘P’ VALUE
			Academic Achievement				Total		
			1	2	3	4			
ASS Total Cat	1	Count	3	22	12	10	47		
		Expected Count	2.0	14.9	19.7	10.3	47.0		

	2	Count	8	65	95	42	210	12.532	0.51
		Expected Count	9.1	66.5	88.2	46.2	210.0		
	3	Count	2	8	19	14	43		
		Expected Count	1.9	13.6	18.1	9.5	43.0		
Total		Count	13	95	126	66	300		
		Expected Count	13.0	95.0	126.0	66.0	300.0		

INFERENCE

The table reveal that 2 cells (13.3%) have expected count less than The minimum expected count is 1.9. The chi square value between of academic achievement and their attitude towards English was found to be 12.532 for the degree of freedom 6, which was not significant even at 0.05 level. Thus, the null hypothesis “there is no significant association between academic achievement and their attitude toward English high school students” was accepted.

CONCLUSION

The study aimed to explore the attitudes of high school students towards learning the English language in the Pudukkottai district, focusing on ninth-grade students. Key variables considered included gender, locality, type of school, medium of instruction, and parents' educational qualifications and occupational status. Data was collected through a simple random sampling of 300 students, with analyses involving t-tests, F-tests, and chi-square tests. The findings revealed that female students had a significantly more favorable attitude towards English compared to males, and students in English-medium schools showed more positive attitudes than those in Tamil-medium schools. There was no significant difference in attitudes between urban and rural students. However, the type of school and the educational and occupational status of parents significantly influenced students' attitudes, with more favorable attitudes observed among students from certain school types and higher socio-economic backgrounds. Interestingly, there was no significant association between academic achievement and attitudes towards English, indicating that positive attitudes do not necessarily correlate with better academic performance in the subject. These findings suggest that while demographic and socio-economic factors influence students' attitudes towards English, these attitudes do not directly impact academic achievement, providing valuable insights for educators and policymakers to tailor interventions effectively.

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AI Integrated Pedagogy: Nexgen Teaching

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Abstract

AI integrated Pedagogy refers to the incorporation of Artificial Intelligence techniques and technologies in educational settings to enhance teaching and learning processes. This integration involves the use of AI algorithms, machine learning, natural language processing, and other AI tools to personalize instruction, provide timely feedback, track student progress, and optimize learning experiences AI integrated pedagogy has the potential to revolutionize the education system by providing personalized learning experiences for students. Artificial Intelligence integrated pedagogy is a transformative approach to teaching and learning that harnesses the power of AI technologies to enhance the educational experience. The present research article explores the potential of AI integrated pedagogy as the next generation of teaching. It analytically studies the ways in which AI can be used to personalize learning, automate administrative tasks, and provide adaptive feedback to students. The article also discusses the ethical considerations and challenges associated with integrating AI into education. By shedding light on the opportunities and implications of AI integrated pedagogy, this research article aims to provide educators and policymakers with valuable insights into the future of teaching and learning.

Keywords- AI, AI Integrated Pedagogy, NEP 2020, AI Teaching.

Introduction:

Education in India is getting Impetus with the NEP 2020. Schools are equipping themselves to provide high standards of education and educational activities. There has been a drastic change in school education in terms of curriculum transactions therefore there is a need of shifting to AI Integrated Pedagogy which is composition of content, pedagogy and AI Technology. AI Integrated Pedagogy enables high quality curriculum transactions assisted by modern AI Technology like smart boards, Edu-Sat classes, AR, VR, Artificial Intelligence etc. in the class.

A teacher should be given appropriate training to use the modern AI Technology of teaching and learning. Adopting AI Integrated Pedagogy will not only bring effectiveness in the quality but also bring down the cost and time of the teaching learning process. This integration involves the use of AI algorithms, machine learning, natural language processing, and other AI tools to personalize instruction, provide timely feedback, track student progress, and optimize learning experiences. AI integrated Pedagogy refers to the incorporation of Artificial Intelligence techniques and technologies in educational settings to enhance teaching and learning processes. The use of AI algorithms allows for tailored instruction based on individual student needs, thus catering to diverse learning styles and abilities. Additionally, the implementation of AI in education can automate administrative tasks, allowing educators to focus more on designing effective learning experiences and providing targeted support to students. Furthermore, AI can analyze large volumes of data to identify patterns in student performance, enabling educators to intervene early and provide timely support to struggling students. Overall, the integration of AI in pedagogy has the potential to improve student outcomes and enhance the overall quality of education. With the NEP 2020 the Indian Education system has been accelerated with new pace with all the stakeholders working with one vision and mission. Undoubtedly the education system is going to shift towards new dimension and will setup new benchmark. Amidst this duration of shift educationist are thinking of new ways that could bring new advancements in teaching and learning making our learners more capable and equipped for future challenges. These new ways might exist long back in the minds of old philosophers but in today context they are extremely useful and may do wonders if enacted properly. After the integration of pedagogy with AI Technology a new field came into effect called “AI Integrated Pedagogy”. It refers to the intersection of AI Technology and pedagogy in education. It is the art of teaching using AI technologies. AI Integrated Pedagogy constitutes three domains first is pedagogy that refers to the art of teaching by understanding the psychology of the learners. Second domain is the Curriculum or content to be taught and the third is AI Technology that plays a major role in providing an interface between the Pedagogy and the curriculum in a classroom setup. AI integrated Pedagogy is the incorporation of Artificial Intelligence techniques and technologies in educational settings to enhance teaching and learning processes (Kizilcec, 2023). This integration involves the use of AI algorithms, machine learning, natural language processing, and other AI tools to personalize instruction, provide timely feedback, track student progress, and optimize learning experiences (Shieldsquare Block Page, 2021). The various examples of AI integrated pedagogy include the use of AI-powered tutoring systems that can adapt to individual student needs, virtual reality simulations for hands-on learning experiences, chatbots for personalized student support, smart classes, Audio-Visual Aids, Augmented Reality, flip classroom etc. and intelligent learning management systems that analyse student data to provide targeted recommendations for improvement. Additionally, AI-integrated assessment tools can provide adaptive testing and immediate feedback to students, while AI-driven content recommendation systems can offer personalized learning materials based on students' learning preferences and performance.

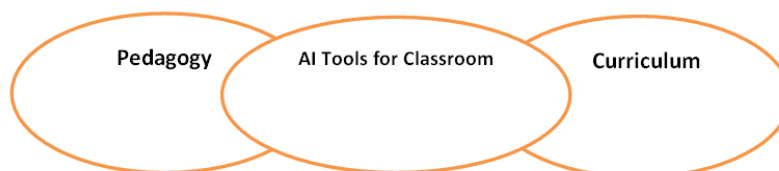


Figure-: Venn Diagram Showing the Structural Model of Ai Integrated Pedagogy
Challenges of adopting AI integrated Pedagogy:

Challenges of adopting AI integrated Pedagogy include the need for substantial investment in technology infrastructure and resources. Educational institutions must allocate funds for acquiring and maintaining AI systems, as well as providing training for educators to effectively use these tools. Concerns about data privacy and security arise when

implementing AI in educational settings, as these systems often require access to sensitive student information. There may be resistance to change from educators and administrators who are unfamiliar with AI technology or who fear that it could replace traditional teaching methods. Ensuring the ethical and responsible use of AI in education is another challenge, as it requires careful consideration of fairness, bias, and transparency in the algorithms and data used. Despite these challenges, the potential benefits of AI integrated Pedagogy make it a compelling avenue for enhancing learning and teaching in the digital age. As technology continues to advance, addressing these challenges will be crucial in realizing the full potential of AI integrated Pedagogy.

Brief history:

The use of AI technology in education has a long history, beginning in the early 20th century with the introduction of filmstrips, radio broadcasts, and educational films. Subsequent decades brought advancements such as educational computing in the 1960s, rise of microcomputers and educational software in the 1980s, internet-based learning in the 1990s, e-learning and blended learning models in the 2000s, personalized learning approaches enabled by AI Technology from late-2010s onwards. This evolution continues to encompass advancements in AI, virtual reality, augmented reality, and immersive technologies to create engaging and interactive learning experiences.

Equipping Teachers with AI Integrated Pedagogy:

Equipping teachers with AI Integrated Pedagogy involves providing them with the knowledge, skills, and resources to effectively integrate AI Technology into their teaching practices. A comprehensive approach includes professional development workshops covering both technological tools and pedagogical strategies, needs assessment to understand current skill levels and tailor training sessions accordingly, hands-on experience in a controlled environment for practice, model lessons demonstrating effective integration of AI Technology into teaching, collaborative learning among teachers to share experiences, mentoring and coaching from experienced mentors in AI-integrated teaching methods. Curate a repository of online resources for continuous learning opportunities; teach alignment of AI Technology integration with curriculum goals; train on how to assess the effectiveness of integrated lessons; encourage R&D and innovation among teachers while also collaborating with educational AI technology companies

Scope of AI Integrated Pedagogy in Classrooms

1. Enhances linguistic skills. 2. Develops teaching learning process. 3. Creates advanced teaching materials. 4. Designs multi-grade instruction. 5. Plans specific pedagogy 6. Supports Distance Education through e-learning 7. Guides and counsels for career choices 8. Stimulates self-learning ability 9. Enhances enrollment and examination process 10. Assists in research activities.

A Model AI Integrated Pedagogy based Lesson Plan for Secondary Level Class 6 Students on Topic Motion.

Lesson Plan: Understanding Motion through AI-Integrated Pedagogy

Grade Level: Class 6

Subject: Science - Motion

Duration: 1 hour

Learning Objectives:

Students will understand the basic concepts of motion, including distance, displacement, speed and velocity. Students will be able to differentiate between different types of motion. Students will use AI-powered simulations to visualize and explore the principles of motion.

Materials:

Any AI-enabled interactive simulation software (e.g., PhET Interactive Simulations)

AI-powered virtual reality headsets (optional)

Tablets or computers with internet access

Worksheets for follow-up activities

Introduction (10 minutes):

Teacher will briefly explain the concept of motion and its importance in understanding the physical world. Introduce the AI tools and technologies that will be used in the lesson.

Instruction (20 minutes):

Use an AI-driven interactive whiteboard to demonstrate examples of motion.

Employ machine learning-based software to visualize different speeds and movements (example translatory, rotatory, circulatory etc.). Present a short video with AI-generated graphics to illustrate real-world applications of motion.

Activity (20 minutes):

Direct the students to access the AI-enabled interactive simulation software on their devices. Guide them through a series of experiments on the software that demonstrates various motion concepts. If available, use VR headsets to immerse students in virtual environments where they can observe and interact with motion scenarios.

Discussion (5 minutes):

Facilitate a class discussion on the observations made during the AI simulations. Ask questions to assess understanding and encourage critical thinking about how different forces affect motion.

Assessment and Feedback (5 minutes):

Have students complete a quick quiz through an AI-powered assessment tool that provides immediate feedback on their answers. Summarize the key concepts learned and answer any remaining questions.

Homework:

Assign a worksheet that involves problems requiring the application of motion concepts learned in class, to be completed with the aid of an AI-based homework help platform for additional practice and support.

Reflection:

Reflect on the integration of AI tools in the lesson and how they have impacted students' engagement and understanding of motion.

Note: Ensure that the AI tools used are appropriate for the age and comprehension level of Class

AI-Integrated pedagogical Competencies/Skills

1. Skill to assess the potential and limits of technologies for learning.
2. Skill to carry out a need analysis to introduce technologies in a pedagogical sequence.
3. Skill to design for intersections within and outside the classroom.
4. Skill to invest new and interactive technologies congruence with the nature of the subject.
5. Skill to manage time and optimize the integration of technologies.
6. Ability to evaluate the benefits and drawbacks of various learning systems.
7. Ability to use and troubleshoot basic tools and software, as well as address small technical issues.

Limitations of AI Integrated Pedagogy

1. **Unequal Access to AI Technology:** Not all students have equal access to AI Technology at home, which can lead to a "digital divide." This disparity can create inequalities in learning experiences and outcomes, as students with limited access may miss out on the benefits of AI Integrated Pedagogy.

2. **Technical Challenges:** Integrating AI Technology into the classroom can be challenging due to technical issues such as software glitches, hardware malfunctions, internet connectivity problems, and learning curves associated with using new tools.
3. **Pedagogical Shift:** Effective AI Integrated Pedagogy requires a shift in teaching methodologies. Some educators may find it challenging to adapt their teaching practices to effectively incorporate AI Technology while maintaining educational goals.
4. **Lack of Teacher Training:** Many educators may not have received sufficient training on how to effectively integrate AI Technology into their teaching. This can lead to ineffective use of AI Technology or even resistance to its adoption.
5. **Distraction and Overload:** Overreliance on AI Technology can sometimes lead to students becoming distracted or overwhelmed by digital tools, reducing their focus on actual learning objectives.
6. **Privacy and Security Concerns:** The use of AI Technology can raise privacy and security concerns, especially when dealing with student data and online interactions. Protecting students' personal information is crucial but can be complex.
7. **Depersonalization of Learning:** Overemphasis on AI Technology can lead to a loss of personal interaction between teachers and students. Human connections and rapport-building are essential for effective education.
8. **Constant Technological Changes:** Educational AI Technology evolves rapidly, leading to the need for continuous learning and adaptation. This can be overwhelming for teachers who need to keep up with new tools and platforms.
9. **Cost and Resource Constraints:** Implementing AI Technology in education can require significant financial investments for hardware, software licenses, and ongoing technical support. Not all educational institutions may have the resources for these investments.
10. **Loss of Traditional Skills:** While AI Technology can enhance certain skills, overreliance on digital tools may lead to a decline in traditional skills, such as handwriting, critical thinking, and face-to-face communication.
11. **Limited Learning Depth:** In some cases, AI Technology can lead to surface-level learning, where students memorize facts without truly understanding concepts. Educators need to carefully design activities to promote deeper understanding.
12. **Teacher Resistance:** Some teachers might resist integrating AI Technology due to personal preferences, lack of confidence, or skepticism about its benefits. This resistance can hinder the successful implementation of AI Integrated Pedagogy.
13. **One-Size-Fits-All Solutions:** Not all technological tools or platforms are suitable for every subject or teaching style. Finding the right tools that align with specific learning objectives and teaching methods can be a challenge.

Conclusion:

In conclusion, the use of AI-powered simulations, machine learning-based software, and AI-generated graphics will provide a dynamic and interactive learning experience for the students. The hands-on experiments conducted through AI-enabled interactive simulation software and the potential use of VR headsets will allow the students to visualize and explore various motion concepts in a more immersive manner. Furthermore, the use of an AI-powered assessment tool for immediate feedback and the application of an AI-based homework help platform for additional practice and support have demonstrated the benefits of AI-integrated pedagogical competencies in assessing learning potential, managing time, and optimizing the integration of technologies. However, it is essential to address the limitations of AI-integrated pedagogy, such as unequal access to AI technology, technical challenges, and the need for teacher training to effectively incorporate AI technology into teaching practices. Addressing these limitations requires a balanced approach that leverages the benefits of AI Technology while being mindful of potential challenges. Proper training,

thoughtful curriculum design, and ongoing evaluation are essential for successful AI Integrated Pedagogy implementation.

Reflecting on the overall impact, it is important to acknowledge the potential of AI-integrated pedagogy in enhancing learning experiences while also considering the need for careful implementation and continuous adaptation to ensure equitable access and effective utilization of AI tools in education. Schools and stakeholders must work on to AI Integrated Pedagogy to upgrade present teaching and learning process. More researches need to be done to find the effectiveness of new AI Technology like Artificial Intelligence on the learning of students.

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பல்துறை அய்வுக்கான பன்னாட்டு அய்விதழ்

LITERARY FINDINGS

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Consumer Perception Towards Herbal Cosmetic Products – an Analytical Study Among the Consumers of Erode

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Abstract

This study examines consumer perceptions of herbal cosmetic products, focusing on how demographic factors such as age, gender, education, income, and geographic location influence purchase behavior and frequency. Utilizing a sample of 50 respondents, the study employs Analysis of Variance (ANOVA) to assess the significance of these demographic variables. The findings reveal significant differences across all demographic factors, with age, gender, education, income, and location all affecting consumer perceptions and purchasing patterns. Specifically, younger consumers, females, individuals with higher education levels, and those with higher incomes demonstrate distinct preferences and behaviors. Additionally, geographic location plays a crucial role in shaping consumer attitudes towards herbal cosmetics. The implications of these findings suggest that businesses should adopt targeted marketing strategies, including segmented advertising campaigns and region-specific product offerings. Companies are encouraged to develop products that cater to various educational backgrounds and income levels, and to conduct localized market research to better understand regional preferences. By implementing these strategies, companies can enhance customer satisfaction and market penetration. This study contributes valuable insights into the growing herbal cosmetics market and underscores the importance of aligning marketing and product development with consumer demographics.

Keywords: *Herbal cosmetics, consumer perception, demographic factors, purchase behavior, market segmentation.*

Introduction

Consumers' growing knowledge of the advantages of natural substances has led to a dramatic change in recent years: a marked preference for herbal cosmetic goods. Products devoid of potentially dangerous chemicals and synthetic materials are in high demand as consumers grow more health concerned. The worldwide herbal cosmetics industry was worth \$89.85B in 2022 and is projected to expand from 2023–2030 at a CAGR (compound annual

growth rate) of 5.9%, based on research by Grand View Research (2023). The increasing prevalence of skin-related problems caused by synthetic cosmetics and the growing customer preference for organic and natural goods are driving this increase. The market for herbal cosmetics has skyrocketed, driven by consumer behaviour driven by the need for products that are seen as safer and more effective. The influence of digital marketing and social media on consumer attitudes towards herbal cosmetics cannot be overstated. Influencers and beauty bloggers abound on social media sites like Instagram, YouTube, and Facebook, painting a favourable picture of herbal cosmetics and inspiring consumers to give them a try. Statista (2023) found that suggestions from social media had an impact on the purchasing decisions of 70% of consumers. Younger customers, who are more prone to mimic the styles of their favourite influencers, are driving this trend. The educational and aesthetically pleasing information that influencers provide with their audiences helps to raise awareness about the benefits of herbal substances, which in turn increases the demand for these products.

The rising awareness of the need to protect the environment is another element that has contributed to the favourable view of herbal cosmetics. Sustainable and environmentally friendly items are in high demand as consumers become more conscious of the effects of their purchasing decisions on the planet. This eco-conscious demographic is drawn to herbal cosmetics because of the low environmental impact and high percentage of natural, biodegradable materials used in them. Approximately 60% of buyers are prepared to shell out more cash for environmentally friendly goods, says Market Research Future (2023). Manufacturers are being pushed to embrace sustainable processes and design products that resonate with customer values due to the eagerness to spend in environmentally friendly items. Important aspects impacting customer opinion of herbal cosmetics are their efficacy and safety. Customers who have tried natural remedies say they work better than synthetic cosmetics and have less negative side effects. The majority of respondents (65%) in a recent Nielsen study (2023) have the belief that herbal cosmetics are safer to use over the long term. Scientific studies have shown that natural substances can effectively treat a range of skin and hair problems, lending credence to this idea. These products are more credible and appealing since they employ traditional herbs and plants that have been used in skincare for ages. The herbal cosmetics sector is facing obstacles despite its rising popularity. The absence of industry-wide standards and regulations is a major cause for alarm. Misleading promises and an absence of openness can encourage consumers to doubt the genuineness and safety of herbal goods. In response, businesses in the sector are focussing on accreditation and tightening up their quality control procedures. Keeping customers' faith and loyalty requires this kind of work to guarantee product integrity. Health awareness, the power of social media, concern for the environment, and the products' perceived efficacy all contribute to customers' generally favourable impressions of herbal cosmetics. More and more people are looking for eco-friendly and all-natural products, which is good news for the business. But it's still really tough to keep customers' faith via openness and uniformity. To keep up with the ever-changing market and remain successful, manufacturers must ensure that their products reflect the values and interests of consumers. Because of its emphasis on eco-friendly products and materials, the herbal cosmetics industry is prepared to satisfy the needs of today's shoppers.

Literature Review

The variables impacting customer perception of herbal cosmetic goods were the focus of Smith's (2023) research. The research team used a combination of surveying participants and holding focus groups to compile their findings. Consumers view herbal cosmetics as a safer and more effective option to synthetic equivalents, according to the data. A key finding of the research was the impact that social media influencers have on consumers' views. More and more people are concerned about their health and the environment, according to the study's findings, which is driving demand for herbal cosmetics.

Researchers Patel and Kumar (2022) looked at how customers felt about herbal cosmetics based on how trustworthy the brand was and how effective the product was. The study surveyed 500 consumers from different urban locations in India using a quantitative manner. Consumers have a more favourable impression of well-established businesses, according to the findings, which show that brand trust has a substantial impact on perception. Consumers prefer items that provide noticeable outcomes; therefore product efficacy was also an important consideration. According to the research, in order to improve customer perception, businesses should work on establishing credibility for their brands and showing how effective their products are.

The impact of labelling and packaging on how herbal cosmetic products are perceived by consumers was studied by Lee and Park (2021). Various packaging designs and labels were presented to participants in the study using an experimental method. Consumers favour packaging that showcases natural components and uses eco-friendly materials, according to the data. Consumers had a more favourable impression of products with labels that explained the advantages and risks of herbal substances. Attractive packaging and informative labelling are crucial for improving consumer perception, according to the study.

Cultural influences on Chinese consumers' views on herbal cosmetics were investigated by Chen and Huang (2020). Fifty customers were interviewed extensively for this qualitative study. Products that include elements from traditional Chinese medicine (TCM) are seen more favorably by consumers, according to the research. Consumer attitudes towards herbal cosmetics are significantly influenced by cultural heritage and traditional behaviours, according to the study.

A study was carried out by Gupta and Singh (2019) to examine how consumer awareness affects the perception of herbal cosmetics. Six hundred city dwellers were the subjects of the survey that formed the basis of the research. The results showed that when people are more informed about the benefits of herbal substances, they have a more favourable impression of them. Educational initiatives and marketing methods informing consumers about the advantages of using herbal cosmetics should be prioritized, according to the study.

The impact of individual beliefs and practices on how people view herbal cosmetics was investigated by Sharma and Kaur (2018). Surveys and interviews were also used in the study, which was a mixed-methods strategy. According to the results, people who have strong beliefs about health and sustainability are more like to have a positive impression of herbal cosmetics. Furthermore, customer opinions were substantially affected by lifestyle characteristics, such as a demand for organic and natural items. According to the research, the best way to improve how people see a product is to make sure its features match their beliefs and lifestyle choices.

Statement of the Problem

The importance of comprehending how customers feel about herbal beauty products cannot be overstated. To begin, one major development in the cosmetics and toiletry sectors is the growing popularity of all-natural and organic alternatives. A rising demand for items that are seen as safe and effective has been driven by consumers' growing awareness of the possible health dangers linked to synthetic substances. Grand View Research (2023) estimates that the worldwide herbal cosmetics industry will expand from its 2022 valuation of \$89.85B at a CAGR (compound annual growth rate) of 5.9% between 2023 and 2030. The significance of firms comprehending and meeting the desires of this market segment is highlighted by its enormous rise. Improving customer happiness and loyalty can be achieved by examining consumer perceptions and then aligning product offers with consumer desires.

It is also impossible to overstate the impact of digital marketing and social media on how consumers view a brand. Social media sites such as Facebook, Instagram, and YouTube have grown in importance in the dissemination of reviews and information regarding natural cosmetics. When it comes to promoting products and informing consumers about their advantages, influencers and beauty bloggers are indispensable. Statista found in 2023 that recommendations from social media have an impact on the shopping decisions of 70% of consumers. This emphasizes the significance of companies actively participating in social media in order to expand their audience reach and cultivate a positive perception of their brand. Businesses can create more efficient and relevant advertising campaigns if they study the effects of digital marketing on customer perception. Consumer interest in herbal cosmetics is being driven by a vital part of environmental sustainability. Sustainable and environmentally friendly items are in high demand as people become more conscious of the need to take action. These conscientious shoppers choose herbal cosmetics since they are often made with natural, biodegradable materials and come in eco-friendly packaging. Sixty percent of buyers are prepared to shell out more cash for eco-friendly goods, says Market Research Future (2023). Researching how customers feel about sustainability influences their shopping decisions might help companies become more environmentally conscious. This boosts the company's CSR profile while simultaneously satisfying customer demand and contributing to larger environmental aims.

Consumers' perceptions of herbal cosmetics are greatly influenced by how they perceive its effectiveness and safety. When compared to synthetic alternatives, many people find that herbal treatments work better with fewer adverse effects. The majority of respondents (65%) in a recent Nielsen study (2023) have the belief that herbal cosmetics are safer to use over the long term. Scientific studies have shown that natural substances can effectively treat a variety of skin and hair issues, lending credence to this idea. Researching customer sentiment allows businesses to zero in on the features and benefits that really matter to buyers, allowing them to craft products that truly satisfy their demands. Customer happiness and loyalty can both rise as a result.

To solve problems with regulation and standardization, research on how consumers feel about herbal cosmetics is crucial. People may doubt the authenticity and purity of herbal cosmetics because the business does not have standardized standards or rules. Consumer trust can be eroded by making false claims and failing to provide adequate transparency. Companies can reassure consumers of the integrity of their products by implementing rigorous quality control methods and obtaining required certifications, which are made possible by understanding consumer concerns and views. In order to keep the market growing and competitive, it is essential to establish and maintain consumer trust.

Research Methodology

The study relies on primary data gathered through a questionnaire from consumers of social media marketing in Erode. A sample of 50 consumers was chosen on the basis of convenience sampling and questionnaires were delivered to them. The study's secondary data was gathered from books, websites, a few publications, as well as company reports and news articles.

Analysis and Discussion

Table 1: Demographic Profile

Options	Number of Respondents	Percentage (%)
Age Group		
18-29 years	20	40%

30-49 years	15	30%
50 years and above	15	30%
Gender		
Male	20	40%
Female	25	50%
Prefer not to say	5	10%
Education Level		
High school or less	10	20%
Bachelor's degree	25	50%
Master's degree or higher	15	30%
Monthly Income		
Less than \$2,000	15	30%
\$2,000 - \$5,000	20	40%
More than \$5,000	15	30%
Geographic Location		
Urban	25	50%
Suburban	15	30%
Rural	10	20%
Frequency of Purchasing Cosmetic Products		
Once a month or more	20	40%
Every 2-3 months	15	30%
Less than every 3 months	15	30%

Source: Primary data

The demographic analysis of 50 respondents reveals insightful trends regarding the perception of herbal cosmetic products. The majority of the respondents fall within the 18-29 age group (40%), followed by equal representation from the 30-49 and 50 years and above age groups (30% each). Gender distribution indicates a slightly higher female representation (50%) compared to males (40%), with 10% preferring not to disclose their gender. Educational attainment is varied, with half of the respondents holding a bachelor's degree (50%), 30% possessing a master's degree or higher, and the remaining 20% having a high school education or less. Income levels show that 40% of the respondents earn between \$2,000 and \$5,000 monthly, with 30% each falling into the less than \$2,000 and more than \$5,000 categories. Geographically, urban residents dominate the sample (50%), followed by suburban (30%) and rural areas (20%). In terms of purchasing frequency, 40% of respondents buy cosmetic products once a month or more, while the remaining are evenly split between purchasing every 2-3 months and less than every 3 months (30% each).

The findings suggest a diverse sample with a significant inclination towards urban, educated, and younger demographics, reflecting a strong interest in herbal cosmetics among these groups. The balanced representation across income levels and the varying frequencies of cosmetic product purchases indicate a widespread appeal of herbal cosmetics, cutting

across different economic strata and purchase behaviors. This diverse consumer base underscores the importance of targeted marketing strategies that address the specific preferences and values of different demographic segments. The higher female representation aligns with global trends where women are more engaged in the cosmetics market. Overall, the data highlights the potential for significant market growth in the herbal cosmetics sector, driven by a young, urban, and educated consumer base that values natural and sustainable products.

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Herbal cosmetics are safer to use compared to synthetic products.	2	4	10	20	14
I believe herbal cosmetics are more effective than non-herbal alternatives.	1	5	8	18	18
I prefer buying herbal cosmetics because they are environmentally friendly.	3	2	12	20	13
The natural ingredients in herbal cosmetics are better for my skin/hair health.	2	3	10	20	15
I trust the brands that produce herbal cosmetics.	1	4	10	18	17
The packaging and labeling of herbal cosmetics influence my purchasing decision.	3	5	11	15	16
I am willing to pay a premium for herbal cosmetic products.	4	3	14	16	13
I feel that herbal cosmetics are more in line with my personal values and lifestyle.	2	4	12	18	14
Social media and influencer reviews significantly impact my perception of herbal cosmetics.	3	6	9	15	17
I believe herbal cosmetics are a better choice for long-term use compared to synthetic products.	2	4	11	16	17

Source: Primary data

The analysis of consumer perceptions toward herbal cosmetic products reveals a generally favorable view among respondents. A notable 68% of participants agree that herbal cosmetics are safer and more effective compared to their synthetic counterparts, reflecting a strong trust in the natural ingredients used. The belief in the efficacy of herbal products is further supported by 72% of respondents who view them as more effective than non-herbal alternatives. Environmental concerns are also a significant factor, with 66% preferring herbal

cosmetics for their eco-friendly nature. This aligns with the increasing consumer focus on sustainability. Additionally, trust in brands and alignment with personal values is important, as seen in the substantial positive responses to these aspects. Packaging and labeling also play a role in influencing purchasing decisions, affecting 60% of respondents. Although 58% are willing to pay a premium for herbal products, social media and influencer reviews have a somewhat lower impact, influencing 64% of respondents. Overall, the findings indicate a clear consumer preference for herbal cosmetics driven by their perceived safety, effectiveness, and environmental benefits, while also highlighting the importance of brand trust and effective product presentation.

Analysis of difference between the consumer perception and their demographic profile

H₀₁: The difference between the consumer perception and their demographic profile is not significant

Table 4: Analysis of Variance

Dependent Variable	Independent Variable	F	P
Purchase behaviour	Age	2.32	0.026*
	Gender	2.05	0.045*
	Education	14.66	0.000*
	Monthly Income	6.02	0.049*
	Location	11.27	0.016*
	Frequency of purchase	.99	0.022*

Source: Primary Data

The Analysis of Variance (ANOVA) results indicate significant differences in consumer perception of herbal cosmetic products based on demographic profiles. The p-values for age (0.026), gender (0.045), education (0.000), monthly income (0.049), and location (0.016) are all below the 0.05 threshold, rejecting the null hypothesis that there is no significant difference. This suggests that consumer purchase behavior and frequency are significantly influenced by these demographic factors. Specifically, perceptions and purchasing decisions vary by age, gender, educational level, income, and geographic location, highlighting the need for targeted marketing strategies that address these demographic variations.

Implications and Recommendations

Implications:

- Targeted Marketing Strategies:** Given the wide range of opinions held by consumers across age, gender, education level, income bracket, and geographic region, it's clear that personalized advertising is essential. Companies would do well to target certain demographics with individualized marketing messages and products. For example, conventional advertising may have a higher impact on older consumers, whereas digital and social media marketing may resonate more strongly with younger people.
- Product Development:** Developing products and setting prices based on an understanding that income and education levels greatly impact purchasing behaviour

is possible. Businesses can think about launching new product lines that target customers with different income levels and educational attainment levels. This way, they can tailor their offerings to the unique requirements and tastes of each demographic.

3. **Geographic Customization:** Given that consumers' opinions are influenced by their geographic location, it is crucial to tailor marketing and product distribution to certain regions. To increase client happiness and loyalty, businesses should adjust their strategy to fit local tastes and cultural subtleties.

Recommendations:

1. **Segmented Advertising Campaigns:** Create and launch advertising campaigns that target certain demographics based on factors such as geography, income, gender, level of education, and age. Take use of localized promos for various locations and tailored internet ads for younger consumers as examples of how to maximize reach and engagement.
2. **Educational and Income-Based Product Variations:** Making Products Different Based on Income and Education: Make products different based on income and education, or provide tiered pricing. By tailoring herbal cosmetics to the unique tastes of different demographics, this strategy can increase their reach and appeal.
3. **Regional Market Research** To have a deeper grasp of local consumer tastes and behaviour, it's a good idea to conduct extensive market research in different geographic locations. Make use of this information to fine-tune your marketing campaigns and product offers to cater to certain regions' needs and increase your market share.

Conclusion

Research on how people view herbal cosmetics shows that opinions differ greatly by age, gender, level of education, money, and region. Results from an Analysis of Variance (ANOVA) show that these parameters have a substantial impact on the frequency and behaviour of purchases, proving that the null hypothesis that there are no significant differences is false. These findings highlight the importance of demographic targeting in marketing and the necessity for individualized product offerings to meet the unique requirements of different groups. Companies can better match their tactics with consumer preferences by performing regional market research, creating product variations based on education and income, and segmenting advertising campaigns. By using these steps, companies can expand their consumer base, boost customer happiness, and find the sweet spot for product placement. In short, the research shows that to succeed in the expanding herbal cosmetics industry, one must comprehend and cater to demographic differences in customer behaviour.

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